2020-12

How Does Convergence Influence Cluster-Based Economic Growth in Regions?

Jamie Meehan
Technological University Dublin

How Does Convergence Influence Cluster-Based Economic Growth in Regions?

Submitted by

Jamie Meehan

D15124001

Supervisor:

Professor Thomas M. Cooney

For the award of Ph.D.

Technological University Dublin

2020

How Does Convergence Influence Cluster-Based Economic Growth in Regions?

Jamie Meehan, **BB, B.Bs, M.Bus, CTE**

Thesis submitted in fulfilment of the requirements for the award of

Doctor of Philosophy

School of Marketing

College of Business

Technology University Dublin

Supervisor: **Prof. Thomas Cooney**

December 2020

Abstract

This thesis is a novel study examining the influence of convergence on cluster-based economic growth in regions. The goal of which is to provide exploratory insights from both national and international perspectives. This research study examines the relevant literature in the fields of convergence, clusters, and regions. It then adopts ideologies from the most salient studies, to create a conceptual framework. There is limited extant literature currently available on the connection between convergence, cluster-based economic growth, and regions. An OECD (2011) report identified the importance of regions as they are the most effective place to make economic decisions. The convergence approach of moving towards equality, bottom-up growth, and co-opetition can be regarded as being imperative to the successful augmentation of a region. This research used a qualitative method (Bryman and Bell, 2015) with 30 semi-structured interviews. The rationale behind the use of a qualitative methodology (Fidel, 2008), is the limited literature available on convergence. Therefore, in order to understand how convergence influences cluster-based economic growth in regions, it is essential to conduct a qualitative study and analysis (Rocha, 2004).

Case study examples were taken from an Irish region, a recipient of the European Entrepreneurial Region (EER) award in 2019 and regions with strong cluster connections. In support of these cases, the first-ever EU Cluster Acceleration Bootcamp programme forms part of this research study which included specific cluster expertise. Therefore, an examination of the Shannon region in Ireland, the Principality of Asturias in Spain, Galicia in Spain, Northern Ostrobothnia in Finland and the first-ever European Union Cluster Acceleration Bootcamp in Frankfurt (Germany) are incorporated. This research study addresses the relationship between convergence and cluster-based economic growth in regions. An exploration of the emergent findings also contributes to both extant practice and the future foundations of cluster research. The analysis of the data and the emerging findings can assist policymakers when designing supportive cluster processes. The key findings presented here will expose the influence this research has on theory development, policy, educators, practitioners and overall implications for future research.

Declaration

I certify that this thesis which I now submit for examination for the award of PhD is entirely my own work and has not been taken from the work of others, save and to the extent that such work has been cited and acknowledged within the text of my work.

This thesis was prepared according to the regulations for graduate research of the Technological University Dublin and has not been submitted in whole or in part for another award in any other third level institution.

The work reported on in this thesis conforms to the principles and requirements of the TU Dublin's guidelines for ethics in research.

TU Dublin has permission to keep, lend or copy this thesis in whole or in part, on condition that any such use of the material of the thesis be duly acknowledged.

Signature: Jamie Meehan Date: 14/12/2020

Acknowledgements

A massive thank you to all who supported me throughout this journey; without your guidance, love and inspiration this achievement would not have been possible.

To my beloved son, Grayson - you can conquer anything in life that you put your mind to. I love you dearly and watching you grow up has brought such happiness and meaning to my life. I am so proud to be your Daddy! ‘Always Smiling’!

“*Showing gratitude is one of the simplest yet most powerful things humans can do for each other*.” —Randy Pausch

Abbreviations

The following table describes the various abbreviations and acronyms used throughout the thesis.

Abbreviations	**Meaning**
BAHEP	Bay Area Houston Economic Partnership
BMW	Border Mid-West
CAA	Cork Airport Authority
CAREC	Central Asia Regional Economic Cooperation
CEB	County Enterprise Board
CIP	Competitiveness and Innovation Framework Programme
COSME	Competitiveness of Enterprises and Small and Medium-Sized Enterprises
DAA	Dublin Airport Authority
DEBI	Department of Enterprise, Business and Innovation
DJEI	Department of Jobs, Enterprise and Innovation
EC	European Commission
ECCP	European Cluster Collaboration Platform
ECEI	European Cluster Excellence Initiative
EEA	European Enterprise Awards
EER	European Entrepreneurial Region
EGF	European Globalisation Fund
EI	Enterprise Ireland
EIB	European Investment Bank
EIF	EU Investment Fund
ENF	East Northern Finland
ESCA	European Secretariat for Cluster Analysis
EU	European Union
FDI	Foreign Direct Investment

FICYT	Foundation for the Promotion of Applied Scientific Research and Technology in Asturias
GDP	Gross Domestic Product
GEM	Global Entrepreneurship Monitor
HEI	Higher Education Institutes
IASC	International Aviation Services Centre
ICT	Information Communication Technology
IDA	Industrial Development Authority
IDEPA	Economic Development Agency of the Principality of Asturias
IOT	Institutes of Technologies
LEO	Local Enterprise Office
LIT	Limerick Institute of Technology
LQ	Location Quotient
MIC	Mary Immaculate College
MNE	Multinational Enterprise
NBVC	Non-Broadcast Visual Communication
NPF	National Planning Framework
OECD	Organisation for Economic Cooperation and Development
OKM	Ministry of Education and Culture
R&D	Research and Development
R&I	Research and Innovation
RED	Regional Economic Development
REG	Regional Economic Growth
RES	Regional Economic Strategy
RESS	Regional Economic and Social Strategies
RIS3	Research and Innovation Strategies for Smart Specialisation
RSES	Regional Spatial and Economic Strategies
SFADC	Shannon Free Airport Development Company
SFI	Science Foundation Ireland
SFZ	Shannon Free Zone

SIDC	Shannon International Development Consultants
SME	Small Medium Sized Enterprises
TA	Thematic Analysis
TEA	Total Early-Stage Entrepreneurial Activity
TheCAP	Cluster Acceleration Programme
UL	University of Limerick
US	United States
USA	United States of America

Table of Contents

Table of Contents

Tables and Figures

List of Tables

List of Figures

Introduction Chapter

Introduction to the Thesis

INTRODUCTION TO THE THESIS

Introduction

This chapter will provide an overview of this thesis which aims to explore and understand the 'influence of convergence on cluster-based economic growth in regions'. This is achieved through semi-structured interviews using the triple-helix actors' approach (industry-academia-government) within four regions, in conjunction with the first-ever European Union Cluster Acceleration Bootcamp, in order to extensively explore the research question. The findings of this work are presented in Chapters Six and Seven, while Chapter Seven will further outline the rationale for the key research question pursued in this thesis. The methodology and interpretation of data is discussed. There is also a synopsis of each chapter, the purpose of which is to familiarise the reader with the composition and direction of this thesis.

Rationale for This Work

The rationale behind this thesis is based in the lack of investigations into the topic of convergence and its influence on cluster development in regions. The convergence approach has been around since the mid-20th Century, yet it has failed to receive a large amount of academic attention, in comparison to the similar topic of agglomeration (Pérroux, 1955 – see Section 1.4 in Chapter One). The decision to concentrate on this knowledge gap within literature surrounding clusters, regions, entrepreneurship and economic geography, was further motivated by the researcher's interest and background in the area. Having grown up in a rural region, an acknowledgement for these areas seeking growth opportunities was apparent. Having lived, worked, and studied in several different national and international contexts, the author observed certain constants. These constants were in relation to how clusters are developed and their influence on regional economic growth potential. This research is the result

of the researcher's travels, encounters with actors of various nationalities and operating in various cultural contexts.

In addition to the researcher's background, convergence can be regarded as an existing field of study which requires further exploration due to a distinct lack of theory underpinning this approach (Antonescu, 2014). The possible influence of convergence on cluster-based economic growth in regions has been overlooked and the decision to concentrate on this knowledge gap was motivated by the suggestion of Antonescu (2014). She stated that convergence (bottom-up growth), as a cluster approach in its current form, explores less developed regions as the 'catch-up' effect to more developed regions. Yet a more modern collaborative approach of working together may be required for regional economies (Crossman, 2019; Delgado et al., 2011). However, this contradicts some earlier views of cluster approaches. Primarily, a top-down governmental backing of regional economic growth and cluster development being the focus (Oakey, 2007; Oakey et al., 2001; Dunning, 2001). The European Union (having 1,061 clusters mapped, with 3,000 statistical industry clusters represented), more specifically the Shannon region in Ireland, Asturias and Galician regions in Spain, Northern Ostrobothnia region in Finland and the first-ever EU Cluster Acceleration Bootcamp in Frankfurt (Germany) represented an opportune contextualisation for the examination of the influence of convergence on cluster-based economic growth in regions (ECCP, 2019).

With convergence forming the theoretical lens for this research study (Chen, 2017), definitions of convergence by Porter (2003) and Delgado et al. (2010, 2011, 2014) are vital. It appears their definitions of convergence are the most succinct. They are based on related industry sectors and businesses (SMEs) which come together and share their resources, infrastructure and comparable technologies to form partnerships and alliances that create a successful cluster (Porter, 2003; Delgado et al., 2010, 2011, 2014). The act of moving towards equality and high

levels of collaboration between the triple-helix actors (Etzkowitz, 2002; Etzkowitz and Zhou, 2017) are key areas of convergence. There is an emphasis on bottom-up (Feser, 2006) collaboration as an enabler of growth, for a regional economy (Etzkowitz, 2002). In addition to this, there is scant literature currently available on: (a) Exploring whether there is a presence of convergence; and (b) The influence of convergence on cluster-based economic growth in regions. The overall combination of these influences made the topic of this thesis a natural selection. While regional disparity issues in economic policies and strategies provided research potential which, arguably made this work more interesting. The following chapters aim to provide a clear understanding of the true nature of convergence, and its overall influence on economic growth in regions, through clusters.

Positioning this Research

The basis of this work is to conduct interviews with triple-helix actors (Industry, Academia and Government) across the Shannon region in the Republic of Ireland, the Principality of Asturias in Spain (European Entrepreneurial Region Award Winners 2019), Galician region in Spain, and the region of Northern Ostrobothnia in Finland. All regions have strong traditions in clusters and are in periods of regional change (Ec.europa.eu., 2019). The specific focus on these regions is due to their economic similarities with the Shannon region, their recent EU Committee of The Regions EER award-winning status, and to learn from examples of international Good Practice. Castro et al. (2010, 2011) stated that 20–40 participants as part of a doctoral thesis would suffice and Ragin (1987) suggested that two-three people should be interviewed per case study. 30 triple-helix participants were included in total supported by Castro et al. (2011). These are broken down as follows: 9 participants from academia, 8 from government and 13 from industry (see Table 6.2 in Chapter Six).

The main research aim of the study is to better understand ***how does convergence influence cluster-based economic growth in regions***. This includes bottom-up growth in collaboration with academia, government and industry, all in aid of the development of the region. The exploration of the influence of industry, academia, and governmental bodies over the growth of the regions involved is presented. Furthermore, an assessment of the levels of collaboration between the triple-helix participants is an important facet of this research study. The overarching aim of this study is the development of a regional development model (see Figure 7.2) which explores specific areas of clusters, convergence, entrepreneurship and regional policy. This model will act as a national and international benchmark for regional development, from a bottom-up perspective.

The application of convergence, cluster, and region theories may provide an empirically sound approach to other disciplines devoid of literature, in developing a framework. Doing so will allow for the gaps in knowledge to be prioritised, and for previously untouched themes to emerge by answering the research question. As such the principal contribution of this work is the development of a conceptual framework derived from data collection and existing literature. The theoretical proposition of this thesis was mainly informed by the field of entrepreneurship. However, several other disciplines related to clusters and regional studies were also mined.

Research Question and Approach

Through the identification of research gaps and the process of reflexive oscillation with the literature, a research question emerged. The central question asked in this work is:

'*How Does Convergence Influence Cluster-Based Economic Growth in Regions*?'

The overall question sought to assess the perspectives of participants concerning convergence. Following this a conceptualisation of its influence, on cluster-based economic growth in regions, was sought. While there is a large scope of within this area of research, due to the limitations of this study, only those questions which are in most in need of an answer, can be addressed. To answer the research question, *How Does Convergence Influence Cluster-Based Economic Growth in Regions*?' a qualitative methodology is adopted, with data collection based around semi-structured interviews. The rationale for the use of a qualitative, semi-structured approach is the strong evidence from the literature review suggesting that a qualitative approach is best for *"describing, interpreting, contextualising and gaining in-depth insight into specific concepts or phenomena* (Milles and Huberman, 1994; Saunders, et al, 2012)". As mentioned, this research question seeks to: (1) Explore whether there is a presence of convergence; and (2) The influence of convergence on cluster-based economic growth in regions. The second of these objectives necessitates the first and therefore should precede it. This will allow for the development of a framework in order to organise and interpret the literature while providing a tool for data generation.

As this work has advanced, an initially foggy set of research questions have become increasingly more defined and bound. What began as an initial exploration of models of business incubators and business clusters, became focused on conceptualising the connection between convergence, cluster-based economic growth and regions. Furthermore, an advantage of this qualitative approach is that the reality of what occurred in the data is reflected in the research question – flexibility and focus combined to support an organic research process. Generating the research question in this work has been an iterative process, following several revisions the key areas being researched emerged.

Rationale for Adopting a Qualitative Approach

Qualitative studies are less likely to abide by a set formula or method as they aim to address and answer specific questions concerning a certain region or cluster (Chung and Tibben, 2006; Foghani et al., 2017). The decision to use a qualitative data collection approach for this research study was since traditional quantitative data collection methods are unable to make a necessary allowance for feelings and emotions (Rosenfeld, 1997). Bryman and Bell (2015) have criticised qualitative research for being too reliant on the subjective interpretations of researchers and as the conditions from which the data was collected is difficult to replicate or generalise. Despite its limitations, qualitative research was adopted as quantitative methods are normally best suited to large statistical studies and census projects (Saunders et al., 2016). Rocha (2004) argued that humans shape their institutions by means of ideas and we change the world around us through action/interaction by finding links between real-life applications of what we learn. One of the qualitative research's strengths is its ability to document ordinary events in their natural surroundings (Saunders et al., 2016).

Qualitative research is often exploratory (Glaser and Strauss, 1967; Crabtree and Miller, 1999; Patton, 2002) and aims to generate new insights using inductive (theory development) rather than deductive (theory testing) approaches which are often used in quantitative studies (Trochim and Donnelly, 2008). Semi-structured interviews lie between both ends of the paradigms. This is since they have a predetermined set of questions, nonetheless, they permit a high degree of flexibility to ask new questions or remove existing ones and let new ideas transpire during the discussion. Rocha (2004) argued that further research is required surrounding clusters regarding how to best define and measure them using qualitative techniques. A renowned qualitative cluster study is Saxenian's (1994) study of Silicon Valley and Route 128. Furthermore, Rosenfeld (1997) maintained that to overcome the drawbacks of each methodology, there is a common accord in the literature that to identify clusters, it is

essential to conduct a qualitative analysis. While the human factor may seem to be a weak facet of the qualitative approach, the rich data that it provides has been, without doubt, its greatest strength (Miles and Huberman, 1994).

Thesis Structure

The purpose of this section is to give an overview of the entire document and an indication of the overall narrative of the work. This section aims to provide an efficient and effective preview of this work. The structure used is common throughout business management literature and its sister disciplines. There is a comprehensive literature review, followed by a discussion of the methodology and there is a discussion of the findings and analysis. In addition to this, occasionally the text will link to information which can be found in the appendix where appropriate.

In the concluding section of this work, the findings will be analysed in Chapters Six. Chapter Seven will provide information regarding how a framework can be created to illustrate how convergence can influence cluster-based economic growth in regions.

Table i: Thesis Structure

Thesis Approach
Introduction
Chapter One: Understanding Convergence
Chapter Two: Cluster-Based Economic Growth
Chapter Three: The Role of Convergence and Clusters in Regions
Chapter Four: Regional Profiling Contextualisation
Chapter Five: Research Methodology
Chapter Six: Research Analysis and Findings
Chapter Seven: Conclusions and Recommendations
Source: Adapted from Literature Review by Author

The literature review seeks to address three important areas and questions, each built upon the answer to the last: Chapter One - Understanding Convergence; Chapter Two - Cluster-Based Economic Growth; and Chapter Three - The Role of Convergence and Clusters in Regions. The literature discussed in these three chapters identifies the urgency for work in this area. It provides a framework for understanding the subject and makes the methodological path clear for the advancement of this subject. The literature review produces the connection between all three theories which are used as a framework for the generation, analysis and interpretation of the data. Chapter Four represents the various regions that form the contextualisation of this research study and helps in positioning the literature review.

Chapter Five discusses the qualitative methodology and justifies the use of the interpretive paradigm for this work. The limitations of this research are also discussed to offer a balanced and insightful context for the interpretation of the data which follows in Chapters Six and Seven. Chapter Six presents a conceptualisation of convergence – enriching the framework which was utilised in this work and building a theory of which convergence influenced cluster-based economic growth in specific regions. Chapter Six also addresses the relationship between convergence and cluster-based economic growth in regions, exploring the emergent findings and contributing to both extant work and the future foundations of cluster and region research. Chapter Seven will conclude by summarising the key findings and outlining what contribution of this research is to theory development, policy, educators and practice, along with its implications for future research.

Chapter One – Understanding Convergence

Chapter One aims to review and critically discuss the theoretical development of the field of convergence. For the purpose of this research study, the definitions of convergence by Porter (2003) and Delgado et al. (2010, 2011, 2014) are most pertinent. Related industry sectors and

businesses (SMEs) come together and share their resources, infrastructure and comparable technologies to form partnerships and alliances. Generally, academic theories concerning convergence have stressed their attention to the '*catch-up'* effect, which focuses on less developed regions making substantial strides to 'catch-up' with rich regions (Antonescu, 2014). Monfort (2008) suggested that a convergence process explores less-developed regions which 'catch-up' on the richer ones (Pérroux, 1955, pp. 307-340). This concept will be further explored through the case study comparison in Chapter Four. Less developed regions can achieve growth and 'catch-up' with developed regions if organised and competent institutions are developed (Galor, 1996; Gaspar, 2012; Soukiazis and Cravo, 2008), thus emphasising the importance of convergence.

Given that convergence requires increased levels of collaboration, it can be said that trust is a key factor to support the enhancement of convergence economies (Saxenian, 1994; Maskell, 2001). Feser (2006) and Brown (2006) have suggested that the bottom-up (convergence) approach is suitable in small regions, which comprise of only a few export industries because the existence of clusters will be more apparent to identify. One might posit that this can be regarded as a key literature finding. On examination of the literature, cluster and regional studies fail to address convergence at a significant level and therefore further exploration is required (Crossman, 2019; Winston, 2019; Albu, 2016; OECD, 2018). There is a growing interest among economists in disparity and development across regions, where spatial dimension plays an integral role. After an extensive review of the current literature surrounding convergence, it could be posited that further research is required around: (a) Convergence within an economy vs. convergence across economies; and (b) Convergence in terms of growth rate (Islam, 2003). Arguably, everyone benefits from the process of coming together, but challenges can arise if industries or organisations miscommunicate.

Chapter Two - Cluster-Based Economic Growth

Chapter Two explores cluster-based economic growth and the overall consensus is that it is an ambiguous area with various interpretations. This has been addressed in this chapter in order to provide a clear understanding of these topics. This study has discussed the theoretical and empirical evidence surrounding business clusters and examined various approaches within the business cluster environment both from a national and international context. Ketels (2015) stated that cluster-based economic growth can be regarded as a market-based tactic to the development of economic policy which cultivates new roles for governments as well as firms, along with universities, research institutions, trade associations and the like (Ketels, 2004; Porter, 1990).

According to Czamanski and Czamanski (1977), Streit (1969) and Richter (1969) despite the prominence of the cluster phenomenon, the problem of how to identify a specific cluster has still not yet been adequately resolved. It can be said that creating the necessary conditions and contexts under which clusters are formed is not an easy task. For the purpose of this study, the most pertinent cluster definition can be regarded as being that of Porter (1990, 1998, 2000, 2003) and Ketels (2003, 2013) due to their holistic nature and their reference to 'geographical location' and 'inter-related' activity as drivers of business cluster development. This chapter began by exploring the origins of cluster theory, which is grounded in agglomeration (Marshall, 1890) and localisation (Weber, 1929; Hoover, 1937) literature. On examination of the current cluster literature, geographical location, enterprises, support organisations and the regional activity/engagement are fundamental factors that contribute to the prosperity of clusters. Ketels (2015) argued that with the presence of strong regional and economic clusters comes *prosperity* (e.g. employment generation, increase in wages), *entrepreneurship enhancement* (e.g. development of new firms and survival of existing firms) and *structural change* (e.g. the emergence of new clusters).

Chapter Three – The Role of Convergence and Clusters in Regions

Chapter Three examines the role of convergence and clusters in regions. On review, there is a consensus that regions do matter to economies. An important finding as part of an OECD (2011) report has identified that regions matter as they can be described as the most effective place to make economic decisions. They are the place where all stakeholders have a robust interest in a positive result. The convergence approach of moving towards equality and collaboration can be regarded as being imperative to the successful augmentation of a region. Audretsch and Keilbach (2005) and Fritsch and Mueller (2007) have backed this perspective from the OECD (2011) report stating that a region is a place where such stakeholders can understand where their key strengths are, as well as how they can collectively engage with each other to improve their outputs.

The definition that Abdullah et al. (2015) provided for the term '*region*' is the most pertinent to this research study. This is as it focuses on the resources available and the economic activities that stimulate the development of a region. In understanding regional economic growth theory, and the role of convergence in business clusters, the consensus is that these concerns require further investigation. For convergence and business clusters to thrive, similar factors (see Figure 3.13 in Chapter Three) are required. As such, they need to be included in an entrepreneurial regional environment (Burton, 2015; Lowe, 1993). One could suggest that this is a unique finding that supports the theoretical study of how business cluster convergence could enhance regional economic growth (REG).

Chapter Four – Regional Profiling Contextualisation

Chapter Four outlines the various regions which form the contextualisation of this research study, with an emphasis on their socio and economic profile. How they relate to the research question is also addressed. The outcome of this chapter will be to outline the various regions

which have been included to form the contextualisation for this research study. The rationale for the selection of these regions will be discussed to illustrate their importance to this research study and the key factors behind their inclusion. As previously mentioned, each region will be examined in terms of their historical context, development of their social and economic backgrounds, and their regional economic growth. This will be in conjunction with an economic analysis position, business cluster analysis and a discussion on what the future may hold for that region. The regional contexts that are addressed in this research are the Shannon region in the Republic of Ireland, The Principality of Asturias in Spain, The Galician region in Spain, and the region of Northern Ostrobothnia in Finland. This in conjunction with the first-ever EU Cluster Acceleration Bootcamp in Frankfurt (Germany). The comparison of the four regions shows that smart specialisation strategies have been important policies in regional development particularly in Asturias, Galicia, and Northern Ostrobothnia. However, there has not been a smart specialisation strategy implemented specifically for the Shannon region in the Republic of Ireland as the approach has been nationally focused.

As previously stated, the first-ever EU Cluster Acceleration Bootcamp in Frankfurt (Germany) was selected to form part of this research study. This included 20 participants consisting of cluster managers, cluster experts, cluster policymakers, academics and cluster practitioners. Arguably, the Bootcamp served as a source of expert information and as it was the first of its kind in the European Union, it can be regarded as an excellent opportunity to learn international best practices in regard to cluster development (Dragomir, 2020). Furthermore, one might suggest that understanding more about practical cluster approaches to regional economic growth and the management process involved, along with learnings from the EU Cluster manager of the year are an effective undertaking (Clusters of change, 2020; Provadis-hochschule.de, 2020).

Chapter Five – Research Methodology

Chapter Five outlines the methodological considerations required for carrying out this research. Here the research question is developed. The rationale behind the adoption of a qualitative semi-structured interview approach is debated and methodological decisions are justified. The sampling strategy is explained, and the research design and instrumentation are discussed. The study focused on an international regional community and adopted an objective, in-depth micro approach, using a small data sample (Cunliffe, 2006). To gain a better insight into the participant's activities, the interviews were conducted in the professional environment of the participant's. The interviews lasted around an hour, contingent on the experience and knowledge of each participant. Answers were audio-recorded, and consent forms were signed by the participants. The generation and analysis of data are discussed with attention to the software tools used in supporting these processes. Due to the research being exploratory and dependent on a small sample data, the study adopts a qualitative methodology based on the 'thematic analysis approach' (TA) devised by Braun and Clarke (2006) and a cross-case comparison study (Neville, 2007; Yin, 2008). The flexibility involved in using TA in data analysis was appropriate as it examines theories and selects themes based on an empirical data set. The controls for the research evaluation, transferability, and quality are discussed to ensure the standing and value of this work.

Chapter Six – Research Analysis and Findings

Chapter Six highlights the analysis engaged this work and the research findings, concerning the advancement of convergence influencing cluster-based economic growth in regions. In this chapter, the described methodology and thematic analysis is applied to the research question. The data is organised and analysed using the NVivo software. Results will then be compared with the findings in the literature review. This chapter concentrates on addressing the research

questions by intrinsically examining the data collated, and highlighting the most important nodes, which are aligned with this research study. Each of the participants' profiles (see Table 6.2) have been demonstrated along with how the process of working with the data unfolded. Furthermore, the data sets were collated, organised and analysed using the NVivo software programme to extract the key findings that the participants solely instigated and then graphically represent the findings. Finally, it was concluded that the three nodes of: (1) People; (2) Triple-helix; and (3) Clusters (see Figure 6.21 in Chapter Six) were the most referenced, therefore it can be posited that these are the most fundamental fields to explore and implement when trying to answer the research question 'How Does Convergence Influence Cluster-Based Economic Growth in Regions'. One can propose that there are others to explore which have been illustrated in Tables 6.3-6.5 which are also important, but these three have been referenced by the 30 participants as being the core nodes.

Chapter Seven – Conclusion and Recommendations

Chapter Seven will set out the recommendations following-on from the key findings from three actors: Academia, Industry, and Government. Conclusions and recommendations will be derived whilst chapters Five and Six present the data based on an automatic exchange with the relevant literature in Chapters One, Two, Three and Four. The concluding chapter answers the research question. The purpose of this chapter is to draw together the key theoretical implications of the findings presented in this work. The findings presented will assist entrepreneurs, policymakers and those who support them in their entrepreneurial processes. The theoretical, policy, and practical contributions are outlined in this chapter. Derived from the conceptual framework and data analysis (see Figure i), firms formed a critical part of the components thematic area. This could serve as an avenue to delve into further by exploring the connection between firms, convergence, cluster-based economic growth and regions. The

fields of convergence, cluster-based economic growth and regions have future research and economic growth potential if the right **people**, **triple-helix** environment and **clusters** are developed. This in line with a bottom-up approach while moving towards equality is embraced. This work concludes with recommendations for future research and suggests priorities for further work in the field.

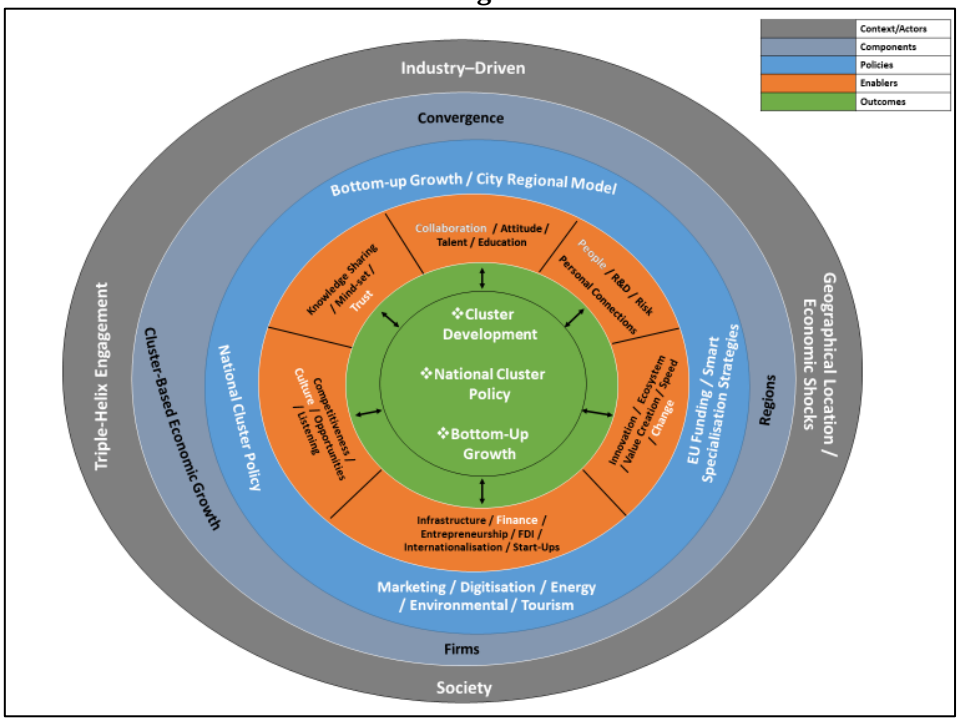
Thesis Contribution

The principal contribution of this work to literature is the creation of a *framework* (see Figure i) in answering the research question. In answering the research question, the developed framework can be adapted for future studies. The aim is to highlight the presence of convergence (triple-helix bottom-up growth of moving towards equality) and to illustrate how convergence can influence cluster-based economic growth in regions. As convergence focuses on moving towards equality and the coming together of industry, academia and government (Etzkowitz, 2002; Etzkowitz and Zhou, 2017; Keating, 1999) to work together more collaboratively to improve regional economic growth (Antonescu, 2014; Feser, 2006), these are the key actors which will be explored.

The proposition of this thesis was theoretically informed by the field of entrepreneurship and by the work in many fields related to clusters and regional studies. This research contributes to addressing a knowledge gap by investigating the influence of convergence on cluster-based economic growth in regions. As discussed, the decision to concentrate on this knowledge gap was motivated by the suggestion of Antonescu (2014). She stated that convergence (bottom-up growth) as a cluster approach in its current form explores less developed regions at the 'catch-up' effect to more developed regions. However, a more modern collaborative approach of working together may be required for regional economies (Crossman, 2019; Delgado et al., 2011). Current studies have focused on global clusters of innovation (Engel, 2016), the

competitive advantage of nations (Porter, 2000) and factors of economic growth (human capital, social capital, entrepreneurship, communities, trust, bottom-up growth, working together, enterprise developments, coopetition, content/knowledge sharing, distribution, finance and cross-promotion) (Lagendijk, 1999, p 23; Dailey, Demo and Spillman, 2003; Pinoyme.com, 2011; Appelgren, 2004).

Figure i: Conceptual Framework: Convergence Influencing Cluster-Based Economic Growth in Regions.



Source: Adapted from Literature Review by Author

None of the above studies have highlighted the influence of convergence on clusters and regions. Figure i depicts the conceptual framework that illustrate the findings in this work. The research presents the context, actors, policies, components, indicators, enablers, and outcomes which have been extracted from the literature that, arguably best represent the contribution of this research study. This conceptual framework is based on the research findings, which have been built on the literature review, methodology and discussion presented in the following chapters. Arising from collated data, the specific outcomes identified are: (a) Cluster Development; (b) National Cluster Policy; and (c) Bottom-Up Growth. Thus suggesting that if

all of the factors within the five thematic areas are embraced regions may achieve positive transformation. The sparse literature and the lack of an established study on the influence of convergence on cluster-based economic growth in regions give this study a different perspective from previous work done in this emerging field of research (Pérroux, 1955; Crossman, 2019; Winston, 2019; Sakharov, 1968, 1980; Albu, 2016; OECD, 2018; Chen, 2017; Barro and Sala-i-Martin, 1991).

Conclusion

This chapter has presented a synopsis of what lies ahead in this thesis. This introduction was designed to deliver the research aims and objectives in a forthright way and to provide an overview of each chapter. The rationale behind the research topic and the factors which contributed to the selection of this field of study were also identified. The interpretive research design was made implicit by the state of existing literature on the topic. This research is framed using a model adapted from the cluster mapping process of Todeva (2011). The realities faced by regions experiencing convergence and cluster-based economic growth will be explored in the conceptualisation of a conceptual framework which will be further assessed through a qualitative methodological approach. The next chapter is the first of four literature review chapters - it reviews the field of convergence with specific attention to moving towards equality and bottom-up growth. This grounds this work in theory and identifying the boundaries of the study. The following chapter will begin the process of theory building around the connection between the three theoretical areas underpinning this research study.

Chapter One

Understanding Convergence

1. Understanding Convergence

1.1. Introduction

To investigate convergence and clusters, it is imperative to first understand their origins in economic geography. This chapter begins by exploring what is meant by **'understanding convergence'** and to use it as the lens to situate the research study. The discussion here will express the significance of the convergence models to the entrepreneurial environment. The outcome of this, which will be the development of a mapping process framework (see Figure 1.4 in Section 1.10), which highlights three key areas: (1) Theory; (2) Gaps; and (3) Opportunity. This literature review will work through relevant disciplines and upon completion, will be used in the generation, clarification and demonstration of the empirical data. Over the past decade, both convergence theory in economic geography and cluster theory in regional studies, have received increased attention as a body of research. This suggests their importance to society. This work seeks to identify any unique combination of the structures and strategy which compares convergence and cluster models. These are relevant to the underpinning of this research (see Table 1.3 in Section 1.7).

Since the turn of the 19th century, both geographers and economists have aimed to describe how economic activities are distributed over the geography of countries and regions (Palacios, 2005). Clark et al. (2003) defined economic geography as *"a sub-discipline of geography and a growing field of study in economics. It is concerned with the spatial configuration of firms, industries, and nations within the emerging global economy in all its manifestations".* In the past economic geography was concerned with the spacing and hierarchical organisation of settlements, the best locations of manufacturing and commercial activities, and how geography affects trade and communication (Clark et al., 2003). At present, economic geographic research has advanced to include some of the most significant issues in modern economics including,

"globalization, the growth, and decline of regions, innovation, and the restructuring of economic systems" (Clark et al., 2003). Furthermore, two conceptual approaches in understanding concentrations of firms and industries are: (a) Convergence, which builds on Weber (1929) and Hoover (1937); and (b) The concepts of agglomeration economies and industrial districts established from Marshall's (1890) seminal work on the analysis of external scale economies.

The theory of external economies plays an important role in cluster literature. In both cases, various types of externalities are used to explain why firms locate together. Solow (1956) focused on the financial developments for convergence to occur, whereas this research study focuses on the coming together of key actors for convergence to occur. As previously mentioned, Delgado et al. (2010) have described clusters in terms of both agglomeration and convergence (see Section 1.4). This also focuses on the coming together of firms and moving towards equality. For the purposes of this research study, equality has been defined as the process of coming together (Delgado et al., 2010).

Table 1.1: Chapter Structure

Chapter Approach
Introduction to Chapter
Historical Evolution of Convergence
Definition of Convergence
Agglomeration and Convergence Clusters
Convergence and Divergence
Growth Theories
Convergence Models
Understanding the link between Convergence and Business Clusters
Empirical Evidence of Convergence
Conclusion
Source: Adapted from Literature Review by Author

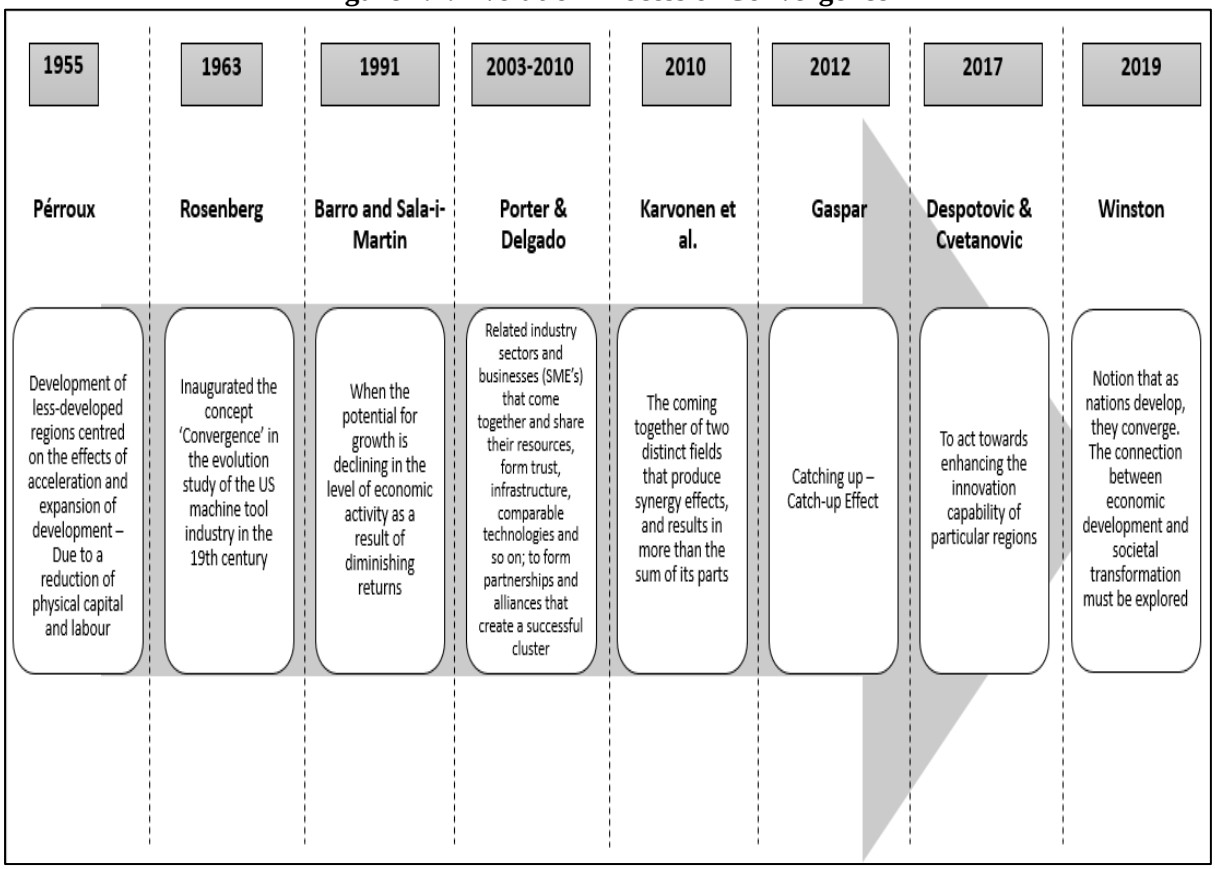
1.2. Historical Evolution of Convergence

Within the theoretical body of economic literature, *convergence* has produced scientific contributions at a regional, national and international level (Antonescu, 2014). Antonescu argued that the debate surrounding convergence and dynamics of spatial distribution have a key role in the current economic system, although the approach of these key theories requires further exploration and analysis. The terminology and definitions of industry convergence can be dated back to the early 1960s (Rosenberg, 1963), and is based on the early evolution of the US machine tool industry in the 19th century. Karvonen et al. (2010) described convergence as the process of coming together to produce synergistic effects and results in more than the sum of its parts. Economic growth and convergence are becoming popular research areas within economics, as both theories examine the welfare of nations. On examination of the neoclassical growth models, nations with lesser GDP per capita will tend to grow quicker than richer ones (Karvonen et al., 2010).

Convergence is not always confirmed. This means that economies or countries are converging, but the steady-state level is not always common, so nations may converge to their own level of steady-states (Karvonen et al., 2010). The term 'convergence' has many different interpretations (see Figure 1.1). For instance, 'catching-up' (see Section 1.3) (Gaspar, 2012). Theorists such as Sakharov (1980) have disputed that as countries develop, they begin to converge or to cultivate certain traits of other developed states. He believed that even nations that are opposite in their views on economic growth (e.g. communist and capitalist nations) will develop along the same path. Sakharov, who was a Russian dissident, human rights activist and nuclear physicist, in the 1980s, was a keen promoter of convergence. He endorsed the development of convergence as a tool to reduce strains between Russia and the US (Sakharov, 1980). On review of the current literature, the area of convergence has evolved since its initial inauguration in the 1950s to the modern era. Initially, convergence was focused on the progress

of less developed regions, centred on the effects of acceleration and development with a reduction of physical capital and labour (Pérroux, 1955). The more modern approach emphasises that as nations develop, they converge (Winston, 2019) (see Figure 1.1 below).

Figure 1.1: Evolution Process of Convergence



Source: Adapted from Literature Review by Author

Although their studies are nearly 40 years apart, both Winston (2019) and Sakharov (1968, 1980) suggested that convergence can be based on the notion that as nations develop, they will take a path to industrialisation similar to the one Western nations took. They stated that convergence examines the connection between economic development and societal transformation, which is a key aspect of this study. Figure 1.1 has been created to provide the reader with a greater understanding of what is meant by convergence and how it has evolved over the years. The evolution shows that different definitions of convergence have taken place over time based on less developed regions, potential for growth is declining, coming together

of actors, ‘catch-up’ effect and economic development. This has been a challenging undertaking due to the limited convergence literature that is currently available. Moving from left to the right on the graph, each study has referred to convergence and the ideology of economies and actors coming together. Crossman (2019) argued that convergence, from a historical and sociological perspective, is industrial systems, whether capitalist or communist, will converge in their social, political, and economic systems due to the effects of technological advancement. This perspective was initially put forward by Kerr (1960) and colleagues in the 1960s. It has also been proposed that it is the forms of technology, which are found in any given economy, which determines the nature of that society (Kerr, 1960). Nevertheless, the convergence dilemma is far from simple (Albu, 2016). Fewer wars will occur as a result of the convergence effect and developing nations will also increase their standard of living, whilst decreasing their high poverty levels. In other words, these nations will ‘catch-up’ to the industrialised nations (developed world economies), hence the term ‘catch-up’ effect. The People’s Republic of China has been presented as a classic example of the ‘catch-up’ effect, as it initially went from being one of the most underprivileged nations in the world during the 1970s to having the world’s highest GDP in 2015 (OECD, 2018). Convergence has also been used in finance and has been described by Chen (2017) as the trading activity that involves two prices that must converge or ‘overlap’.

1.3. Definition of Convergence

Winston (2019) has described convergence as nations, which *“transition from the beginning stages of industrialization to highly industrialized nations, the same societal patterns will emerge, eventually creating a global culture”*. Although, convergence occurs *“when the potential for growth is declining in the level of economic activity as a result of diminishing returns”* (Barro and Sala-i-Martin, 1991). It has also been referred to as the ‘catch-up’ effect,

as some convergence theorists such as Kenton (2018) argued that society is entering a modern era in which most countries will be industrialised, interdependent and have a homogenous culture. Alternatively, Soukiazis and Cravo (2008) argued that "*convergence between economies is defined as the tendency for the levels of per capita income, or levels of per worker product (productivity), to equalise over time which will happen only if a catching-up process takes place".* Pérroux (1955, pp. 307-340) proposed that the process of convergence is based on the development of less-developed regions which is centred on the effects of acceleration and expansion of development. He stated that the convergence of a region is the consequence of a reduction in physical capital and labour. Dynamic regional policies are critical to the economic convergence of developed regions, by those, which are less developed, and need to act towards enhancing the innovation capability of particular regions (Despotovic and Cvetanovic, 2017).

It has been proposed in extant convergence literature that lagging regions can have a high potential for growth due to a backlog of technological knowledge developed in more advanced regions (Cappelen, 2003). Nevertheless, since lagging regions are also those which obtain the most support from European sources, it may be challenging to separate the effects of 'catching-up' and regional support. Monfort (2008) defined convergence as the exploration of poorer regions which 'catch-up' on more affluent ones, the distribution evolving towards one with lower frequencies at the tails, as clearly indicated by the stationary distribution. Research has been initiated into the degree of 'catching-up' between different territories (so-called 'beta convergence') and the decrease of disparities among four regions in time ('sigma convergence').

A key insight which has emerged from this literature is that a limited process of convergence has taken place among European regions over the past four decades (Monfort, 2008). López-

Bazo (2003) believed that the following must be considered: (1) The speed of convergence differs across time; and (2) Nations undergoing rapid structural change ('catching-up') frequently face tensions between national and regional development. These tensions can be the result of new, higher value-added activities, which tend to focus initially in particular underprivileged regions so that regional disparities escalate along with national growth (Williamson, 1965). Faludi (2006) posited that the issue on whether underprivileged regions tend to 'catch-up' with better-off ones plays a noticeable role in regional economic policy (Le Gallo and Dall'erba, 2006; Eckey and Türck, 2006).

Mikulić et al. (2013) discussed the theoretical and empirical research regarding regional convergence as an area that has received attention over the last two decades. This was initially inaugurated by the studies on convergence presented in Baumol (1986) and Barro and Sala-i-Martin (1991). On examination of the current literature, the consensus is that studies surrounding convergence are mainly concerned with three well-known competitive convergence theories: (1) The absolute (unconditional) convergence hypothesis; (2) The conditional convergence hypothesis; and (3) The club convergence hypothesis.

Based on the **absolute convergence**, the per capita incomes of nations or regions converge with one another in the long-term irrespective of other initial conditions. Beta-convergence is the traditional and widely used tool for analysing the convergence hypotheses. Mikulić et al. (2013) suggested that, *"beta-convergence (β- convergence) is defined as a negative relationship between initial income level and growth rate and implies that all economies converge at the same unique and stable steady state equilibrium"*. The theoretical context for this hypothesis is found in pre-modern neoclassical growth theory, asserting that economic growth is contingent on the three main production influences: (a) Population; (b) Capital

accumulation; and (c) Technology. With increased capital in more developed regions, lower marginal returns to capital and stagnant rates of economic growth may occur.

Conditional convergence accepts that in the long run, per capita incomes of economies converge with one another if the predominant facets of those economies are comparable. The technological levels of countries or regions, their socio-demographic factors (such as academic levels and population growth) and overall institutional milieu, are the key features which are expected to be preconditions for convergence. If those features vary among economies, consequently each specific economy will tend to reach its unique equilibrium. Considering the current studies on convergence, the evidence should propose the reality of conditional convergence that if the negative relationship between initial per capita incomes and their growth rates holds, only after the possibility of the aforementioned structural features has been controlled (Mankiw et al., 1995).

Fischer and Stirbock (2004) defined **club convergence** "*as the process by which each region belonging to a certain club moves from a disequilibrium position to its club-specific steady-state position".* At the steady-state, the growth rate is the same across the regional economies of a club. Cappelen (2001) suggested that the theory of club convergence (Quay, 1996) is not pertinent in the context of standard neoclassical models as the agents are assumed to be similar. This means that there are no different initial conditions and, therefore no club convergence. Conversely, if the agents are permitted to be varied, the dynamic system of the neoclassical growth model might lead to multiple steady-state equilibrium, despite diminishing returns to capital. However, Durlauf (2001) proposed that an important constraint of the empirical analyses of cross-sectional regional growth has been that the supposition of a single steady state must hold for all the regional economies in the sample. Which is the case for absolute and conditional convergence hypotheses. Paas and Schlitte (2007) demonstrated the theoretical

basis for the convergence and divergence process. They suggested that the decline of discrepancies in income levels is anticipated due to the diminishing returns to capital. Based on the endogenous growth philosophy, policy measures can have a long-term influence on the growth rate of a country or region. While in the neoclassical model long-term growth can be recognised only by an alteration in the savings rate. Antonescu (2014) suggested a different perspective, proposing that there are three main types of convergence:

> *(1). Real convergence which pursues the elimination of gaps between countries or regions within the development level given by the income per capita and labour productivity;*
> *(2). Nominal convergence applied in the field of monetary policy and which refers to obtaining economic stability and switching to the Euro; and*
> *(3). Institutional convergence presupposes rendering compatible the institutions from the viewpoint of structures and functioning.*

Adding to conventional theories, North (1990) posited that institutions are the motivating systems of a civilisation, they can both enhance and lessen economic growth. One could argue that less developed regions can, therefore grow and 'catch-up' with developed regions. This can happen only if well-organised and competent institutions are developed (Galor, 1996; Gaspar, 2012; Soukiazis and Cravo, 2008), thus emphasising the importance of convergence. Porter (2003) and Delgado et al. (2010, 2011, 2014) considered convergence to be grounded in the understanding of related industry sectors and businesses (SMEs), which come together and share their resources, form trust, infrastructures, and comparable technologies, in order to form partnerships and alliances that create a successful cluster (Abdin, 2015; PRO-INNO Europe, 2008; Braun, 2004). For this research study, the definitions of convergence by Porter (2003) and Delgado et al. (2010, 2011, 2014) will be utilised.

It could be suggested that a significant factor surrounding the literature on the definition of convergence is the trust which influences the degree to which the actors co-operate with one another (Paniccia, 1998). Trust can be described as an important factor in a cluster as it binds

firms, which may be in competition, together. Trust may be established through repeated relational exchanges in long term relationships (Paniccia, 1998). These exchanges result in *"relationally, economically motivated structures of trust,"* (Langlois and Robertson, 1995). The networks of firms in clusters, depend upon the intangible supports of social capital and trust, which Wolfe (2009) described as *"the glue that holds the networks together"*. The concept of trust as a characteristic of clusters has been discussed by Saxenian (1994), Maskell (2001) and Rosenfeld (2005), among others.

McGrath (2008) suggested an important caveat, that trust facilitates, rather than motivates cooperation. Firms who trust each other may not form strategic relationships, yet the absence of trust for instance, in a joint venture, can inhibit the sharing of tangible and intangible resources. This in turn prevents the creation of value (Currall and Inkpen, 2000). It can be said that frequent interactions on a face-to-face basis, (which is more easily arranged in geographic proximity), is integral to the building of trust and subsequently to cluster development. Trust is a key enabling factor of convergence which will form part of the conceptual framework (see Figure 7.2) of this research study. Losing the word convergence as part of this research study would alleviate the bottom-up approach to cluster-based economic growth in regions with higher levels of collaboration and trust between the stakeholders. The convergence and cluster externalities depend upon the interaction of the cluster participants, therefore emphasising the need for the exploration of agglomeration and convergence.

1.4.Agglomeration and Convergence

Both agglomeration and convergence can influence entrepreneurship and the development of clusters. This is due to the fact that they can help new establishments grow or existing establishments enter new or unknown areas. Delgado et al. (2014) acknowledged that any

empirical investigation of the economic performance of clusters must consider two competing economic forces: *Convergence* (Barro and Sala-i-Martin, 1992) and *agglomeration*. The shortcoming of many cluster studies is that they do not investigate the true effect of clusters, but instead intrinsically examine agglomeration effects (Duranton, 2011; Wolman and Hincapie, 2015) and alleviate the study of convergence. Regions and clusters experience the effects of agglomeration externalities, which apply across firms in separate industries in learning, innovation and producing entrepreneurs (Audretsch, 1998; Henderson, 2003; Gompers et al., 2005; Glaeser and Kerr, 2009; Delgado et al., 2014). Due to higher levels of intense competition, there is also pressure on companies within clusters to achieve increased productivity (Porter, 1990; 1998a; Ketels, 2013). Inter-firm rivalry within a cluster can be common, due to the ease of comparison between local firms that have similar general circumstances.

A range of theories have been proposed to explain why some regions have higher growth rates than others. These include factor conditions, the potential for innovation and knowledge spillovers and the composition of economic activity, agglomeration effects, the social infrastructure - institutions and government policies and even geography and climate are crucial (Porter, 1990; Glaeser et al., 1992; Barro and Sala-i-Martin, 1995; Sachs and Warner, 1995; Venables, 1996; Henderson, 1997; Fujita et al., 1999; Gallup et al., 1999; Hall and Jones, 1999). O'Leary (2007) has argued that convergence comprises a productivity lapse in somewhat affluent regions such as Dublin or Mid-East and the South-West of the Republic of Ireland, with somewhat poor regions, such as the Border and the Midlands being effective at taking advantage of their 'catch-up' potential. Agglomeration (top-down) has been described as the term given to a jumbled collection or mass, whereas convergence (bottom-up) has been defined as the act of moving towards equality.

For the purposes of this research study, the convergence concept will be the main priority and further explored as one could argue that the agglomeration field is well established. Agglomeration incorporates an opposite activity on regional output and performance as O'Leary (2007) proposed that agglomeration economies are specific *"kinds of internal and external economies of scale, scope and complexity"*. It can be said that agglomeration in clusters can increase growth and sustainability levels in economic activity. It occurs from mutual relations across similar economic activities which help to raise increasing returns. Henderson et al. (1995) argued that localisation and urbanisation are two possible forms of agglomerating powers:

> *Distinguishing the impact of any of these types of agglomeration effects has been hindered because of the influence of convergence on regional growth. If both convergence and agglomeration effects are present, regional economic performance growth will reflect a balancing of the two effects, making it difficult to identify either effect in isolation. (Henderson et al., 1995).*

(a) Top-down Approach

Henderson et al. (1995) and Brown (2006) proposed that top-down agglomeration cluster analysis, comprises of an inclusive evaluation of all industries within a study region. This approach is suitable in regional economies with high industrial activity, where it is more challenging to determine what industries are most noteworthy due to the total number of industries present. Brown (2006) has suggested that by starting with a comprehensive list of all industries and potentials, the approach methodically lessens the list of industries and benchmark clusters, by a process of exclusion.

The measures for exclusion are normally maximum or minimum values for the data measurements in employment and establishments. Moreover, in less diversified economies, many industries have no existence or a suppressed presence in employment and establishment

data, which Brown (2006) has argued makes this top-down approach less meaningful (Brown, 2006). There have been many forms of agglomerations (see Table 1.2), which span various geographic scopes and industry ranges.

Table 1.2: Palacios' (2005) Key Features of Localised Industrial Agglomerations

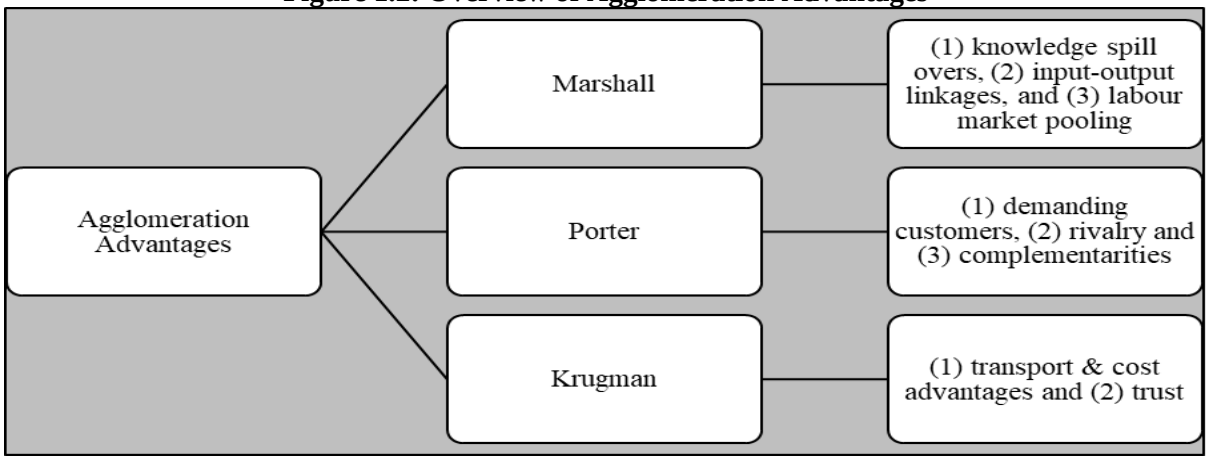
Industrial Complexes	**Industrial Districts**	**Industrial Clusters**
Geographical proximity	Geographical proximity	Geographical proximity
Innovation clustering	Innovative industrial atmosphere	Innovative milieu
Location pattern similarity	Inter-firm competition	Cooperative competition & rivalry
Locational interdependence	Inter-firm collaboration	Inter-firm alliances & partnerships
Technology similarity	External economies	External & agglomeration economies
Circular & cumulative causation	Social embeddedness	Path dependence/lock-in effects
Production & marketing interrelations	Inter-firm networking	Production linkages & networks
Sectoral specialisation (all firm sizes)	Sectoral specialisation (SMEs)	Sectoral specialisation (All firm sizes)
	Institutional thickness	Social (non-business) infrastructure

Source: Palacios' (2005)

The similarities among industrial complexes, districts and clusters provided by Palacios' (2005) shows both minor and major differences occur between the theories, but geographic proximity and interconnectedness are among the core principles of each model. According to Marshall (1920), Krugman (1991) and Porter (1990), there are many advantages associated with agglomeration and geographic proximity of firms. Such advantages have been illustrated in Figure 1.2 below. It can be argued that agglomeration is a form of clusters or 'clustering' and the advantages shown below have helped to reiterate this suggestion. Rosenfeld (1997) has suggested that "*businesses today operate in global agglomeration economies and clusters are a regional phenomenon".* It can be argued that agglomeration and convergence are core facets of clusters. This has been proposed by Todeva (2011) in Figure 2.4 in Chapter Two. Therefore,

various cluster models (see Section 2.4 and Table 2.5) have been investigated to emphasise their importance to this study.

Figure 1.2: Overview of Agglomeration Advantages



Source: Adapted from Literature Review by Author

(b) Bottom-up Approach

Feser (2006) posited that the bottom-up approach is an examination of a small number of key industry groupings or dimensions of a cluster. These are micro-level analyses used to solve explicit regional interests or policy constraints (e.g. the marine trades cluster study in Carteret County in North Carolina, USA was a bottom-up approach). Based on this study, the county communicated with *"researchers to explore a specific cluster, rather than explore for a cluster"* (Feser, 2006). Furthermore, the bottom-up approach is predominantly suitable in small regions which are only comprised of a few export industries, and due to the existence of clusters, are easier to identify (Brown, 2006). As outlined in Section 5.3 of Chapter Five, the bottom-up approach typically relies on qualitative data exploring the inner workings and inter-firm relations of a specific cluster or locality. In addition, the bottom-up approach may examine the relationships and co-operation between the actors (see Figure 3.11) in a sector to identify linkages with similar and non-similar industries (Bergman and Feser, 1999). When considering the matters which have been discussed in this section, it can be noted that the importance of

agglomeration to clusters is evident within the current literature, but 'convergence' is not. Agglomeration has been described as the term given to a jumbled collection or mass, whereas convergence has been defined as the act of moving towards equality. Convergence is an area which requires further examination and as such, will continue to form the basis of this study, although based on the examination of the current literature, divergence is a term that also requires further investigation.

1.5. Convergence vs. Divergence

Within the current body of literature, divergence is something which has been discussed throughout, however it must be differentiated from convergence. As discussed in Section 1.3. above, convergence has been referred to as the 'catch-up' effect. It has been established that when technological advancement is introduced to countries still experiencing the early stages of economic development, capital from other states may pour in to take advantage of this opportunity. These economies may become more accessible and exposed to international markets. This allows them to 'catch-up' with more advanced economies. If the opposite were to occur and no money was invested into these economies and international markets did not take advantage or identify an opportunity, thus no 'catch-up' can occur. Therefore, the economy is said to have diverged rather than converged (Crossman, 2019). Arguably, economies which experience instability are more likely to diverge due to political or social facets such as lack of educational resources, or employment generation capabilities. This suggests that convergence would not apply. Crossman (2019) proposed that:

> *Convergence theory also allows that the economies of developing nations will grow more rapidly than those of industrialized countries under these circumstances. Therefore, all should reach an equal footing eventually.*

There are numerous influences to consider in regard to the concept of convergence as it can be seen as a process and not as an effect. Appelgren (2004) has suggested that the *"effects of the process of convergence are visible, measurable and possible to detect, while the actual process might not be"*. Ross (2018) described convergence as a means of coming together, while *divergence* commonly means moving apart. The process of convergence can be purposefully intended and is influenced by market forces, trends in society and technological improvements. One might conclude that divergence is another process, also creating effects which can sometimes be similar to the effects of convergence. Gordon (2003) advocated that as one process ends, another begins. Therefore, convergence and divergence can follow after the other as well as running in parallel (Appelgren, 2004). Following this, the convergence growth theories have been explored to further this research study.

1.6. Growth Theories

Throughout the exploration of the literature surrounding convergence, the topic of growth theories has been mentioned on several occasions. Various theories have been suggested to determine why some regions experience greater growth levels than others. There is a particular emphasis on the role of conditions, the potential for innovation and knowledge spillovers, and the composition of economic activity (among others, Porter, 1990; Glaeser et al., 1992; Barro and Sala-i-Martin, 1995; Venables, 1996; Henderson, 1997; Fujita, Krugman and Venables, 1999). Policymakers and researchers have focused considerable attention on areas such as Silicon Valley which has achieved strong economic performance. This was achieved through the presence of innovative clusters of related companies and industries coming together and moving towards equality (Porter, 1990, 1998; Saxenian, 1994; Swann, 1998; Bresnahan and Gambardella, 2004).

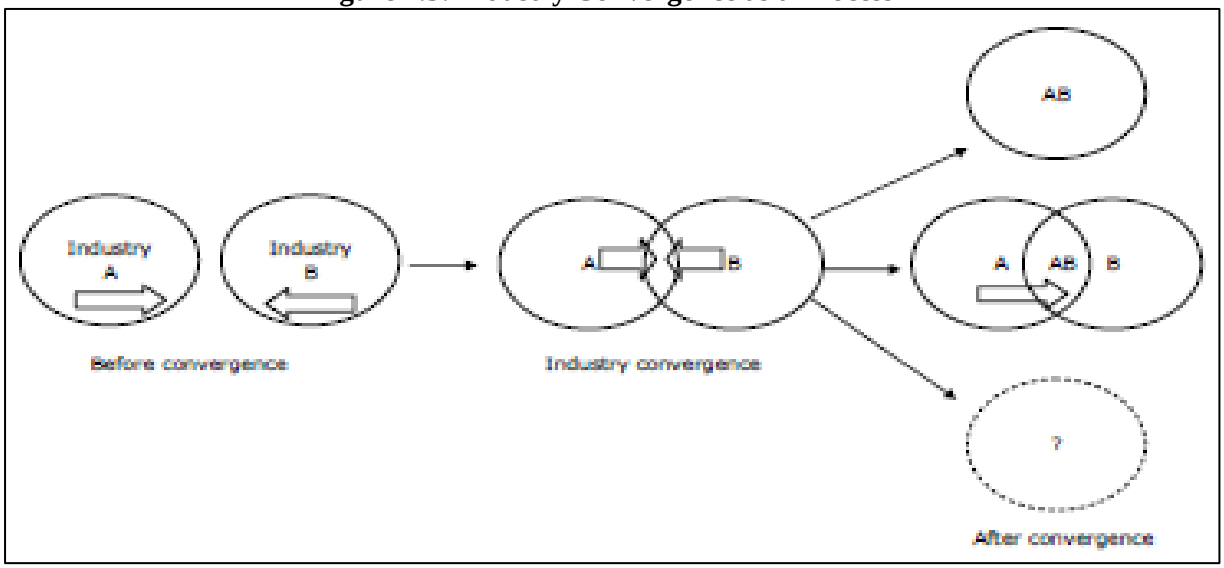
Growth theories are associated with definitions of convergence, as well. Solow (1956) has developed a model based on conditional convergence (see Section 1.3) which state that growth is due to the diminishing return of capital. This can also be explained as nations with lesser GDP tend to grow faster, although the convergence is conditional. Solow (1956) stated that financial development accelerates the convergence process. Consequently, structural variables (savings rate, population growth, exogenous growth and depreciation) must be homogenous which is rarely the case, as developing nations typically have lesser values of structural variables. However, there are many adaptations of the Solow model (e.g. Barro and Sala-I-Martin (2004) which focus on saving rates and capital mobility). Nevertheless, in all these models nations develop at an exogenous rate of technical change in the steady-state, thus the 'true growth' is not clarified (Gaspar, 2012; Sorensen and Whitta-Jacobsen, 2005). One could argue that a lack of research in this area is evidence that the concept of convergence and its effect on clusters, could be a real opportunity which requires further research.

1.7. Models and Frameworks for Convergence

When exploring the industry level of analysis models, the economic foundation of convergence exists when new developments produce, substitute and/or matching products which ultimately displace the existing product offerings and dominant approaches to the value creation of a given industry (Karvonen et al., 2010). Furthermore, they developed a model (see Figure 1.3) which represents the significance of convergence and argued that, *"a new industry segment will either replace the former segments or will complement them at their intersection"*. Lei (2000) suggested that innovations arising from one industry will frequently give rise to the development of new products. This in turn will allow new industries to absorb the features and value-adding characteristics which are the economic basis for value creation in other industries. Additionally, Bauer (2005) proposed that, "*as both processes of convergence in substitutes and*

convergence in complements unfold in parallel, it is typically very challenging to predict the overall effect of convergence". One might posit that industry sectors vary largely regarding their knowledge base and learning processes linked to innovation. Many sectors look at science as the driver of knowledge growth, while in others, learning by doing and the build-up of new innovations are the major drivers (Malerba, 2005; Weawer, 2007).

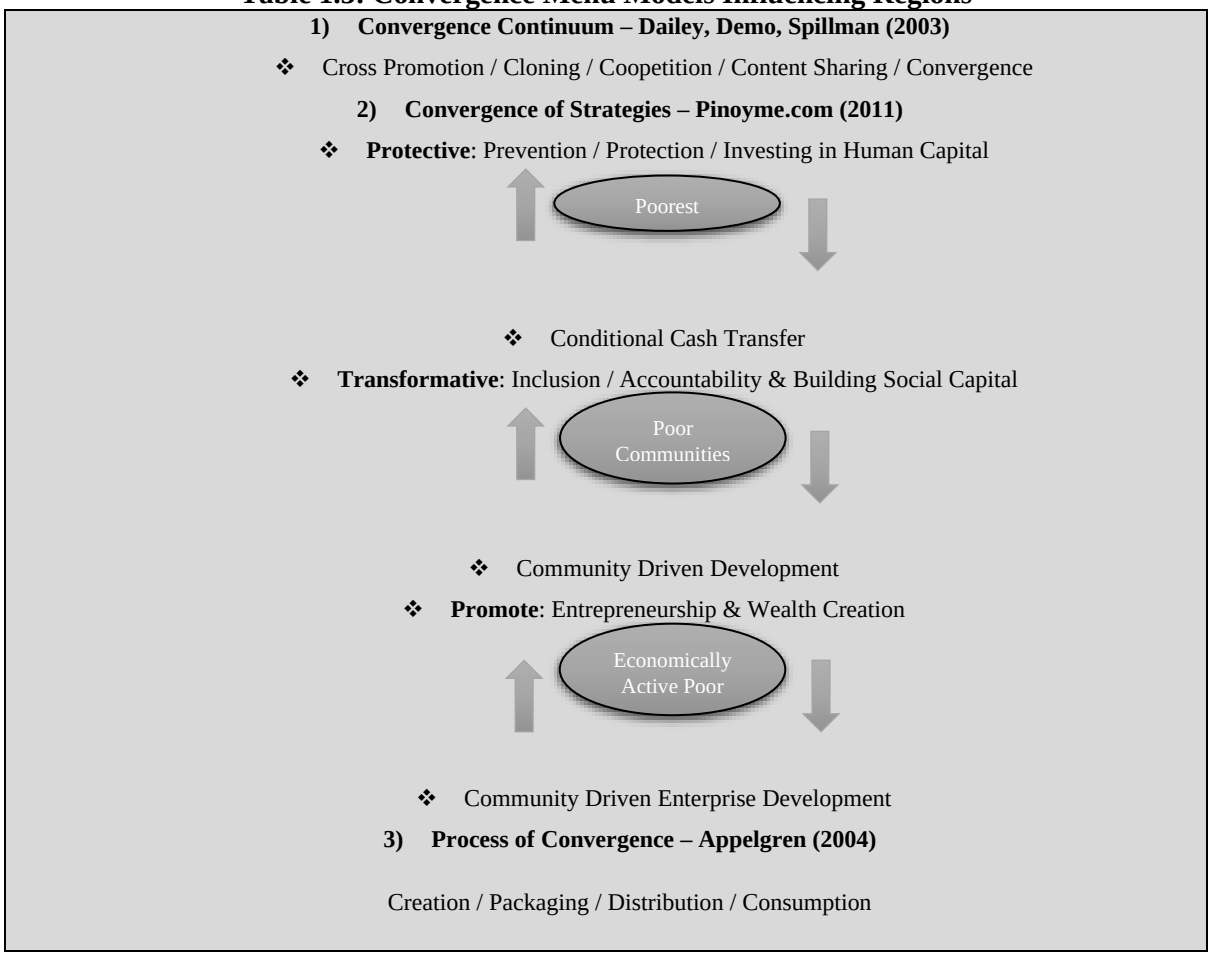
Figure 1.3: Industry Convergence as a Process



Source: Karvonen et al. (2010)

After careful review of the existing literature surrounding convergence and what models have been developed to perpetuate the concept in various economic geography or cluster studies, the specific models most pertinent to this research study have been examined. It can be said there is a lack of empirical research regarding various models of convergence. The three models have been explored in Table 1.3, arguably are the only existing models that highlight the key factors needed for convergence to occur. Firstly, Dailey, Demo and Spillman (2003) developed their perspectives on convergence with the creation of a model of convergence titled, 'the convergence-continuum'. This model has been formed due to the lack of a common, behaviour-based description of convergence and the absence of a common tool for assessing convergence effects.

Table 1.3: Convergence Menu Models Influencing Regions



Source: Adapted from Literature Review by Author

As part of their explanation, the model contains five partly overlapping areas which includes: Cross Promotion; Cloning; Coopetition; Content Sharing; and Convergence (Appelgren, 2004). Secondly, as part of the PinoyME group in Japan, the creation of a three-pronged approach of 'convergence of strategies' model was initiated which tackles the unique challenge in empowering poorer regions through three stages of development: "***(1)*** *providing the chronic poor with basic social services to;* ***(2)*** *improving the financial access of the transitional poor through community-driven development to;* ***(3)*** *supporting the entrepreneurial poor by providing credit, enhancing socio-economic skills, and developing entrepreneurial values,"* (Pinoyme.com, 2011). The third and final model was also developed by Appelgren (2004). It discussed the process of convergence encompassing four key areas: Creation; packaging; distribution; and consumption. These models (outlined above) will be examined in more detail

in the future as they will form part of the theoretical contribution of this research study. These convergence models emphasise the importance of convergence in more detail and the factors or drivers which are included within them. For the purpose of this research study, the model developed by PinoyME around convergence strategies, can be regarded as being the most pertinent. This is due to its fundamental components and holistic approach to convergence influencing regions. This model may emphasise the overarching factors required for convergence to occur. These factors include but are not limited to the need for human capital, social capital, community-driven development/enterprise development, entrepreneurship and wealth creation. Furthermore, based on current literature studies, it could be posited that this is the only model that represents convergence.

On review of Table 1.3, it can be suggested that human capital, social capital, entrepreneurship, communities, trust, bottom-up growth, working together, enterprise developments, coopetition, content/knowledge sharing, distribution, finance and cross-promotion are vital factors of convergence.

It can be said that these factors can play an integral role in the emergence and enhancement of regions and have informed the development of the thematic sheet in Appendix G. It is now an important time to explore the link(s) between convergence and business clusters.

1.8. Understanding the link between Convergence and Business Clusters

From an academic perspective, the concepts of industry and business clusters are only a quarter of a century old. However, since Porter (1990) introduced the concept of clusters, it has become one of the most popular tools in regional economic development policy. There is a consensus within the literature that clusters are accepted as an analytical concept and key policy tool by

policymakers and governments all over the world. It is utilised as a theory to achieve the aims, goals, and growth targets for industry sectors of importance at a regional or national level. Barro and Sala-i-Martin (1991) have proposed that convergence and agglomeration in clusters can increase growth and sustainability levels in economic activity. SMEs are continuously receiving specialised consideration as they are extracting and producing *"economies of convergence and agglomeration* (Delgado et al., 2010)*"*, the benefits that firms attain when locating adjacent to one another and create successful new enterprise developments. Delgado et al. (2014) has acknowledged that any empirical investigation of the economic performance of clusters must consider two competing economic forces: *Convergence* (Barro and Sala-i-Martin, 1992) and *agglomeration* (see Section 1.4). The shortcoming of many cluster studies is that they do not investigate the true effect of clusters, but instead intrinsically examine agglomeration effects (Duranton, 2011; Wolman and Hincapie, 2015) and alleviate the study of convergence.

Lagendijk (1999, p 23) suggested that regions will benefit from business cluster convergence if they cultivate resources of some kind, for example, nurture fundamental assets. Such assets can be described as infrastructures, training, education, support centres and facilities and business relationship. Further investigation is required regarding the examination of convergence and its effectiveness to business clusters, and the wider enterprise landscape. According to a journal report on 'Clusters: Sexy but Mysterious and Elusive' written by Dreyfuss (2011), identifying businesses to strategically partner and fit into the cluster development environment is not the point of the cluster approach. It is about augmenting those interrelationships to enhance growth and cluster competences. One could propose that this concept is crucial for the study of the convergence approach placing an emphasis on the existing resources and capabilities at play and improve the environment from within (bottom-up). However, Dreyfuss (2011) stated that it is not pragmatic to think that a geographic region

can, *"build, attract or initiate a cluster on its own"*. They develop from natural economic, geographical processes and advantages; not through public intervention. The local-serving and non-export firms have been identified as important facets of convergence in Delgado et al. (2010, 2014) study, which are important to a vibrant economy. They may support cluster firms and workers, and economic development policy must continue to address these industries as well. After examining these links, empirical information will now be explored.

1.9. Empirical Evidence of Convergence

Galicia underwent a process of convergence, which will be further expanded upon in Section 4.4 in Chapter Four. However, the regional development process has gone through a period of transition which ultimately led to the slowdown of the convergence approach. Rodríguez-Pose (2000) stated that during the Francoist dictatorship period and the subsequent transition to democracy, the Spanish economic landscape embraced convergence across regions (Suárez-Villa and Cuadrado-Roura, 1993; Cuadrado-Roura et al., 1999). To support this statement, regions in the southern and western Spanish borders were 'catching-up' with the more developed regions of north-eastern Spain and Madrid. However, this process of convergence came to a sudden stop in the late 1970s and early 1980s (Alcaide, 1988; Mas et al., 1995; Cuadrado-Roura et al., 1995; Cuadrado-Roura et al., 1999; Villaverde, 1999) as a more centralised urban approach was prioritised. The slowdown in convergence was not limited to Spain. Even at a European level, several authors suggested that similar exhaustion of the convergence process took place at the beginning of the 1980s (Armstrong 1995; Champion, et al., 1996; Sala-i-Martín, 1996; López-Bazo et al., 1999; Rodríguez-Pose, 1999).

Monfort (2008) presented the concept of 'the convergence of EU regions measures' and promoted a European Cohesion Policy, which was developed to, *"promote economic and*

social progress as well as a high level of employment and achieve balanced and sustainable development". A key requirement of this policy initiative is to lessen the levels of regional disparities in the development of different regions and the backwardness of the least favoured regions or islands, including rural areas. Since the policy was inaugurated and the first programming period (1989-1993), there has been a particular emphasis placed on the promotion of convergence between EU regions. This is even thought that the Cohesion Policy focuses at more than only economic convergence, the decrease of regional disparities in the level of development has mainly been assessed as the convergence of regional levels of GDP per head relative to the EU average. Consequently, this type of convergence has even become a key feature in evaluating the effectiveness of the European Cohesion Policy.

One could argue that CyberIreland is an empirical example of convergence in action in the Southern region in the Republic of Ireland. This organisation aims to bring together industry, academia and government (triple-helix context), in order to represent the needs of the cybersecurity ecosystem in Ireland. It aims to enhance the innovation, growth and competitiveness of firms and enterprises which are part of the cluster (Cyber Ireland, 2019). On review of the objectives of Cyber Ireland, it acts as a cluster organisation (see Section 2.2.5), with a cluster manager. For it to be successful, it needs to be industry-driven, fuelled by academia and backed by government. Without the co-operation of these three fundamental actors, the cluster can not reach its full potential. Taylor (2018) maintained that the governmental body which is primarily focused on attracting foreign direct investment into the Irish economy, (the Industrial Development Authority (IDA)), is funding the initial establishment phases of Cyber Ireland. However, the collaboration between the triple-helix environment (see Table 2.5) is imperative to its success. It can be posited that to achieve critical mass and long-term sustainability, Cyber Ireland must seek further bottom-up growth (see Section 1.4) through high levels of collaboration (Delgado et al., 2010, 2011, 2014).

Economies which have converged with developed nations, validating the 'catch-up' effect, have been well documented in Nakaoka's work (Nakaoka, 1982, 1987, 1990, 1994, 1996). Cases based on Japan and Mexico are two such examples in the Meiji period (1868-1912). Nakaoka further argued that in the 1960s and 1970s, the East Asian Tigers quickly converged with developed countries. These included Singapore, Hong Kong, South Korea, and Taiwan. All of which are today considered to be developed modern societies. In the post-war period (1945–1960) examples include: West Germany; France; and Japan, which were able to quickly salvage their pre-war position by exchanging wealth that was lost during World War II (Nakaoka, 1982, 1987, 1990, 1994, 1996). In Nakaoka's work, it was argued if government policies are much more powerful drivers of economic growth than facets such as outside investment. Gerschenkron (1962) indicated that governments can substitute for absent requirements to activate 'catch-up' growth. Sokoloff and Engerman (2002) developed a theory which proposed that factor endowments are an essential contributor to structural inequality which hinders economic growth in some nations. Sokoloff and Engerman (2012) suggested that nations such as Brazil and Cuba, who have rich resources such as soil and climate, are susceptible to certain sector developments with limited economic growth. It could be argued that land which is appropriate for sugar and coffee development (in areas such as in Cuba), can experience economies of scale. These begin from the creation of plantation and in turn created the small exclusive families with a vested concentration in the certain sector (Engerman and Sokoloff, 2002, 2012). The exogenous appropriateness of land for wheat versus sugar can determine the growth rate for many nations. Therefore economies with land which is appropriate for the growing of sugar converge with other nations that also have land that is appropriate for growing sugar (Korotayev and Zinkina, 2014).

Sokoloff and Engerman (2000) described this convergence approach in their article '*History Lessons: Institutions, Factor Endowments and Paths of Development in the New World'*. They

argued that the United States and Canada were originally two of the most underprivileged and poorest colonies in the New World. However, they achieved rapid growth compared to other nations as a result of their soil assets. Both Sokoloff and Engerman suggested that the United States and Canada had land appropriate for the growing of wheat. This meant they had small scale farming. Wheat, unfortunately, does not benefit from economies of scale. They argued that this led to a somewhat equal distribution of wealth and political power, supporting the population to vote for broad public education. As a result, this separated them from nations such as Cuba which had land suitable for growing sugar and coffee. Such nations did benefit from economies of scale and so had great plantation agriculture with slave labour, large income and class inequalities and restricted voting rights. It can be said that this dissimilarity in political power led to little expenditure on the creation of much-needed institutions such as public schools and decelerated their economic progress. Consequently, nations with comparative equality and access to public education grew quicker and were able to converge with nations with inequality and limited education (Engerman and Sokoloff, 2012).

Barro and Sala-i-Martin (1991) analysed 73 European regions (since 1950) and 48 USA states (since 1880) and established the presence of convergence in both examples. As part of the European Commission (2008) report on 'growing regions, growing Europe,' they explain that regions which converge have a lower GDP and employment rates than the EU average. However, it has been acknowledged within this study that construction, industry and agriculture are three pivotal sectors within convergence regions and are experiencing steady growth rates. In the USA, less developed states tend to grow faster in per-capita terms in contrast to wealthier states even if other relevant variables are not considered constant. Conversely, based on the European countries assessed, conditional convergence (see Section 1.3) was established after controlling for factors of initial productivity and the rate of technological progress.

Sala-i-Martin (1996) study encompassed Japanese regions and Canadian provinces, which established that regions tend to converge at a speed of around two per cent per year. This resulted in a decrease of interregional distribution of income over time. Rey (1998) and Tsionas (2000) have studied the convergence process in the USA, while Rey (1998) found robust configurations of global and local spatial autocorrelation, Tsionas (2000) determined that regional income in the USA has not converged over the sample period (1977-1996). They have both suggested that regional income convergence has been documented in Europe from the 1950s to the 1970s. The convergence process is less obvious after that period. Further studies such as Neven and Gouyette (1994) examined the growth of European economies in the period 1975-1990. They concluded that this growth was based on convergence trends across sub-periods and the subsets of regions. Regions in Southern Europe converged at the beginning of the period 1975-1990 and deteriorated thereafter (Lopez-Bazo et al., 1997) and fast and continuous convergence in productivity for 129 EU regions was found in the period 1983-1992. Mikulić et al. (2013) proposed that EU regional policy has a direct influence on labour productivity, but its effects on per capita GDP are not as evident.

Boumont et al. (2002) using a sample of 138 European regions over the period 1980-1995, concluded that the convergence process varies across areas and it could not be identified for northern regions, while there is proof of convergence for southern regions. Checherita, Nickel and Rother (2009) studied the convergence process and the role of financial transfers in the EU for the period 1995-2005. They argued that there has been a process of convergence across EU regions in terms of both per-capita output and income. Maleković, Puljiz, and Tišma (2011) argued that advantages exist in the context of increasing the speed of convergence inclusive of, "*the process of institution building, a more active approach in formulating national policy frameworks, and the creation of new cooperation".* Paas et al. (2007) found that convergence within each nation is strikingly more limited, although it can be found in Italy.

The general consensus is that convergence has been practised in the past, but that the approach has undergone a significant slowdown in prioritisation over the years. If interest can be generated again, regional stakeholders can come together, and work together for the benefit of their regions. Examples have been discussed in this section, which suggests that when key actors (see Table 2.5) work together for the greater good, the region can experience advancements. After exploring the empirical evidence of convergence, this research study will add to the existing literature by the exploration of convergence factors that can enable the development of less developed areas.

1.10. Conclusion

Generally, the academic theories concerning convergence have emphasised the '*catch-up' effect* (see Section 1.3), which focuses on less developed regions making substantial strides to 'catch-up' with more affluent regions (Antonescu, 2014). Antonescu argued that the debate surrounding convergence and dynamics of spatial distribution have a key role in the current economic works. However, the approach of these key theories remains inefficiently explored and analysed. Considering Monfort (2008) suggested that a convergence process explores less-developed regions which 'catch-up' on more affluent ones (Pérroux, 1955, pp. 307-340), this will be further explored through the case study comparison in Chapter Four. The importance of convergence has been assessed by the examination of less developed regions as they can achieve growth and 'catch-up' with more developed regions. This can be achieved if well-organised and competent institutions are developed (Galor, 1996; Gaspar, 2012; Soukiazis and Cravo, 2008). Given that convergence requires increased levels of co-opetition, it can be deemed important that trust is a key factor to support the enhancement of convergence economies (Saxenian, 1994; Maskell, 2001).

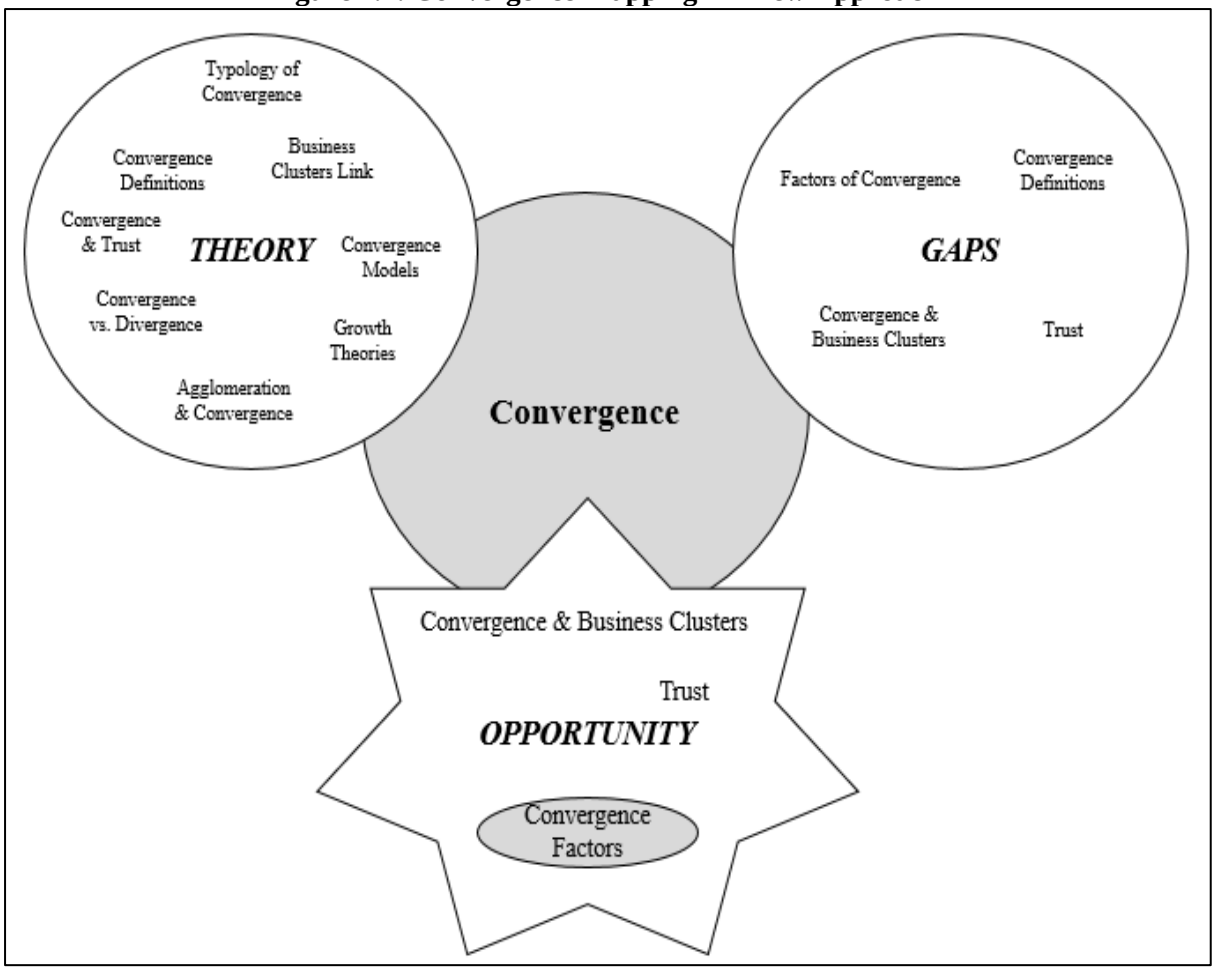
Feser (2006) and Brown (2006) have suggested that the bottom-up approach is suitable in small regions which only comprise of a few export industries. This is due to the fact that the existence of clusters will be more apparent to identify which can be regarded as a key literature finding. On examination of the literature, cluster and regional studies fail to represent convergence. Therefore, further exploration is required along with this research study. The consensus is that there is a growing interest among economists in disparity and regional development across regions, where spatial dimension plays an integral role.

For the purpose of this research study, the definitions of convergence by Porter (2003) and Delgado et al. (2010, 2011, 2014) are most pertinent. Related industry sectors and businesses (SMEs) come together and share their resources, infrastructure and comparable technologies to form partnerships and alliances.

It can be argued that the concept of convergence has become a buzzword in recent years as Jenkins (2001) discussed the confusion surrounding the definition of convergence as people try to use the theory in a multidisciplinary way, in numerous separate contexts. Based on Karvonen et al. (2010) study of converging industries, a key outcome was the need for the assessment in order to discover the presence of convergence and to further comprehend its importance in economies/regions. As discussed in Section 1.3, it can be suggested that a key finding within the convergence literature is that of Pérroux (1955, pp. 307-340) who stated that the process of convergence is based on the development of less-developed regions centred on the effects of acceleration and expansion of development. Furthermore, Pérroux expressed that the convergence of a region is a consequence of a reduction of *physical capital* and *labour*. Arising from the examination of the literature, another crucial discovery was that dynamic *regional policies* are critical to the economic convergence of developed regions by the less developed and further the need to act towards enhancing the innovation capability of regions

(Despotovic and Cvetanovic, 2017). Winston (2019) and Sakharov (1968, 1980) understanding of convergence can be regarded as an important finding as they emphasised that as nations develop, they will take a path to industrialisation like the one which Western nations took. They identified that convergence focuses on the link between economic development and societal transformation which can be regarded as being a key aspect of this research study. As previously stated, Lagendijk (1999, p 23) argued that regions will benefit from business cluster convergence if they cultivate resources of some kind (for example, nurture fundamental assets). Such assets can be described as infrastructures, training, education, support centres, facilities, and business relationships. Further examination is necessary regarding the analysis of convergence and its effectiveness in business clusters and to the wider enterprise landscape.

Figure 1.4: Convergence Mapping - A New Approach



Source: Adapted from Literature Review by Author

After the development of Table 1.3, the fundamental factors of convergence were highlighted, suggesting that human capital, social capital, entrepreneurship, communities, trust, bottom-up growth, working together, enterprise developments, coopetition, content/knowledge sharing, distribution, finance and cross-promotion, play an integral role in the growth of regions. As part of this research study, the key convergence research areas that have been examined are illustrated in Figure 1.4. This mapping process has been informed by the various sections in this chapter and will be used to contribute to the development of the theoretical framework in Figure 4.10. It can be described as a new convergence research mapping tool. Furthermore, this process has highlighted the fundamental *'convergence theoretical'* areas, the *'gaps'* in the literature which require further investigation and the key *'opportunity'* areas. These required specific attention and increased research examination in terms of forming part of the 21st Century convergence literature. This process will be further built upon, developed, and discussed further on in this thesis. After an extensive review of the current literature surrounding convergence, it can be posited that further research is required. This research could explore: (a) Convergence within an economy vs. convergence across economies; or (b) Convergence in terms of growth rate (Islam, 2003). Arguably everyone benefits from the process of coming together, although challenges can arise if industries or organisations miscommunicate. Nakaoka (1982, 1987, 1990, 1994, 1996) has debated that many criticise the theory, suggesting that endogenous facets such as government policy are much more powerful drivers of economic growth.

To conclude phase one of this journey, this chapter has emphasised the understanding of convergence through the examination of extensive literature and the creation of a new unique convergence mapping framework (see Figure 1.4) and menu model (see Table 1.3). These incorporate the necessary convergence attributes and features needed to drive economic

growth. The next chapter will go into a more in-depth analysis of cluster-based economic growth and highlight gaps in the literature which need further research.

Chapter Two

Cluster-Based Economic Growth

2. Cluster-Based Economic Growth

2.1. Introduction to Business Clusters

The previous chapter explored the literature surrounding *'Understanding Convergence'*, along with the analysis of *'Business Clusters' and 'Regions'*. These topics are the platform to continue this study. The purpose of this chapter is to discuss **'cluster-based economic growth'**. The discussion will express the significance of various approaches within the business clusters environment. Both from a national and international context to the greater enterprise environment. Like Chapter One, the purpose of this chapter is the development of a mapping process (see Figure 2.13). This will encompass the key areas of business clusters and cluster-based economic growth, pertaining to this study. Over the past decade, cluster theory has received increased attention as a body of research, thus suggesting its importance to society.

Table 2.1: Chapter Structure

Chapter Approach
Introduction to Chapter
Historical Overview and Evolution of Business Clusters
Cluster Mapping
Models and Frameworks for Clusters
Empirical Evidence of Clusters
Clusters and Entrepreneurship
Understanding Cluster-Based Economic Growth
Empirical Evidence of Cluster-Based Economic Growth
Conclusion
Source: Adapted from Literature Review by Author

Economic geographers, economists, sociologists, business management, industry practitioners, entrepreneurs, and policymakers have established an increased interest in business clusters. This interest took place throughout the 1990s. Evidence of this interest can be found in several

sources (Weiss, 1988; Porter, 1990; Pyke and Sengenberger, 1992; Saxenian, 1994; Van Dijk and Rabellotti, 1997; Steiner, 1997; Crouch et al., 2001). One might suggest that one of the core reasons for this increased interest is due to the perceived impact of clusters on firm performance, regional economic development, and overall country competitiveness (Rocha, 2004). Karlsson (2007) has claimed that a general search on the search engine 'Google' for the concept of clusters, yielded about 116 million hits in 2005 compared to 534 million results in 2020. He further stated that another search on 'Google Scholar' yielded about 1,550,000 hits in 2005, compared to 4,980,000 results in 2020. These results indicate that there is increased attention in regard to clusters. The areas which have been identified make the theoretical area of business clusters an interesting read. They form an effective literature review basis for which further research investigation can take place. The primary purpose of this study is to discuss the theoretical and empirical evidence of business clusters and to examine various approaches within the business cluster environment, from both a national and international context. The discussion in this research study will aim to express the significance of business cluster theory, models, and practice to the wider enterprise landscape. The following section has investigated the origins of business clusters literature to put the historical foundations in place.

2.2. Historical Overview and Evolution of Business Clusters

It can be argued that the presence of cluster-type organisations can be traced back to the eleventh century. Medieval guilds and craft associations developed in northern Italy (Putnam, 1993), France and Germany and associations of trader-craftsmen are documented from both medieval and early modern Europe. The craft guilds were bottom-up autonomous associations, who negotiated with the state for public recognition. These self-governed associations were optional rather than mandatory and were solely for employers or owners. Mokyr (2003) asserted that *"recent interpretations suggest that crafts responded to information asymmetries*

in thin markets with high transaction costs". Craft guilds played an important role in organisations, in financial support, in quality standards and fixing prices. These reduce information asymmetries and provide a positive contribution to the technological development of craft trades (Mokyr, 2003). Innovation came from the co-location of artisan shops in towns and industrial districts, which produced positive organisational and technological externalities, whilst technological cross-fertilisation was supported by temporary and permanent migration. The growing interest in business clusters was initially encouraged by the early efforts of Marshall (1920) and more recently by Porter (1990). Alfred Marshall (1920) began examining the area of clusters with his study on *'industrial districts'* in his book, 'The Principle of Economics.' This can be described as arguably the starting point for most of the subsequent theoretical proposals on clusters. He also stated that, *"clusters emerge because of specific benefits that firms can enjoy from locating close to others engaged in related activities"* (Ketels and Protsiv, 2013). Marshall's (1920) manuscript on economics provided the early foundations for modern theoretical approaches to clusters through analysing the geographical clustering of economic activity and business firms.

The Marshallian Triad

- Labour market pooling
- Supplier specialisation
- Knowledge spillovers

Although Marshall does not use the term 'cluster' precisely, he analysed the economic space around London. He recognised that for the purpose of the conceptual and empirical work, there are three main reasons for firms to co-locate adjacent to one another and, therefore become more dynamic: (1) Labour market pooling; (2) Supplier specialisation; and (3) Knowledge spill-overs (Cortright, 2006; Dan, 2012). Inaugurating the concept of industry clusters,

Marshall has provided a foundation for many scholars, researchers and policymakers to research, use and cultivate modern cluster theory (Motoyama, 2008).

In developed nations, knowledge spillovers amongst territorially clustered businesses have been regarded as a key driving force for innovation, learning and economic growth. This has been further outlined by Kesidou and Romijn (2008):

> *Knowledge spillovers are intellectual gains through exchange of information for which a direct compensation to the producer of the knowledge is not given, or for which less compensation is given than the value of the knowledge. Already in the Principles of Economics, Marshall (1920) points up their importance when he observes that producers in industrial agglomerations derive benefit from knowledge and ideas that are present 'in the air'. In early well-known conceptual contributions on the subject, fleshed out the idea by conceptualising clusters as 'new industrial spaces' (Kesidou and Romijn, 2008).*

Given Kesidou and Romijn's arguments, Marshall (1920) has suggested that 'input-output' (see Chapter Five) relationships between firms are one of the advantages of localised industry, since *''subsidiary trades grew up in the neighborhood, supplying the firm with implements and material, organizing its traffic, and in many ways conducing to the economy of its material".* Marshall has also suggested that the increased degree of specialisation for providers of inputs and services is due to the concentration and connectivity of firms. Linkages can be described as input-output relations among firms or industry sectors, which are in the same economy.

Furthermore, Marshall (1920) has described 'labour market pooling' as *"the local labour market which expands. Such a bigger market implies that firms and workers are better matched and are less likely to be restricted in their labour demand and supply respectively".* There has been sufficient research done to elaborate on these drivers which include, *"local demand characteristics, specialised institutions and the structure of regional business and social networks,"* (Delgado et al., 2010). Ketels (2003) has argued that, *"the reason for the increased interest in clusters is not only because they describe the economic reality, but also because*

they have become important for creating competitive strategy". Arguably in recent years, the concept of clusters has gained significant interest. It has become entrenched in the business and entrepreneurship academic fields ever since Marshall's initial study.

The Michael Porter Approach

- Related and Supporting Industries
- Demand and Market Conditions
- External Factors Conditions
- Firms Strategy Structure and Competition

It is also crucial to discuss Porter's contribution to contemporary business cluster theory. It can be argued that Porter's Diamond model (1990, 1998) remains the exemplary model for cluster development and enhancement. It has even been suggested that Porter's (see Section 2.2.1) own definition of clusters has evolved as *'collaboration'* and *'co-operation'* are now more salient instruments of his own cluster interpretation (1998, 2000, 2003). Porter (1990, 1998) described three effects of business clusters: (1) Clusters which inspire the development of new firms; (2) Stimulate innovation; and, (3) Have an encouraging impact on productivity. Supporting his evolution, both Oakey (2007) and Delgado et al. (2011) have insisted that clusters enable businesses to improve efficiency levels due to their high level of interaction, collaboration, and communication. These can come in the form of 'top-down' or bottom-up' clusters (Brown, 2000b; Lagendijk, 1999; Pamminger, 2015; Enright, 2000).

'Top-down' clusters (see Section 1.4) can be defined as the influx of a major multinational corporation, to which local businesses form around and do business with. These 'top-down' clusters are to achieve sustainability and to improve their productivity and efficiency levels (Dunning, 2001; Oakey, 2007). **'Bottom-up'** clusters (see Section 1.4) have been described as

local or regional businesses which come together to share vital resources, to better themselves, and their national and regional environments (Delgado et al., 2011).

Clancy et al. (2001) disagreed with Porter (and many other scholars). However, they argued that his operational concept is not a cluster. They have suggested that it is no more than a, *"localized concentration of linked sectors or industries, but clustering—is the particular process that leads to the development of clusters".* According to Piore and Sabel (1984) and Putnam (1993), whilst this type of network (clusters) has been around for some time, it is only in recent years that clusters and clustering have become an effective and utilised business strategy (Neven and Droge, 2000).

What has become apparent in regard to clusters, is that there is a general agreement, both within the academic and industrial context, that the competitive advantage is robustly dependent on the 'location' and the 'degree of connectivity' and 'collaboration' between the related business entities (Porter, 1998). Penttinen (1994) however, argued the converse as the importance of geographical location may be limited. Alternatively, Etzkowitz (2002) has discussed the importance of interconnected companies, governments, and institutions, which has been outlined in the 'triple-helix model' (see Table 2.5). These create new types of strategic enterprise relations within clusters for which trust is crucial. Rosenfeld (1997) pointed out that the '*geographically clustering of interconnected businesses*' and '*becoming interdependent'* are the fundamental reasons for why the existing enterprises perform more efficiently. When considering these matters, it explains why the modern world economic map is saturated with clusters and cluster activity (Porter, 1998). In addition, after the Protestant Reformation, military and economic competition between states fostered technological diffusion. Artisans from the most technologically advanced cities were attracted by financial and legal incentives.

Therefore, most migrants found themselves in guilds where they could impart their techniques to other skilled workers.

Figure 2.1: Evolution Process of Business Cluster Theory

Source: Adapted from Literature Review by Author

Another source of innovation which has been under-analysed was the protection (which is the equivalent to a modern-day patent), that crafts offered members who invented a technical 'secret.' This was in the expectation that other masters would sooner or later pick up any significant breakthroughs (Mokyr, 2003). One could argue it is apparent that many authors have examined the ever-growing business cluster area. However, in theory, in order to develop an effective literature review on cluster-based economic growth, certain scholars, have been more comprehensively examined than others. As shown in Figure 2.1, Marshall, Porter, Ketels, Oakey, Enright, Sölvell, Lindqvist, Krugman, Delgado and Stern, Lagendijk, Rocha, Sternberg, Todeva, Doyle and Bieńkowsk and Creţu are such authors. According to extant literature, there are only two primary schools of business cluster theory, which are: (1) **Marshall** and (2) **Porter**. Further discussion on these theorists will take place in the following section.

2.2.1. Definition of Clusters

To understand clusters and the way in which the business environment stimulates growth and positivity from their existence, it is important to understand the definition of clusters. Braun et al. (2005) has proposed that cluster definitions are becoming more complex due to the ever increasing examination of this literature field (Maskell, 2001; Martin and Sunley, 2003). Vom Hofe and Chen (2006) have argued that there is no single definition of a cluster, although there is plenty of literature available on the importance of geographical location, clustering of firms, institutions and industries (Asheim, 2001; Brusco, 1990; Krugman, 1995; Porter, 1990 cited in Braun et al., 2005). Skokan (2005) has suggested that the idea of the cluster is to enhance the levels of efficiency and innovation between the stakeholders within the cluster. As previously mentioned, since the early 1990s, the question of 'what a cluster is,' has received increased interest. It continues to intrigue many academics and policymakers. The cluster concept was

initially used by Porter (1990) in his work/book, *'The Competitive Advantage of Nations'* as a spin-off of the Marshallian approach. Sölvell and Ketels (2003) have described a cluster as a *"geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities"*. Similarly, Porter (2008) has described clusters as groups of companies and institutions co-located in a specific geographic region linked by interdependencies and providing a related group of products and or services (Kumral and Deger, 2008). For a more comprehensive look at Porter's definition, the description below has been included:

> *Clusters are geographic concentrations of interconnected companies and institutions in a particular field. Clusters encompass an array of linked industries and other entities important to competition. A geographically proximate group of interconnected companies, suppliers, service providers and associated institutions in a particular field, linked by externalities of various types (Porter, 1998). Clusters are a striking force of virtually every national, regional, state, and even more metropolitan economy, especially in more economically advanced countries. Silicon Valley and Hollywood may be the world's best-known clusters. Clusters are not unique, however; they are highly typical- and therein lies a paradox: the enduring competitive advantages in a global economy lie increasingly in local things-knowledge, relationships, motivation-that distant rivals cannot match. (Porter, 2003).*

Porter commented that the geographic scope of a cluster can differ in range from a single city or region, to a country, or even a network of countries. Additionally, Porter (2008) explained that clusters can take a variety of forms. However, they must involve the following: End products or service businesses; financial institutions (Wall Street in New York, USA); and businesses in related sectors. It can be argued that they regularly involve companies in the supply chain which are in a specific business channel, or those who make complementary products. When considering these matters, they can also involve specific infrastructure suppliers, government or specific training providers, education, information, research and technical support such as universities, think tanks, vocational training providers and standard-setting agencies.

Table 2.2: A Collection of Cluster Definitions

- Porter (2000) described clusters as 'critical masses of unusual competitive success in particular business areas'
- Business Clusters are rapid best practice improvements and proliferate opportunities for distinctive competitive positions (Perry, 2005)
- Clusters have been described as the amalgamation of businesses to certain geographical locations which relate to a particular business/industry sector, which will effectively improve their economic outputs due to them being connected with that milieu (Porter, 1998; 2003)
- Boja (2011) stated that clusters do not magically appear in random areas or in regions that theoretically provide the best conditions; clusters are initiated in regions where there have been previous (clusters), where a number of companies grouped and have developed economic links for collaboration or competition; also, the cluster initiative belongs to a market player.
- A cluster is a collection of enterprises which share local resources, use comparable technologies, and which form partnerships and alliances. Where clusters exist within industry sectors, they help foster entrepreneurship (Delgado et al., 2010)
- Oakey (2007) has argued that they are 'top-down' (MNEs) approaches that affect regional activity and clusters are the connectors that help new businesses become more sustainable (Keen and Etemad, 2012)
- Enright and Roberts (2001) agreed that both 'linkages and interdependencies among actors in value chains' are at the centre of the cluster concept
- Crouch et al. (2001) stated that the more general concept of 'cluster' suggests something looser: a tendency for firms in similar types of business to locate close together, though without having a particularly important presence in an area
- Clusters are here defined as groups of firms within one industry based in one geographical area (Swann and Prevezer, 1996)
- A cluster means a large group of firms in related industries at a particular location (Swann, 1998) and Clusters are conceived as broad industry groups linked within the overall macro economy (Feser, 1998)
- Rosenfeld (1997) emphasised that clusters contain 'active channels' for 'business transactions, dialogue, and communications. A cluster, therefore, is something more than a spatial concentration of firms and is based on systemic relationships among geographically bound firms
- Clusters aim to build knowledge bridges between companies and knowledge institution and to create innovation and growth within a group of companies with shared interests (Nielsen, 2013)
- Clusters are groups of specialised enterprises – often SMEs – and other related supporting actors that cooperate closely together in a particular location (Ec. europa.eu, 2016)
- A cluster is a regional concentration of related industries in a particular location. Clusters are a striking feature of economies, making regions uniquely competitive for jobs and private investment. They consist of companies, suppliers, and service providers, as well as government agencies and other institutions that provide specialised training and education, information, research, and technical support (ClusterMapping.us, 2014)
- Clusters are the amalgamation of businesses to certain geographical locations which relate to a particular business/industry sector, which will effectively improve their economic outputs (Butel and Watkins, 2006)
- Clusters can also be an improved alternative to vertical integration (involved in more than one stage of production. The Geographic proximity of a cluster improves communication and distribution as collaboration can be achieved more successfully (McHardy et al., 2005)
- Clusters are flexible networks of small and large companies that complement each other, enhanced by research, development, qualification institutions and additional centres of competence that build competitiveness thanks to close supply linkages and cooperative relationships (PRO-INNO Europe, 2008)
- Existing interaction *and* cooperation of firms (EC, 2008b). They carry marked features of both competition and cooperation. (Andersson et al., 2004)

Source: Adapted from Literature Review by Author

Government agencies which significantly influence a specific cluster can be part of that cluster (Porter, 2000). While Bieńkowsk and Creţu (2016) (see Section 2.2.1) and Penttinen (1994) (see Section 2.7), argued the converse. Table 2.2 above illustrates some of the crucial cluster

definitions that have been engendered by many different academic scholars. According to Chris Horn cited in The Irish Times (2012), *"great people with a desire to succeed help to create efficient and successful clusters"*. It can be said that the development of business clusters can only succeed by the establishment of great businesses. Horn further investigated how clusters promote both competition and cooperation, as these strategic locations of businesses try to succeed, but also work collectively to help each other.

Arguably, the term 'clusters' can be referred to as 'business clusters' (see Table 2.3). Romanelli and Khessina (2005) suggested that clusters can be clarified by the relationships and collaborations through industries and institutions which are of most significance to the competition in that region. Ffowcs-Williams (2013) made similar arguments stating that clusters are groups of independent, but related businesses, which specialise in a particular industry sector and are located in the same geographical area. On examination of most (if not all) of the scholars discussed above, geographical location, enterprises, support organisations and the regional activity/engagement, are the fundamental factors which contribute to the prosperity of clusters. It can be said that this co-location and collaboration system can stimulate innovation and competitiveness via intense interaction, which in turn can suggest higher productivity levels. The European Commission (EC) however believed different, as they have said that clusters are a source of competitive advantage in the global economy (European Commission, 2013). It suggested, therefore that the EC support their co-operation, and they promote research-driven clusters as a smarter regional economic development approach (Ffowcs-Williams, 2013). One could argue that this description alludes to clusters as embedded within regional competitiveness and that regional economic performance is enhanced through cluster activity (see Section 2.6.3). This perspective differs from all preceding definitions as it focuses more on competitive advantage and performance of regions as the key to forming clusters, rather than geographical location.

Porter's (1990, 1998b, 2000) use of the phrase 'geographic concentrations' assume s that firms and actors within clusters share some similar 'space', but Mottiar and Jacobson (2002) claimed that 'space' is open to interpretation. They argue that 'space' refers to the 'wider arena in which firms produce, and they suggested that 'place' refers to 'the local area in which firms are located'. According to Isaksen and Hauge (2001), clusters develop due to 'place' conditions. This includes items such as the availability of raw materials, knowledge within R&D organisations, and specific know-how. When considering these matters, Hudson (1999) concluded that different regions will benefit by the expense of other regions, due to the resources at hand and local conditions. It can be argued that clusters are not an element of all regional and local economies, as the predominant actors and conditions must be available for clusters to emerge and grow (Bieńkowsk and Creţu, 2016; Perry, 2005; Rocha, 2004; European Commission, 2013).

Overall, it can be said that a business cluster is not a new concept, but one that has existed for well over a century. For the purpose of this study, both definitions of Porter (1998; 2008) and Ketels (2003, 2013) are the most appropriate, due to their holistic nature, and their reference to 'geographical location' and 'inter-related,' activity as drivers of business cluster development. There is real confusion within academic discourse as to which term and definition best describes the understanding of clusters. One could claim that there is a need to create an overarching definition or term which bests describe what a 'cluster' is. Currently, the various terms (can be considered as being too broad and ambiguous (Marshall, 1890, 1898, 1920; Porter, 1990; Oakey, 2007, Sölvell, 2008; Bergman and Feser, 1999). When considering these matters, the different cluster 'terms' have been analysed and discussed in Table 2.3 below (Saxenian, 1990, 1994; Piore and Sabel, 1984).

Table 2.3: Cluster Terminologies

Clusters

- **'Clusters'** are complex and dynamic structures that are subject to continuous change (Cluster-analysis.org, 2016)
- Clusters have been described as a specific level of social interaction and governance which allows for new forms of learning (Lagendijk, 1999; European Commission, 2013; Khalid, 2011)

Business Clusters

- **'Business clusters'** have been described as a concentration of interconnected businesses present in a single geographic location (Porter, 2000)

Industrial Clusters

- **'Industrial clusters'** are also known as 'competitive clusters' or Porterian clusters (Porter, 1990)
- Industrial clusters are defined in terms of core linkages between industries, which is often translated in broad groups of activities (as in Porter's approach). A good example here is the Dutch notion of mega clusters (Jacobs, 1997), or Enright's notion of regional clusters (Enright, 1994a).

Technology Clusters

- A **'Technological Cluster'** is a geographical concentration of related technology firms including competitors, suppliers, distributors, and customers; usually around scientific research centres and universities (Stevens Institute of Technology, 2016).

Enterprise Clusters

- **'Enterprise Clusters'** tend to focus on how closely they resemble successful industrial districts elsewhere (McCormick, 2001).

Regional Clusters

- A '**Regional Cluster'** is an industrial cluster in which member firms are in close proximity to each other Enright (1996)
- Bergman and Feser (1999) describe a regional cluster as one 'whose elements share a common regional location, where region is defined as a metropolitan area, labour market, or other functional economic unit' (Isaksen and Hauge, 2001; Delgado, 2015)

Local Clusters

- **'Local Clusters'**, in contrast, consist of industries that serve the local market. They are prevalent in every region of the country, regardless of the competitive advantages of a particular location (ClusterMapping.us, 2014)

Creative Clusters

- **'Creative Clusters'** differ from conventional business clusters because 'additional factors are critical to their development and form and their aims are different from conventional business clusters – some have social as well as enterprise goals, cultural as well as growth objectives' (LDA, 2005)

Statistical Clusters

- **'Statistical Clusters'** are an explorative analysis that tries to identify structures within the data. They are also referred to as segmentation analysis or taxonomy analysis. More specifically, they try to identify homogeneous groups of cases, i.e., observations, participants, respondents and are used to identify groups of cases if the grouping is not previously known (Statistics Solutions, 2016).

Innovative Clusters

- **'Innovative clusters'** are structures or organised groups of independent parties (such as innovative start-ups, small, medium and large enterprises, as well as research and knowledge dissemination organisations, not-for-profit organisations and other related economic actors) designed to stimulate innovative activity by promoting sharing of facilities and exchange of knowledge and expertise and by contributing effectively to knowledge transfer, networking, information dissemination and collaboration among the undertakings and other organisations in the cluster. (European Commission, 2014; Engel and del-Palacio, 2011)

SME Clusters

- An **'SME Cluster'** is a cluster that has a concentration of 50 or more enterprises producing similar products or services and is situated within an adjoining geographical location of 3-5 kilometre radius and has a common strength, weakness, opportunity and threats profile. There are 177 SME clusters in Bangladesh (Abdin, 2015; PRO-INNO Europe, 2008; Braun, 2004))

Source: Adapted from Literature Review by Author

This research acknowledges that there is much debate over a definitive definition of clusters and there is no one accepted definition. Therefore, this research moves to set out the key aspects of a cluster which are of value to this project. By investigating the array of cluster definitions reviewed (see Tables 2.2 and 2.3), highlights three aspects of the concept of clusters concept which are present in most definitions. These aspects are:

(1) Clusters consist of firms in related and supporting industries, economic actors and institutions;

(2) The firms and actors in a cluster must be geographically proximate or concentrated; and

(3) These co-located firms must be connected or linked in some way, which results in the superior performance of the firms.

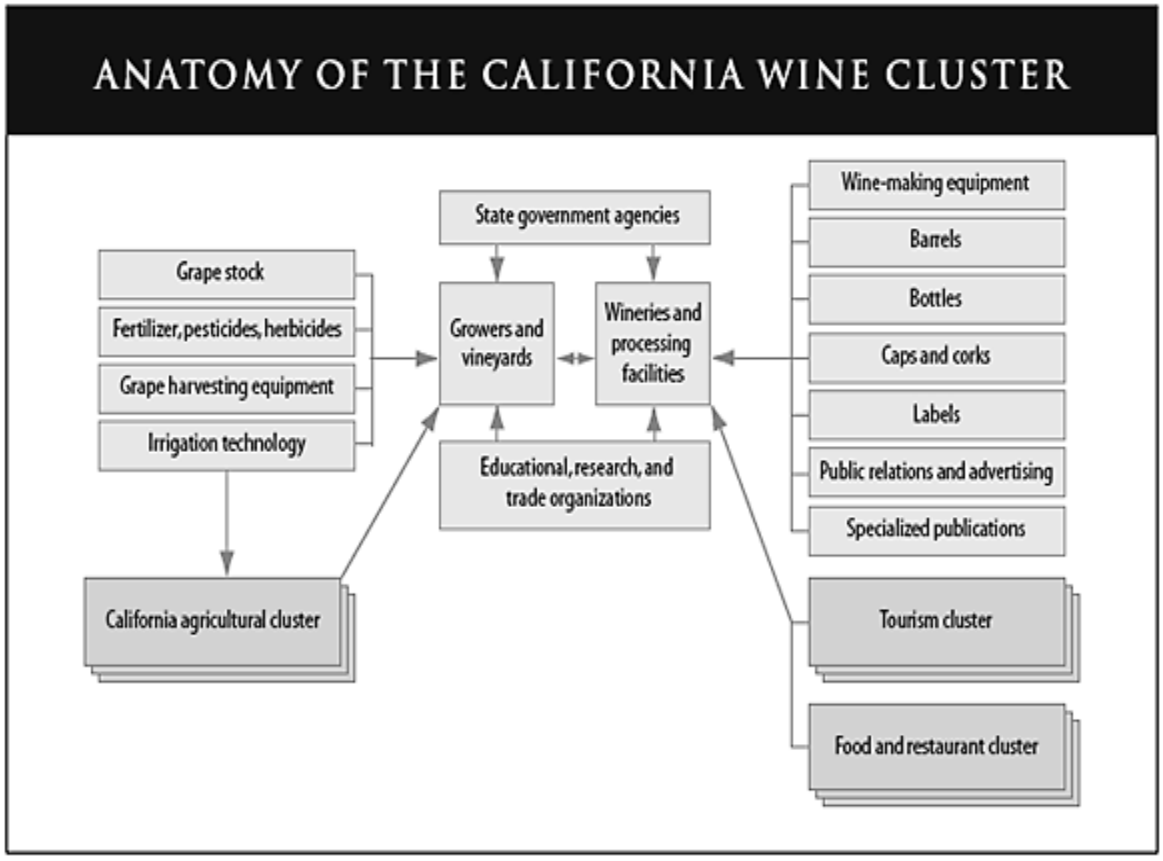
Taking these features into account, the following industry cluster definition is proposed for use in this research as follows: *A cluster is a geographically proximate group of firms in related and supporting industries, with economic actors and institutions linked in some way, which benefit from their mutual proximity and connections.* The subsequent section examines the importance of cluster typologies and classifications to emphasise the necessary types involved.

2.2.2. Classification and Typology of Clusters

It can be said that clusters, come in various shapes, sizes and types. There is not a 'one size fits all' form of a cluster. The examination into the various types of clusters can enhance this study. It will provide an ideology of what sort of clusters have been developed and how they operate. It can be argued that various types of clusters are evident in different regions/contexts based on the resources that are available in that geographical location. According to Ketels (2003), clusters can differ in many dimensions: (1) The type of goods and services that they

manufacture; (2) The locational paradigms that they are subject to; (3) Their development stage; and (4) The economic environment which encapsulates them. The typology of clusters has been well documented by Oakey (2007) in his article, *'The Problem of Regional Development – Clustering.'* He also extended upon the typology of clusters perspectives (see Appendix A) whilst placing an important emphasis on the typology of clusters in terms of: (1) Vertically Disintegrated Cluster; (2) Competitive cluster; and (3) Non Interacting cluster (Dunning, 2001; Abdin, 2015; PRO-INNO Europe, 2008; Braun, 2004; Marshall, 1920; Ketel and Protsiv, 2014; Etzkowitz, 2002). Oakey suggested the California Wine cluster is related to the Non-interacting cluster type (see Figure 2.2 below).

Figure 2.2: Anatomy of the California Wine Cluster

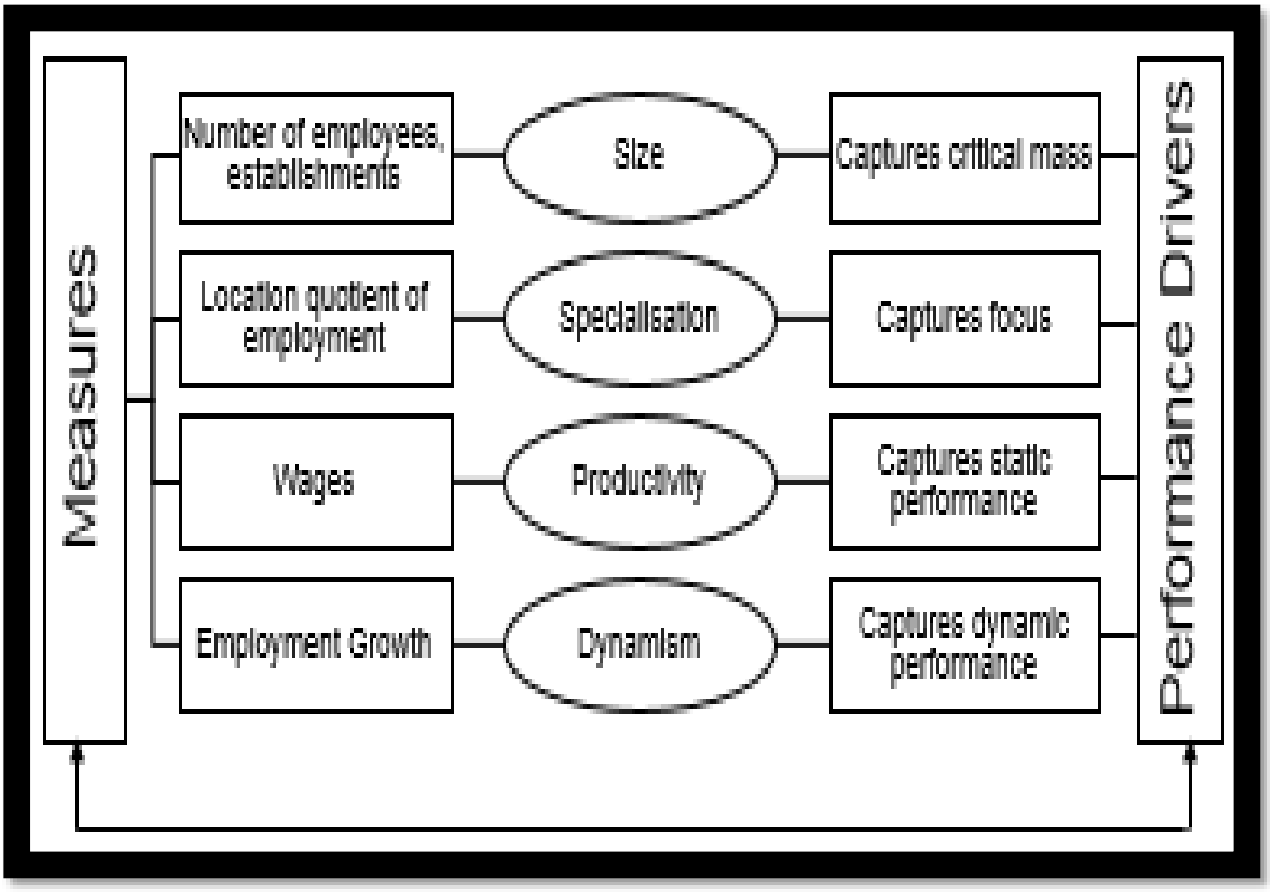


Source: Porter (1998)

When considering the matters of the typology of clusters literature, it is important to introduce the classification of clusters and highlight how the strength of clusters can be measured. In

support, Egeraat et al. (2017) discussed the measurement of clusters in terms of big firms, and concentrations in fewer locations rather than larger geographical areas. According to Figure 2.3 below, the original definition devised by Ketels and Protsiv (2014) has illustrated this issue effectively.

Figure 2.3: Measuring Cluster Strength



Source: Ketels and Protsiv (2014)

According to Ketels and Protsiv (2014), the strength of a cluster is a complex multi-faceted concept. This is captured by the aspects of overall size, specialisation, productivity and dynamism. A new indicator of cluster strength has been presented here that captures all these dimensions, however it must be a rotating process. Arguably, the absolute size of the cluster, measured in terms of several employees or enterprises, can be important as this may affect the number and intensity of feasible linkages. However, since regions and industries vary in size,

a relative indicator of specialisation, such as the location quotient, can often be used as an additional measure. These two employment-based indicators formed the basis of the 'Three-star' methodology (see Table 2.9) used by the European Cluster Observatory, as part of the first European cluster mapping in 2007.

Over the last several years, it has become apparent that purely employment level-based measures should be complemented with new indicators. These indicators can include data availability and comparability improvements. As a result, the initial third employment-based regional 'focus' indicator used since 2007 was replaced with new indicators. After this, as the strength of a cluster may not just be reflected in its static level, but also in the dynamism of its development, an additional measure of annual growth was been incorporated to capture these dynamics.

The third aspect which complements the original 'stars' definition, is employee productivity. Since productivity levels vary drastically across Europe and could be more than an order of magnitude apart, these differences should be captured as part of the cluster strength measure. To achieve this, average wages per employee was included as the most widely available and comparable productivity metric across Europe. This cluster strength indicator reflects the accumulated competitiveness 'level'. It also complements the dynamism indicator which may only capture 'catch-up' effects (i.e., improvements), but not the full level of cluster strength. Therefore, there are four dimensions along which a cluster's performance varies and that serve as the basis for a single cluster performance indicator (Ketels and Protsiv, 2014). On review, various kinds of clusters are evident in different regions/contexts based on the resources which are available in that geographical location. Oakey (2007) has developed his perspective on the typology of clusters and the strength of a cluster is a complex multi-faceted concept, capturing

aspects of overall size, specialisation, productivity and dynamism. It is important to highlight how clusters might emerge to determine their true strength.

2.2.3. The Emergence of Business Clusters

According to Rosenfeld (2002), most of the world's most successful cluster examples were accidents of circumstance, a process of events. Rosenfeld suggested that the entrepreneurial spirit and market demand has stimulated the growth of the largest clusters. He further stated that some began as large firms in unpopulated areas that then dispersed (e.g. Furniture Cluster, Monaghan, Ireland) (Oakey, 2007; Dunning, 2001; Mottiar and Jacobson, 2002). Roy (2001) argued the converse as he suggested that urbanised areas with populations of 1,000,000 or greater will have several clusters. Examples of these areas are those like Toronto GTA. This has a population of 4,500,000 and has ten clusters. Montreal, on the other hand has a metropolitan population of 3,500,000 and has ten clusters. While Ottawa, has a population of about 850,000, with seven clusters. When considering these matters, Roy presents business clusters as:

> *Business clusters are concentrators, synergizers, accelerators of business activity, competition and collaboration. Business clusters create a dynamic virtual cycle of knowledge, innovation, technology, and increasingly, convergence, as building blocks for productivity, competitiveness, international trade, profitability, and growth. Business clusters lead to increased corporate capital re-investment, increased direct foreign investment, new employment creation, generational knowledge increase, dynamic synergy increase in multiple forms of interfirm, as well as firm and infrastructure collaboration, and increase in wealth to entrepreneurs and society at large in the immediate areas (Roy, 2001).*

When considering this description of business clusters, it can be suggested that organisations such as the *TCI Network* (Ketels, 2013; Network, 2016), *EU Cluster Portal* (Ec. europa.eu, 2016), *US Cluster Mapping* (ClusterMapping.us, 2014) and the *ATClusters* (SWRA, 2009) are

fundamental support platforms, which enable the emergence of business clusters. Arguably, these agencies have been set up specifically to enable the business cluster space. They have been included in this study to highlight their significance and to show the kinds of supports which are available for clusters.

As mentioned in earlier sections, Marshall (1920) is often linked with the first instance of the concept of clusters with his study on 'industrial districts.' However, Porter (1990) introduced the term and concept of 'business clusters.' Since then, it has received a lot of academic and industrial attention. The emergence of business clusters has proposed that most of the world's most successful cluster examples were accidents of circumstance, a process of accidental events, although it has been suggested that urbanised areas with populations of 1,000,000 or greater, will generally have several clusters. Clusters do not develop, they emerge over time according to Bieńkowsk and Creţu (2016). The examination of various business cluster examples and policy considerations form an important facet of this study.

2.2.4. Cluster-Based Policy and Initiatives

Recently, there has been a renewed focus on cluster policy in the Republic of Ireland as the Department of Business, Enterprise and Innovation (see Section 3.7) has launched many cluster initiatives. Regardless, there is still no national strategic plan or policy which exists on clustering. van Egeraat and Doyle (2018) provided a summary of the development of Irish cluster policy. They highlighted that there is evidence of an awareness to the potential benefits of cluster-based industrial development policy since the Culliton report in 1992. Mattimoe (2002) noted that the Culliton report was radical at the time, as rather than directly aiming to create jobs via government-led large-scale spending programmes. It was suggested that the

focus should instead be on ensuring the creation of the necessary conditions, for which private business development could be translated into employment opportunities.

Furthermore, one could suggest that government plays a variety of roles in an economy. They are responsible for providing overall macroeconomic and political stability, but also to address the microeconomic conditions identified in Porter's diamond theory (see Section 2.4). Porter (2000a) asserted that governments play a role in facilitating cluster development and upgrading through its policies, spillovers and innovation advantages from public entities. They are also responsible for facilitating and incentivising collective action by the private sector. Governments have an array of economic policy options. They may provide subsidies or R&D grants to individual firms, target narrow industries (e.g. high tech) with support, or set broad policies for sectors (e.g. manufacturing or services). All of which have their limitations (Porter, 2000a).

The advantage of cluster policy is that it supports groups of actors such as firms, suppliers, service providers, related industries, research. This help to address the common problems above the industry level, yet more targeted than the sector level without threatening competition. Furthermore, Porter (2000a) recommended that governments should aim to build on the strength of a region in supporting existing and emerging clusters instead of attempting to create new ones: *"The process of cluster upgrading involves recognition that a cluster is present and then removing obstacles, relaxing constraints, and eliminating inefficiencies that impede productivity and innovation in the cluster".*

Cluster development (see Section 2.7) and upgrading should not be confused with industrial policy. Industrial policy is based on the view that some industries, which have the opportunity for growth, should be targeted for support. Industrial policy aims to improve competitive advantage by increasing returns to scale and is typically set at the national level. In contrast,

cluster policy takes a broader view of competition among firms and location, based on productivity. It advocates that all existing and emerging clusters deserve attention, including traditional clusters (e.g. agriculture and encourages FDI). Cluster policy can be developed at a national level, but it has a regional focus to build on strengths of a region to pursue competitive advantage.

Cluster policy is not a set of isolated initiatives, it brings together many policy areas from science and technology, education and training, export and FDI promotion, and regulatory reform, among others. The theory proposed that clusters emerge spontaneously due to the factor endowments in a region and market forces. If clusters can develop naturally, why is there a need for cluster-based policy? Economic policy which supports clusters is advantageous as it provides the institutions (Edquist et al., 2002) with incentives to avail of external economies, which in turn improve productivity in a region. Moreover, government have a role to play in organising cluster participants, if the private sector does not achieve this. After the cluster participants formally convene in the form of an industry association or cluster organisation (see Section 2.2.5), government needs to become an active participant.

Governments can incentivise cluster participants, in order to collectively invest in assets which would benefit the cluster (e.g. research centres, training programs and infrastructure). Porter (2007) suggested that a national program to support cluster-based strategy could comprise the following: (a) Governments could certify designated clusters who meet certain criteria; (b) Designated clusters would qualify to submit for national matched funding to support the cluster and/or cluster organisation; and (c) Designated cluster could be given preference when applying for existing national programs or new programs (e.g. funding for training programs, collaborative organisations and R&D projects).

Feser and Bergman (2000) advocated that cluster policy, which is now widespread, is applied at several geographic levels in cluster programs. For example: at a national level (e.g. Pôles de Compétitivité in France, the Centres of Expertise in Finland, Japan's Industrial Clusters and Knowledge Clusters programmes, etc.), at a regional level (e.g. Catalonia, Upper Austria, Baden-Wurttemberg, East Sweden, Limburg, etc.), and even at a city or metropolitan area level (e.g. MediaCityUK – Manchester, Phoenix West – Dortmund).

Targeted cluster initiatives and programmes are designed to affect a specific cluster, developed from data and information on the cluster. The purpose of the different policy instruments will vary depending on the type of cluster and regional needs. Targeted cluster initiatives can not be generalised and applied to other clusters in the same region, or even for similar clusters in other regions, as they are developed for a context (Feser and Bergman, 2000). There are numerous reports which describe various cluster programmes and initiatives globally (Martin and Sunley, 2003; Andersson et al., 2004; National Governors Association and the US Council on Competitiveness, 2007; OECD, 2007; 2009; Oxford Research AS, 2008; World Bank, 2009; Christensen et al., 2012). From these, excluding policies addressing framework conditions such as the business environment, regulation and finance, commonly used instruments tend to support: (1) The engagement of actors; (2) Collective services and business linkages; and (3) Collaborative R&D and commercialisation.

Firstly, engaging the actors can be achieved by: Identifying clusters (conduct mapping studies of clusters such as Todeva's (2011) mapping framework – see Section 2.3); use facilitators and other brokers to identify firms which could work together; and support networks and clusters (host awareness raising events, financial incentives for firm networking organisations, benchmark performance and map cluster relationships). Secondly, developing collective services and business linkages through: improving capacity; scale and skills of suppliers

(mainly SMEs); increase external linkages such as FDI and exports; and build competencies in skilled labour for strategic industries. Thirdly, increasing collaborative R&D and commercialisation through: Programmes to improve links between research and firm needs; increase commercialisation of research; and access to finance for spinoffs. Developing targeted initiatives for a cluster must prove a greater benefit than the broader policy for all firms, across a region or nation. An OECD (2010) report acknowledges factors which contribute to the success of targeted cluster programmes: Building on existing strengths in terms of public assets, firms and research competencies; strong leadership to ensure the cluster is dynamic and evolves with market changes; leverage private sector investment, a bottom-up approach and industry leadership in providing services, collaborative projects and networking; recognising the available characteristics and externalities of the cluster (e.g., competition, cooperation, research commercialisation, the critical mass of human capital, skills enhancement, quality of life and social capital). This OECD report (2010) highlighted the Basque cluster policy approach which has been emphasised in Section 7.3. The next section introduces the role of the cluster organisation, which is a cluster initiative which may be supported by government cluster-based policy or could be an industry-led initiative without any support.

2.2.5. Cluster Organisations

Cluster organisations are vital bodies within a cluster, as they act as innovation support providers (Lämmer-Gam et al., 2016). Although, if limited to a specific part of the regional ecosystem of a cluster, cluster organisations can unlock the potential of the cluster. This is achieved by providing pertinent services to the cluster actors and by collaborating with other networks or actors within the cluster, which are either active in the same or other industries (cross-cluster / cross-sectoral collaboration) (Lämmer-Gam et al., 2014). The creation of local institutional supports for businesses are an important part which contributes to the development

of business clusters. Numerous successful clusters have profited from the growth of robust networks and the formation of a dedicated organisation for the cluster (e.g. Silicon Valley and California Wine Cluster) (Saxenian, 1990, 1994; Piore and Sabel, 1984; Wolfe, 2009).

It can be suggested that a cluster or sector may benefit from some local organisations such as chambers of commerce, industry associations, start-up support agencies, and government bodies can aid businesses. These associations may deliver support programmes and help overcome coordination difficulties in the delivery of national and regional programmes of value to local clusters. Nevertheless, a dedicated cluster organisation is most effective when strategically positioned to comprehend problems affecting the cluster, to make connections between actors and build upon the strengths of the cluster (Porter, 1998a).

To understand the organisation of a cluster and its role, it is important to differentiate between: (i) The cluster; (ii) A cluster initiative; and (iii) A cluster organisation. As stated, a cluster is a geographic concentration of firms and actors which are interconnected, and benefit from their proximity and relations, more than non-clustered firms (Porter, 1998a). A cluster initiative is *"an organised effort to increase the growth and competitiveness of a cluster within a region, involving cluster firms, government and/or the research community"* according to Sölvell et al. (2003). A cluster initiative may be organised by any institution, such as an Organisation For Collaboration (OFC). It can consist of a mix of 'bottom-up' and 'top-down', private and public, initiatives.

Sölvell et al. (2003) also proposed six main types of cluster initiatives: (1) General cluster networking; (2) Human resource upgrading; (3) Cluster expansion; (4) Business development; (5) Innovation and technology initiatives; and (6) Improving the business environment. *"Cluster initiatives are increasingly managed by specialised institutions, known as cluster organisations, which take various forms, ranging from non-profit associations, through public*

agencies to companies" (EC, 2008b). Lastly, a cluster organisation may be the consequence of a cluster initiative to enhance growth and competitiveness of the cluster. It may also act as a channel for cluster initiatives. Arguably, cluster organisations nurture collaboration between cluster participants and offer networking through events and programmes as they pursue a range of objectives and cluster initiatives. Normally, these comprise of constructing a cluster's identity, incorporating a cluster manager (to oversee operations), branding the cluster/region, developing a strategy and vision for the cluster. Enterprise development objectives such as joint purchasing and export promotion and initiating innovation projects and R&D investment are also part of the objectives (Ketels et al., 2012). Donahue et al. (2018) proposed that there are five traits of successful cluster organisations & initiatives:

(1). Industry-driven, university-fuelled, government-supported;

(2). Championed by passionate, dedicated leaders;

(3). Focused on establishing a robust ecosystem, not quick job gains;

(4). Placing a collective big bet on a unique opportunity – activate don't create; and

(5). Anchored by a physical centre.

Based on the study of European cluster organisations and initiatives, Ketels et al. (2012) posited that usually more than half of cluster member businesses are within one-hour driving distance of the cluster organisation. This supports frequent face-to-face contact. He further suggested that cluster organisations are not only local, but they also tap into networks with other clusters globally. They bridge the gap to global markets and value chains which are typically small organisations with half employing only three or fewer employees. Furthermore, size or membership of cluster organisations differ, contingent on the size of the cluster. The majority of cluster organisations have from 20 to 100 members (Ketels et al., 2012).

Empirical evidence suggests that European cluster organisations are inducted from both public (41%) and private (40%) capital sources and continue to fund their organisation with a

combination of sources of revenue*: "Public – 24% regional/local, 17% national and 13% international; and private - 25% membership fees and 9% sales of services"* (Ketels et al., 2012). The European Cluster Collaboration Platform (ECCP) listed 246 European cluster organisations in 2016 compared to 940 in 2019 (ECCP, 2016, 2019). Therefore, emphasising their importance to the enhancement of the cluster and its identity. These figures are the cluster organisations which are presently signed up to the platform. It can be argued that there are many more cluster organisations across Europe. In 2009, the EU developed the European Cluster Excellence Initiative (ECEI), as part of its efforts to develop more world-class clusters across Europe by strengthening cluster organisations.

The ECEI created methodologies and tools to augment cluster organisations, in order to advance their capabilities and competencies in the management of clusters and networks (ESCA, 2012). From this, the European Secretariat for Cluster Analysis (ESCA) came into being and produced both an evaluation and benchmarking methodology for cluster organisations. The benchmarking is conducted through interviews in order to record data on numerous dimensions of the cluster and the cluster's organisations. These dimensions are as follows: Structure of the cluster; cluster management and cluster governance; financing; and services provided by the cluster organisation and achievements of the cluster management organisation (ESCA, 2012). These results are then compared to a database on more than 190 clusters from different EU nations. As a result, the cluster organisation is awarded a label (Bronze, Silver or Gold), to benchmark it in comparison to its peers (ESCA, 2016).

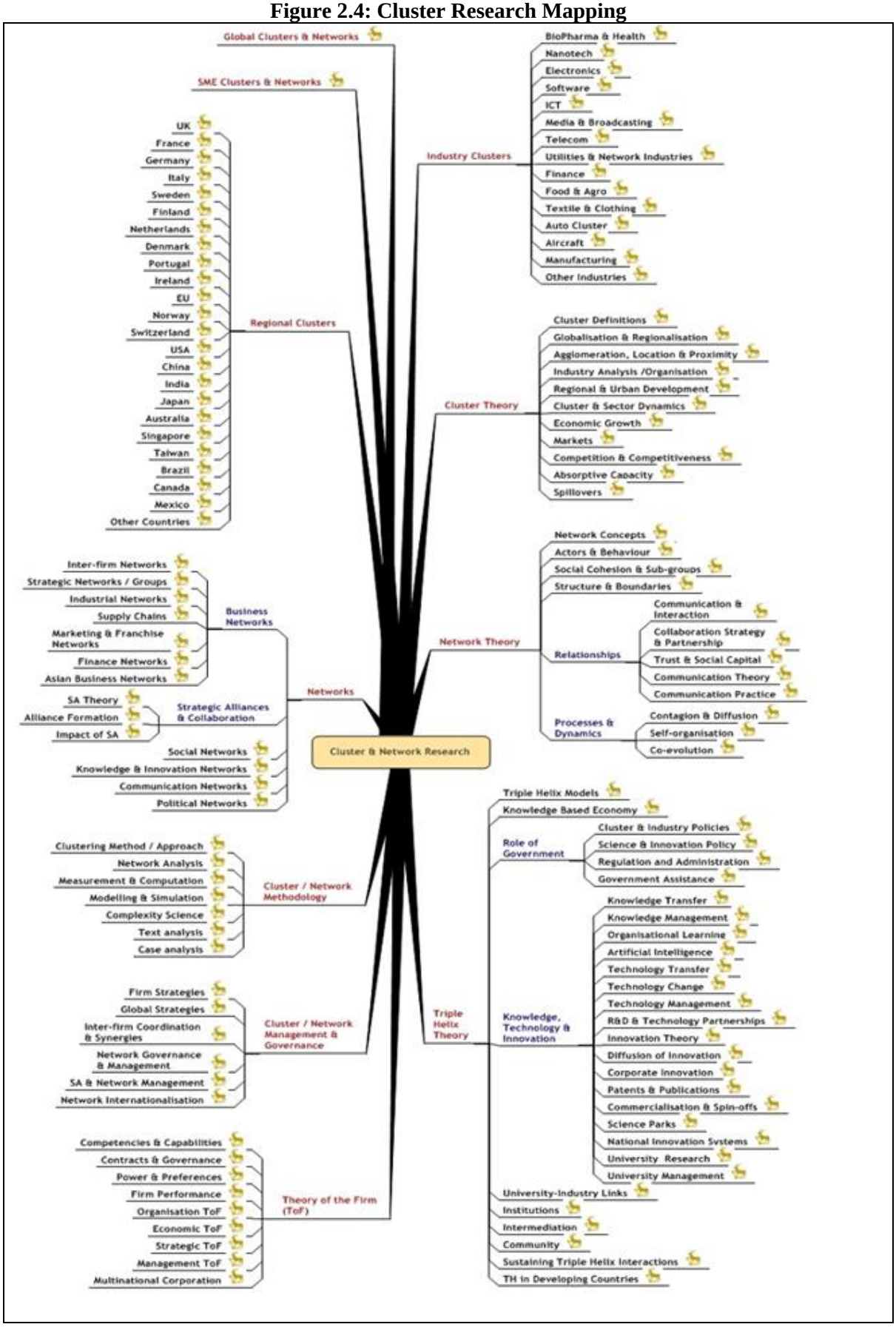
One of the main objectives is to identify the best cluster management organisations in Europe and also to support cluster management organisations with guidance for the development of the assessment on how to further improve (ESCA, 2016). Additionally, the ESCA cluster label does not identify a cluster through empirical analysis. It is a benchmark for the cluster

organisation's management capabilities. Ketels et al. (2012) contested that cluster organisations not only connect the actors locally, but they can facilitate connections with businesses and institutions external to the cluster and region. Section 2.2 reviewed the origins and application of cluster theory, from its emergence, its popularity and widespread application of the theory, and typology. It also discusses cluster-based policy and initiatives. Finally, the role of cluster organisations is examined. Since cluster theory, its definitions, characteristics and application have been discussed, one could suggest that addressing cluster mapping is essential. The lifecycle and development process, their value and certain limitations of the theory should be explored.

2.3. Cluster Mapping

Todeva (2006) highlighted that clusters are a theoretical concept, which aid various areas including, but not limited to: Economic geography; industrial economies; industrial organisation; strategic management; business policy; industrial policy; and economic sociology. Todeva has further suggested that, *"clusters are agglomerations of firms co-located in a geographic area, connected by value adding activities and with access to benefits from input/output markets, from infrastructure and from environmental coordination via institutions and policies".* Additional definitions of clusters can be found in Section 2.2 and Table 2.2. The inclusion of a specific framework that embodies the true meaning of business clusters can be described as having significant relevance to this study. Todeva's (2011) '*cluster and network research'* mapping framework (see Figure 2.4) has been incorporated to make the term 'business clusters' more transparent and *holistic*. The overarching aim of including Todeva's (2011) cluster and network research mapping framework, enables the understanding of business cluster literature.

Figure 2.4: Cluster Research Mapping



Source: Todeva (2011)

Having reviewed all of the available mapping tools, this specific structure has been chosen over others such as the US cluster mapping structure (ClusterMapping.us, 2014), the Clunet cluster mapping tool (PRO-INNO Europe, 2008) and the EU mapping tools (Europa.eu, 2016; Clusterobservatory.eu, 2016). Todeva's approach forms the basis of this paper and systematically examines business clusters, to understand the business cluster theoretical area in more detail. A broad cluster review was conducted by Todeva (2011) to allow the understanding of the true benefits of cluster theory, due to its holistic nature. It can be argued that the US cluster mapping structure is more descriptive, but does not highlight the necessary elements required for a business cluster to emerge, develop and grow (Bieńkowsk and Creţu, 2016; Perry, 2005; Rocha, 2004; European Commission, 2013). Muro and Katz (2010) also argue that economies should focus on establishing the right conditions for clusters to emerge and that one should not try to create clusters.

Alternatively, the EU mapping tool (Europa.eu, 2016) is EU-centric and again, it can be argued that it fails to highlight the necessary components of cluster formation as highlighted by Todeva (2011). As part of the EU mapping structure, there are five key fundamentals: (1) Specialisation and size measures; (2) Performance measures; (3) Regional context; (4) Collaboration; and (5) Structure of firms in clusters. Overall Todeva's approach is the most appropriate for this study due to its holistic nature of business cluster theory. The concepts and terms which have been outlined by Todeva will form the basis for this study and will be further examined later. All core sections of Todeva's mapping framework have been examined in this study, except for the 'theory of the firm' element. It can be argued that this section is part of the entrepreneurship literature, not cluster theory and as such has not been included as part of this study. Todeva's framework has identified that some factors or sections which are more important than others concerning business clusters such as: (a) Regional clusters (see Section 2.2.1); (b) Networks (see Section 2.3.1); (c) Triple-helix (refer to Table 2.5); and (d) Industry clusters (see Section

2.2.1). These areas are included, as part of this research study as they can form the basis for any researcher that is trying to holistically explain the business cluster literature. Based on the cluster theory elements of Todeva's framework, the importance of highlighting the cluster lifecycle and network theory has been investigated.

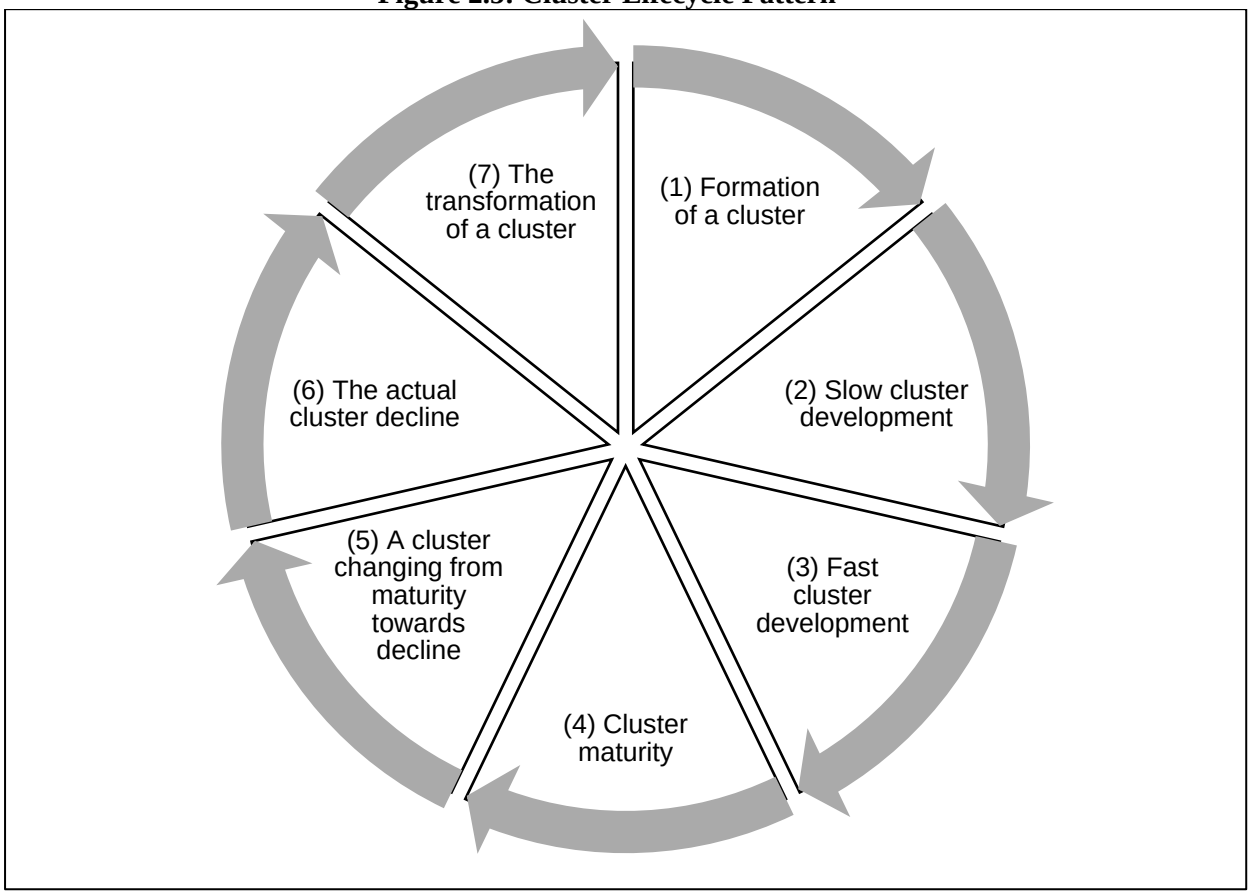
2.3.1. Cluster Life Cycle and Network Theory

Brown (2006) stated that clusters do not just happen or originate in a local economy by chance. They form, grow and strengthen over time. He has come up with four stages to describe a cluster's life cycle: *(1) Potential; (2) Emerging; (3) Existing; and (4) Declining.* Conversely, Malakauskaitė and Navickas (2011) have argued that seven stages are involved in the life cycle of a cluster (see Figure 2.5). **Potential clusters**, by their very nature, have yet to reach a critical mass, but do show signs of growth or opportunity. **Emerging clusters** do have indications of critical mass with more firms and institutions and some growth. Furthermore, **existing clusters** are those that already encompass critical mass, which are determined by size, depth and diversity in the economy. Finally, **declining** clusters have been described as principal industries which are declining in enterprise establishments and employment, both in the regional and national economy.

It can be concluded that understanding how clusters grow and decline is vital when exploring data in order to identify clusters when examining different strategies to further develop clusters (Brown, 2006). In addition to cluster dynamics and cluster formation which has been discussed previously, it is interesting to note that a cluster has a life cycle pattern (see Figure 2.5) which includes approximately seven developments and ageing stages as it evolves and declines. These stages can be described as the following: (1) Formation of a cluster; (2) Slow cluster development; (3) Fast cluster development; (4) Cluster maturity; (5) A cluster changing from

maturity towards decline; (6) The actual cluster decline; and finally, (7) The transformation of a cluster, which may or may not occur (Malakauskaitė and Navickas, 2011). A significant observation from a recent study in the US by Malakauskaitė and Navickas (2011) regarding the cluster life cycle is that the end of the development phases and the start of the maturity phase, are found to be the most competitive phases for the cluster member companies. Once mature, it can be suggested that a cluster needs careful review as it is found to become less competitive due to growing administrative structures and inflexibility (Byrne, 2016).

Figure 2.5: Cluster Lifecycle Pattern



Source: Adapted from Literature Review by Author

While the early stages of a cluster life cycle involve specialisation, vertical integration, access to resources, economies of scale and cost-based competitiveness, the later stages will, arguably be dependent heavily on R&D (research and development). This is required to spur innovation and technological advancement to create business growth. Therefore, it can be argued that a

cluster is likely more dynamic in the early stages of the life cycle rather than the latter. As a result, cluster activities which impact the cluster dynamics are as important, if not more important, when the cluster develops and declines over time. As Malakauskaitė and Navickas (2011) indicated, a cluster's lifecycle must include seven key stages. Ffowcs-Williams (2013) has recommended that it is salient to understand what stage a potential cluster is at in the cluster lifecycle. Malakauskaitė and Navickas (2011) stated that at the end of the development phase and the start of the maturity phase of a cluster lifecycle, these phases are found to be the most competitive and most dynamic for the cluster participants and stakeholders (Lagendijk, 1999). Rosenfeld (2002) has argued that the lifecycle of clusters comprises four key stages: (1) Embryonic (innovation phase); (2) Growth stage (markets are sufficiently developed); (3) Maturity (processes or service are more routine); and (4) Decay (replaceable) (PRO-INNO Europe, 2008; European Union, 2010). Arguably, the main difference between these lifecycle perspectives has been the evolution pattern in terms of the context and support structures that the cluster entails.

According to Ffowcs-Williams (2013), a potential mature cluster may yield strong evidence. For example, it may have high employment, but underlying issues such as changing technology or declining markets. For instance, the loss of 1,900 jobs at Dell (computer manufacturer), may have impacted the cluster's development (RTE.ie, 2009). At this stage, it can be said that it is sufficient to recognise generally that high-tech ICT electronic manufacturing in the Limerick Area of the Republic of Ireland, is at a mature stage in the cluster lifecycle of development due to its longevity. However, this would warrant further detailed analysis. Fundamentally, when examining the cluster lifecycle, understanding the age of a cluster is vital in understanding where it is in terms of its development. Mature clusters require careful analysis and need to show evidence of innovation and spin-off start-ups, in order to ensure they are not in decline (Ketels, 2003; Porter, 2008; Lindqvist and Sölvell, 2011; Ffowcs-Williams, 2013). This study

has highlighted that ICT electronic manufacturing in the Limerick Area is at a mature stage in its life cycle. Therefore, it is important to check for development, innovation, and spin-off businesses within the cluster, as a mature cluster can often profile well.

- ***Network Theory and Ecosystems***

Throughout existing cluster studies, 'network' and 'ecosystem' terms have been used interchangeably. Consequently, network theory can be regarded as an area of interest within the body of cluster literature and Deardorff (2005) defined a network as, *"a set of connections among a multiplicity of separate entities sharing a common characteristic."* This perspective of economic geography implies the connections between firms, various actors, and institutions which influence the local economy. The cluster must be regarded as a form of a network as a cluster can be regarded as a *business network* with homogenous and/or competing interests. This perspective is supported by the Organisation for Economic Cooperation and Development (OECD, 1999, 2007). Hamdouch (2008) suggestsed that a cluster may contain numerous layers of networks. In cluster theory, the actors in the network represent various organisations or even people (individual entrepreneurs or inventors, firms – suppliers or buyers, universities research institutes, public organisations, etc.). In turn, while the relation, or linkage, represents a type of relationship (formal or informal, buyer or seller linkage, information or knowledge sharing, etc.) between the different actors (Giuliani and Pietrobelli, 2014). Clusters and networks are dissimilar, yet they are often linked. They are both seen as facilitators for improving industrial transformation, for developing new regional competitive advantages, for rallying up the establishment of businesses and employments and thereby, influencing economic prosperity (Ketels, 2012).

Networks can be described as alliances between firms, which work together towards an economic goal. They can be established between firms within clusters, but also exist outside

clusters. Ahuja (2000) posited that networks can be horizontal and vertical. Horizontal networks are built between firms which compete for the same market, such as a group of producers establishing a joint retail shop. Vertical networks, particularly suppliers' development schemes, are alliances between firms belonging to different levels of the same value chain. Such as a buyer assisting its suppliers for upgrading.

It can be argued that a line between clusters and networks must be drawn, even though they can appear to be similar. Networks of firms are structures precisely developed for active collaboration and this collaboration could be open-ended or focused on a specific project task. They may or may not be confined to a specific geographical location and set of industries, whereas clusters are a specific type of network that is concentrated in a geographical area. Arguably, clusters and networks can complement each other, as one will provide the business agglomeration and the other one the connections, the sharing of knowledge, and information to achieve common goals (Ahuja, 2000). Networks and clusters also foster knowledge spillovers in which the knowledge produced by one firm can be appropriated, at little cost, by other firms (Jaffe, 1986). Linkages appear under a number of terms in cluster definitions, including: Relationships (Saxenian, 1994; Feser 1998; Hill and Brennan, 2000; Cooke and Huggins 2002); networks (Roelandt and Den Hertog 1999; Van den Berg et al., 2001); connections (Porter, 1998a; Simmie and Sennett, 2001; Cortright, 2006; Hobbs, 2010); and interactions (Wolman and Hincapie, 2015).

In reviewing numerous cluster definitions, there are linkages between, co-operation and collaboration present in most. In a cluster, co-located firms must be connected in some way to form a network, which results in superior performance. This is when compared to spatially dispersed non-cluster firms. Being in geographic proximity may be beneficial for firms (e.g. access to labour and availability of suppliers), but it is the linkages with firms and other

organisations in the locality that are critical to enhancing the competitiveness and productivity of a firm. Porter (2000b) stated that:

> *The mere presence of firms, suppliers and institutions in a location creates the potential for economic value, but it does not necessarily ensure the realisation of this potential. Social glue binds organisations together, contributing to the value creation process. Competitive advantages depend on the free flow of information, the discovery of value adding exchanges or transactions, the willingness to align agendas and to work across organisations, and strong motivations for improvement.*

An interesting opinion in contemporary studies on regional clusters is that geographic proximity does not guarantee firm success (see Boschma, 2005; Tallman and Phene, 2007). That it is the social networks which are generated across cluster actors explain at least part of their innovation (Owen-Smith and Powell, 2004; Whittington et al., 2009). Benefits of networks for firm embeddedness and social integration, are important differentiators of clusters, from the agglomeration model (Gordon and McCann, 2000). The value of local networks seem to be diminishing in an increasingly globalised world, where competitiveness, suppliers and customers are international (Singh, 2005). In the face of this, clusters still appear to be important mechanisms for international competitiveness (Pitelis et al., 2006). Network models within agglomerations can provide the benefits of localisation with the knowledge and information linkages in national and international networks (Amin and Thrift, 1992). They reinforce the importance of 'weakties' (Granovetter, 1973); that firms should aim to engage in many networks, to extend their relationships, especially with better-connected actors. This may prove more beneficial than limiting the firm to value chain linkages, local linkages, or only within a certain group (Gordon and McCann, 2000).

Firms which are embedded in connected networks, both locally and globally, benefit from their position relative to isolated firms. Networks provide some marginal benefits to members which exceed the marginal cost of participation (Scitovsky, 1954). It keeps transaction costs to a

minimum (Granovetter, 1985), it reduces spatial-transaction costs (Camagni and Capello, 2000), and reduces uncertainty and adaptation costs (DeBresson and Amesse, 1991; de la Mothe and Paquet, 1998). It also facilitates the exchange of tacit knowledge, connects organisations and people not formally connected and fosters trust and reciprocity (Powell, 1990).

Table 2.4: The Comparisons and Differences between Clusters and Networks

Clusters	Networks
Clusters attract needed specialised services to a region	Networks allow firms to access to specialised services at lower costs
Clusters have open "membership"	Networks have restricted membership
Clusters are based on social values that foster trust and encourage reciprocity	Networks are based on contractual agreements
Clusters generate demand for more firms with similar and related capabilities	Networks make it easier for firms to engage in complex business
Clusters require both cooperation and competition	Networks are based on cooperation
Clusters have collective visions	Networks have common business goals

Source: Adapted from Lundequist and Power (2002)

Research on innovation has recognised the benefits of networks. It is widely acknowledged that innovation is a social process incorporating information exchange, interaction and cooperation of various actors (Freeman, 1991; Powell et al., 1996; Owen-Smith and Powell, 2004; Singh, 2005; Whittington et al., 2009). The benefits of networks are not solely confined to developed economies and have benefits for developing economies where market failures and institutional weaknesses may be particularly severe (Guillén, 2000; Khanna and Rivkin, 2001; Mesquita and Lazzarini, 2008; McDermott et al., 2009). According to Lundequist and Power (2002), firms can achieve better access to skilled, trained and knowledgeable employees and suppliers in clusters and networks (see Table 2.4).

Rosenfeld (1997) discussed whether clusters are networks or whether they are two separate ideologies. An adaptation of the framework has been synthesised to illustrate the differences and comparisons between both clusters and networks (see Table 2.4 above). Arguably, clusters are more collaborative, susceptible to change and foster the development of interconnected firms. Another term which has been used to describe a cluster is 'ecosystem' (see Section 2.6.3) that Spigel and Harrison (2018) posited that a different structure regarding a network of many different actors, which are directly or indirectly connected to each other. In an ecosystem, all the actors interact with each other in one way or another, in a self-organising situation and everyone depends on everyone else (Parkinnovaare.ch, 2018). Furthermore, this site has suggested that there is no monopoly player and eco-systems have the flexibility to improve processes, deal with external shocks and work on smaller scales. When trying to decide whether or not 'clusters', 'networks' and 'eco-systems' are similar concepts, it is important to note that clusters can be regarded as being more collaborative, susceptible to change and foster the development of interconnected firms which can demonstrate the value of clusters.

2.3.2. Advantages and Disadvantages of Clusters

The questions, 'why do firms locate near one another?' and 'why do clusters happen?' have been explored within the existing literature. It can be concluded that based on Porter's geographical proximity definition, clusters help to reduce the cost of conducting business for firms involved (Brown, 2006). An interesting insight into the value of clusters for firms has been discussed by Rocha (2004) who has argued that, *"firms within clusters are better off than firms not within them"* (Fiedler and Welpe, 2011). Rocha proposed that milieus within clusters, nurture firm efficiency levels, innovation and improved their performance (Saxenian, 1994; Krugman, 1991; Marshall, 1920; Porter, 1998).

Clusters which are independent and informally associated with firms and institutions signify a robust organisational structure which can offer returns in efficiency, effectiveness and flexibility (e.g. Silicon Valley and Route 128, USA) (Porter, 2000; Ketels, Lindqvist and Sölvell, 2012; Saxenian, 1994). Lundequist and Power (2002) demonstrated that being connected with a cluster can bring many benefits to firms, industry sectors, and the business environment. They have argued that companies which are linked by clusters are open to operate more efficiently in obtaining inputs, retrieving data, coordinating with related companies in their sector, in evaluating and motivating improvement. Firms can achieve better access to skilled, trained and knowledgeable employees and suppliers in clusters (Lundequist and Power, 2002).

According to McHardy et al. (2005), businesses in up-and-coming clusters can successfully benefit and tap into existing pools of committed and skilled employees. This, in turn, decreases their recruitment costs. One could argue that since a cluster indicates opportunity and lowers the possibility of relocation for employees, they can also be easier to entice skilled people from other locations. This is a significant advantage in some industry sectors. Porter (1998) stated that, *"extensive market, technical, and competitive information accumulates within a cluster, and members have preferred access to it. In addition, personal relationships and community ties foster trust and facilitate the flow of information. These conditions make information more transferable".* A well-developed cluster also delivers a productive means of acquiring other needed inputs and this cluster offers a large local supplier base and lower transaction expenses (Shane, 2012; Sölvell, 2008). According to McHardy et al. (2005), the geographic profile and proximity of a cluster improves communication and distribution, as collaboration can be achieved more successfully. Ketels (2004) has suggested that firms in a cluster are more productive and innovative than those which are independent. This is due to clusters offering an

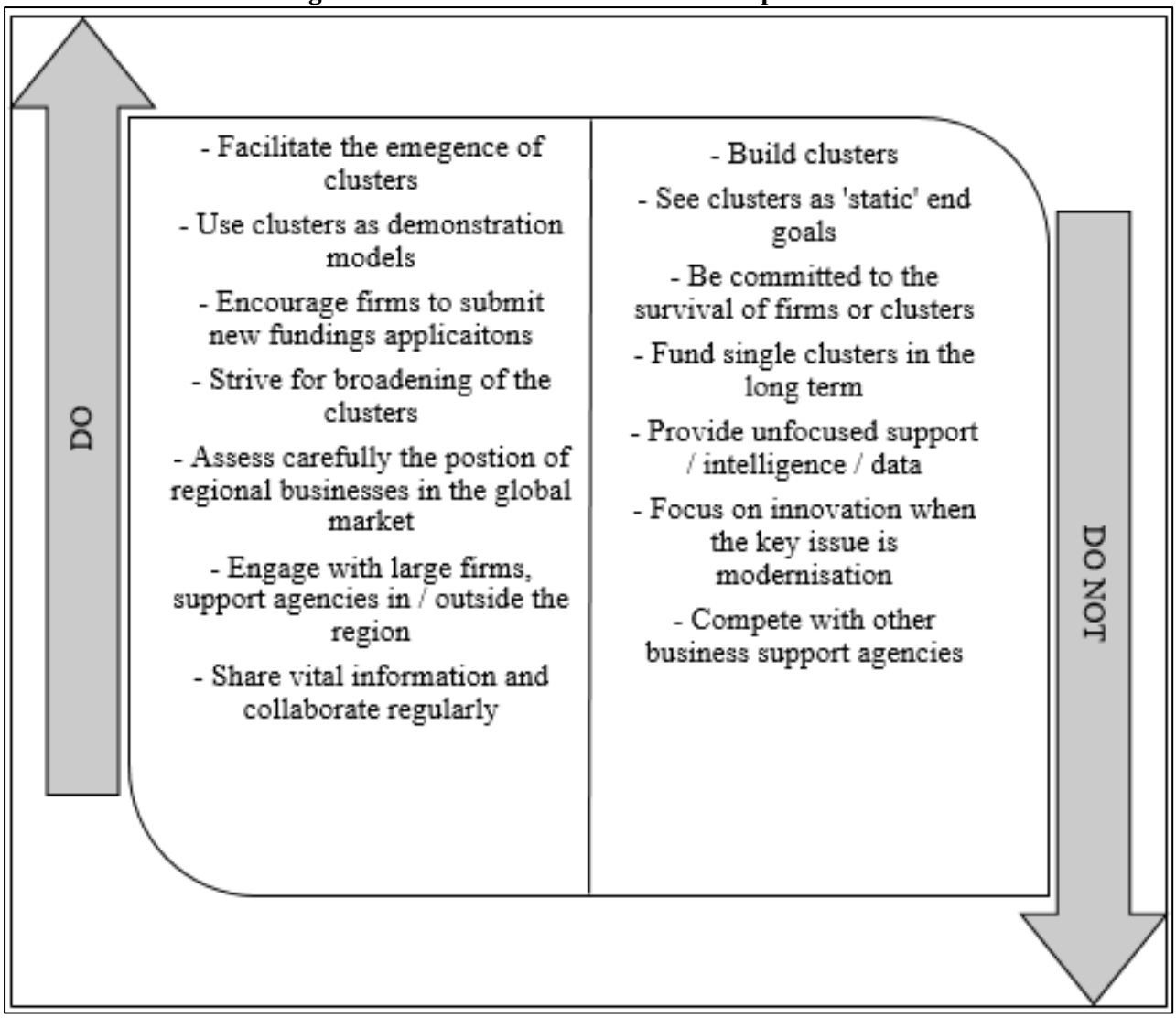
environment which encourages innovation (Ketels and Protsiv, 2014), but Penttinen (1994) argued differently.

Conversely again, Engel and del-Palacio (2011) claimed that the most successful cluster examples are those which are globally connected, where their enterprise groupings collaborate and improve the process of innovation and production (Muro and Katz, 2010). Rosenfeld (2002) concluded that: (a) Concepts (innovation, imitation and competition and entrepreneurial energy); (b) Connections (networking and networks & connections and intermediaries); and (c) Competencies (specialised workforce, industry leaders, talent and tacit knowledge) are the fundamental factors that enable the growth of clusters. Delgado et al. (2010, 2011) proposed that clusters have a significant impact on the survival and emergence of small firms in today's economic climate. Cooke and Morgan (1998) have discussed the value of clusters as they have stated that effective clusters transpire due to the activity and connectivity of firms without public service intervention to improve the economic landscape.

Based on existing literature studies, cluster theory has many supporters and has been applied extensively. However, it also has its critics. The main critics are: Harrison and Glasmeier (1997); Martin and Sunley (2003); Kitson et al. (2004); Motoyama (2008); Crawley and Hill (2008); Crawley (2009); and Hobbs (2010). Martin and Sunley (2003) and Kitson et al. (2004) identified three major shortcomings in regard to clusters: (1) The notion of regional competitiveness and specialisation; (2) Geographical and industrial ambiguity; and (3) Universalism. Furthermore, Motoyama (2008) contributed two more crucial limitations: (4) The descriptive and static nature of the theory, (5) The practical application of enhancing the interconnectedness of the cluster. As a result of the extensive literature review, this study proposes the following criticisms: (6) The understanding of convergence and its applicability

to cluster theory; and (7) The difficulties of identification, measurement and analysis, the V-LINC mapping analysis framework is striving to solve this issue (Hobbs, 2019).

Figure 2.6: Good Cluster Practice and Impacts



Source: Adapted from Literature Review by Author

Lagendjik (1999 p. 194) discussed the impacts and benefits of clusters as *"waiting for and receiving grant money is for some firms the main issue for joining clusters"*. However, Rocha, (2004) suggested that physical infrastructures within clusters influence a firm's productivity, helps to lower transaction costs and increases the quality of services. Pouder and St. John (1996) argued the converse, as they have suggested that as clusters grow, saturation within the

cluster may create diseconomies of scale. This is reflected by a higher cost of living, real estate values, and salaries of technical personnel. Figure 2.6 has been adapted from Lagendijk (1999), there are some 'Do's and Don'ts' when it comes to clusters. This can be described as of interest to this study as it has illustrated that when clusters start to emerge (Bieńkowsk and Creţu, 2016), certain factors must be thoroughly and carefully examined. Arguably, both can affect the impact and benefits of clusters in some form.

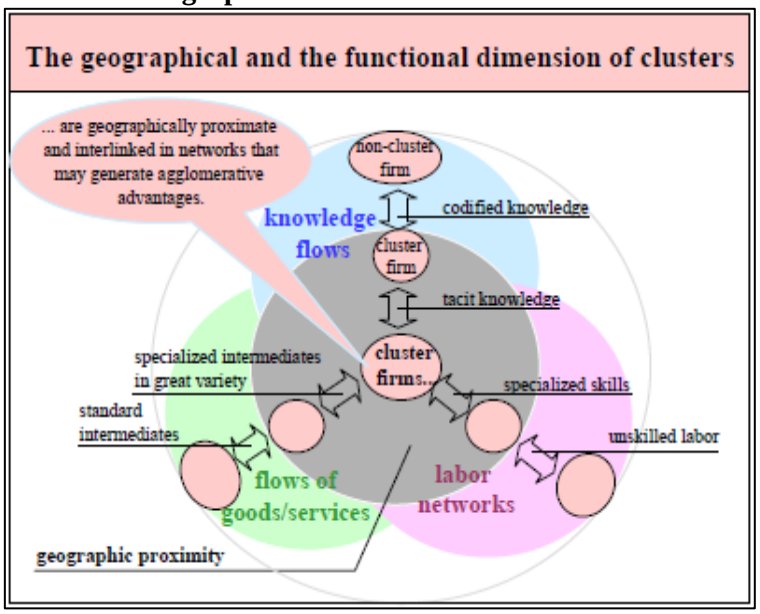
Ketels (2003) emphasised that cluster components can enjoy positive economic benefits from cluster co-location, participation and development. These include: (a) Access to specialised human resources and suppliers; (b) Knowledge expertise availability; (c) Pressure for higher performance in head-to-head competition; and (d) Learning or knowledge spill from the close interaction with specialised customers and suppliers. Ketels (2003) also argued that a business which operates as part of a cluster-based economy can experience improved performance levels. This is due to companies operating at a higher level of efficiency with more specialised assets and suppliers, and shorter reaction times than if operating in isolation. It can be argued that levels of innovation can also be higher amongst companies and research institutions located within a cluster. Roberts and Enright (2004) proposed that businesses which operate within a cluster milieu can form a syndicate to tender for large projects or access export markets. Brown (2006) has discussed that rural regions can benefit by:

> *(1) The capacity for rural regions to innovate is built by industry clusters;*
>
> *(2) Clusters are "incubators of innovation" and therefore help enhance regional prosperity;*
>
> *(3) There is a commitment in rural regions to mobilize their inherent potential, but coherent ideas with actionable guidance on how to develop and implement new strategies are needed for policymakers; and*
>
> *(4) Clusters enjoy higher average wages, productivity, rates of business formation, and innovation than non-cluster firms.*

As discussed by Porter (2003), not all regions that identify as a cluster are more innovative or efficient than regions which are not identified as a cluster. Even regions which encompass a cluster should enact cluster-based strategies for improvement. It can be posited that no two economic regions are the same and that each have a unique history, labour climate, human capital, infrastructures, industry competitiveness, external market conditions and culture which influence how strategies may work and how firms may respond. When exploring the advantages and disadvantages theory of clusters, it can be said that it is important to comprehend why regions might pursue a cluster analysis study or investigate whether a cluster exists within the region. To support this viewpoint, Bergman and Feser (2000) examined why most regions might follow an industry cluster analysis. They suggested that: (a) Regions' become aware of the leading industries, but require an understanding of the collaborations between industries could be enhanced; (b) Examine potential strategic alliances between industries or different—or possibly as yet undeveloped—regional industries; and (c) Little knowledge is known of their main regional strengths and potentials.

The purpose here of identifying the advantages and disadvantages of clusters is to understand how their existence affects the economic environment. Lagendjik (1999) discussed that based on the concept of clustering itself, firms had been challenged with an **identity problem**. Kim (1995) and Hoover (1936) developed a framework (see Figure 2.7) which has highlighted the key results of both 'clustered' and 'non-clustered' firms. It can be argued that this model is an adaptation of both Marshall (1920) and Porter (1990) business cluster workings due to its geographic and agglomeration nature. It can be proposed that the activity involved in the 'clustered' firm, considerably outweighs that of the 'non-clustered firm'. This suggests that the advantages of being involved in a cluster are significant. On examination of the framework: the networks; knowledge; and flow of goods/services are the key components of a cluster.

Figure 2.7: The Geographical and the Functional Dimension of Clusters



Source: Kim (1995) and Hoover (1936)

Arguably, the creation of clusters, whether they be regional, national or international, can provide similar businesses and industries with massive opportunities, in order to achieve sustainability and growth. It can be said that clusters help to deliver a platform and structural environmental landscape in order to achieve stress as they amalgamate business-to-business (B2B) activities (Romanelli and Khessina, 2005). According to Kesidou and Romijn (2008), clusters enable (*benefits*) enterprise development and the development of successful start-up firm growth by:

- **lowering** the costs of entry
- enhancing **opportunities** for innovation-based entry and
- allowing start-up firms to **leverage local resources** to expand new businesses more rapidly

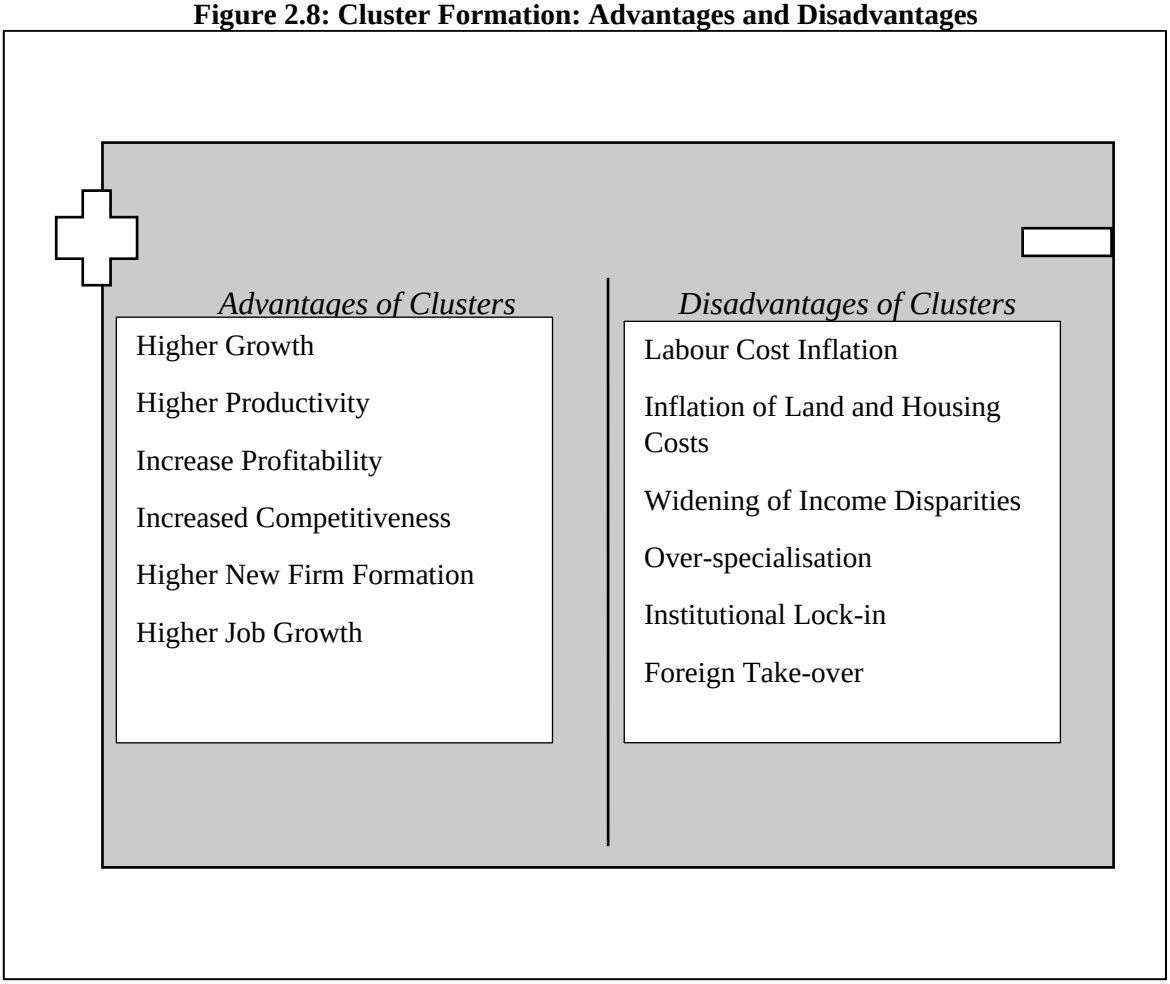
Porter (1998) proposed that clusters provide a fundamental pathway to a new way of thinking regarding economic performance, and the organisation of economic development efforts in many contexts. It can be argued that clusters help to extend the thinking of many aspects of economic policy, such as export enhancement, the attraction of Greenfield investment, research

and development, technical and vocational training and infrastructure. Porter (1998) has additionally argued that clusters *"provide a means for bringing together firms and institutions and identifying the impediments and constraints that are holding back productivity".* Oakey (2007) argued that *problems* can be associated with creating successful clusters:

- **Time-consuming** which can be illustrated in the case of Silicon Valley which took over 40 years to create
- To be effective, there must be a restriction to a **limited number of projects** in existence in a limited number of locations. Consequently, many geographical location and sectors will be neglected and
- To operate effectively, clusters **must have strength** resulting from internal collaboration and external unity which is within the wider regional and national economic framework

Rocha (2004) has proposed that the negative impact of clusters is due to the region only having one or two clusters which are drivers for growth. When considering these matters, the region has a greater possibility of regional despair before economic or competitive shocks than a more diversified region. Martin and Sunley (2003) have argued that clusters have costs disadvantages associated with their development as well as benefits. Their claimed advantages and disadvantages have been mapped out in Figure 2.8 below to showcase their significance. One could argue that whilst there are *disadvantages* associated with the development of clusters, the *advantages* outweigh these. As Steiner (1997) has suggested that clusters are a decisive component for the competitiveness of regions and nations. According to Romanelli and Khessina (2005), growth in urban areas has major implications on the creation of a new cluster in peripheral locations. Inevitably, though the creation of a cluster can be a viable solution to unsustainability in any business sector.

Figure 2.8: Cluster Formation: Advantages and Disadvantages



Source: Adapted from Literature Review by Author

Arguably, successful regional and business clusters are attractive to major multinational companies as they help raise the appeal of their sector and region, maintain employment, and foster entrepreneurship. Nevertheless, it can also be important to place an emphasis on 'economies of agglomeration' (see Section 1.4) which can be described as the benefits which businesses attain when they locate adjacent to one another, as a result successful new enterprise developments and strategic relationships are formed. Rosenfeld (1997, 2002) argued that the formation of clusters are not suitable to every region as they are not endowed with the necessary resources, conditions or factors for clusters to emerge (Bieńkowsk and Creţu, 2016), or for creation or sustainability. It can be said that the activity and events at the local, regional or national level have influenced the development of clusters. So too can the failure of clusters to

transpire be aligned to previous insufficiencies with regards to 'lack of investment' and 'skilled labour,' or 'ineffective policy construction' and 'execution'. For instance, *"the bakery industry case study that a history and tradition of* ***inter-firm rivalry*** *and* ***secrecy*** *has prevented a spatially concentrated group of firms from developing co-operative links with one another,"* (Rosenfeld, 2002). Subsequently, it has been suggested that this can, in turn form a major barrier to the industry's development from spatial concentration to cluster augmentation. Jacobson et al. (2002) identified other factors such as pollution and congestion, infrastructural deficits, inability to access capital, technology and innovation, regional isolation, poor levels of education/institutional structures and absence of a skilled workforce as key fundamentals which inhibit the development and growth of clusters (Rosenfeld, 1997, 2002; Sengenberger and Pyke, 1992; Amin and Thrift, 1994; Keeble et al., 1999; Carbonara, 2002). Arguably, whether the creation of a cluster is an advantage or disadvantage, the context and resources need to be right.

Sivitanidou (1999) concluded that the notion of clusters remains messy at best in expression. It also does not provide a starting point for rigorous cluster identification exercises. Sivitanidou (1999) has suggested that there is no full understanding of the spatial scope of clusters and where the spatial boundaries of clusters exist. The creation of clusters whether regional, national or international, can provide similar businesses and industries with massive opportunities to achieve sustainability and growth. The various advantages of clusters and how they enable enterprise development and the development of successful start-up firm growth, have been discussed. Although there are many advantages, clusters have high costs and time-consuming issues associated with their development (Rosenfeld, 1997, 2002). Whilst there are many disadvantages associated with the development of clusters, one might posit that the advantages can outweigh these. To enhance the advantages and disadvantages of clusters, the models and frameworks for clusters have been explored.

2.4. Models and Frameworks for Clusters

As clusters are quite complex it is salient to include a table of cluster frameworks (see Table 2.5) which maps out the process of the key cluster models. The purpose of this menu model is to illustrate the cluster-based economic growth aspect of this research study. It is generally accepted that there are more models embedded within the literature area such as Kind and Köcker (2012). However, the following have been included as they can be described as being the most pertinent to this study (Field, 2016: Clusterdevelopment.com, 2016; Kamath et al., 2012; Sölvell, 2008; Etzkowitz, 2002; Ketels, 2000; Kuah, 1998; Porter, 1990; Ramsawak, n.d, pp.1-2). The main purpose of this model was to understand what core elements are needed to support the emergence of new clusters and betterment of existing clusters.

On review of Table 2.5, it can be determined that 'industrial, educational and governmental organisations play an integral role in the emergence and enhancement of business clusters (Etzkowitz, 2002). It can be further suggested that this approach can too be adopted in demonstrating the bottom-up convergence approach cluster-based economic growth in regions. Cluster development requires significant investment from the so-called 'triple-helix' which is comprised of the interactions between industry, universities and government. To support this, Etzkowitz and Zhou (2017) emphasised that it is the interactions and relationships between the three actors of the triple-helix, which provide an optimum environment for entrepreneurship and innovation. This in turn enables the transition of research and knowledge, into practice and use. They highlight that the central role of the triple helix is to enhance innovation, research, entrepreneurship, and regional development. However, they also note that over time industry, university and government interactions can be taken for granted and that their effectiveness can dissipate.

Table 2.5: Prospective Business Cluster Models Driving Economic Growth

(1) A Cluster of Possibilities – (Field, 2016)

- Skilled Workforce / Industry Advocacy / Market Intelligence
- Access to High-Cost Resources / Technical Solutions / Pooled Purchasing

(2) Business Cluster Development Model – (Clusterdevelopment.com, 2016)

- Incubation & Acceleration / Cluster Growth Strategies
- Regional Innovation Clusters / Entrepreneurship / Commercialisation
- Eco-systems / Collaboration / Technology / Universities

(3) The GEMS Model – Kamath et al. (2012)

- Anchor Effect / Business Climate / Industry Networks / Public Policy / Historical Factors
- Concentration of Firms / Innovation & Entrepreneurship / Element of Chance
- Porter's Diamond Model Incorporated

(4) Cluster Factors Model – Sölvell (2008)

- Education & Research / Media / Business Environment / Financial System
- Government & Public Administration / Organisations for Promotion & Collaboration

(5) Cluster Development: The Triple-Helix Model – Etzkowitz (2002)

- Business Environment (Industry) / Education & Research (Universities/IOT's) / Government & Public Administration

(6) Key Dimensions of Clusters – (Ketels, 2000)

- Geography (Proximity) / Actors (Interaction) / Industries (Linkages)
- Bottom-Up / Regional Activity / Own Strength & Resources / Co-operation

(7) Cluster Strategic Fit Model – Kuah (1998)

- Infrastructure / People / Science & Technology
- Government Support / Management
- Finance / Home Market / Internationalisation

(8) Porter's Diamond – Porter (1990)

- Related & Supporting Industries / Demand and Market Conditions /
- External Factors Conditions / Firms Strategy Structure & Competition

(9) Cluster Industries Emerging as the Engines of Economic Activity – Cluster Models and Case studies - Ramsawak (n.d, pp.1-2)

- Human Resources / Capital Finance / Technology R&D
- Physical Infrastructure / Tax & Regulatory Environment
- Actors - Companies / Institutions (IFCs) for Collaboration / Government / Research Community

Source: Adapted from Literature Review by Author

There is no static equilibrium at which the optimal configuration of the triple helix has been achieved. As there is a constant evolution of competition, which necessitates a constant reconfiguration of the role which each actor plays in the system and a re-imagining of the processes of engagement. For the purposes of this research study, the 'Cluster Development: The Triple-Helix Model' by Etzkowitz (2002) has been selected. Its transparent integration of the key actors which make up a cluster is extremely useful. This model will be used throughout this research study as a benchmark for understanding the key elements of a cluster, and what facets should be examined when conducting any work on clusters. The following section has examined the empirical evidence of clusters, in order to seek out some contextualisation within clusters and their development and growth.

2.5. Empirical Evidence of Clusters

The application of good cluster practice examples forms an important part of this research study. Spain, The Republic of Ireland, Portugal, Lithuania, Finland, Latvia, and Italy have been identified as examples. Specifically, five good practices have been found which can serve as effective international best practices for cluster development. Hobbs (2019) proposed these as: (1) The Innovation Poles Programme in Piedmont that brings together actors from across the triple helix to develop strongly connected innovation clusters; (2) The Gaming cluster in Kainuu answers to the challenge of industrial renewal; (3) Rural Policy Council (MANE) which brings actors together to develop rural areas; (4) The Laser and Engineering Technologies cluster LITEK cluster in Vilnius; and (5) the Coworking space and creative centre "Skola6". The first example of good practice is drawn from the Metropolitan City of Turin in Italy. The second and third from Kainuun Etu in Finland. The fourth from Sunrise Valley in Lithuania. Finally, the fifth is taken from the Vidzeme Planning Region in Latvia (Hobbs, 2019).

Table 2.6: EU Clusters

Country Rank out of 75 Countries	State of Cluster Developm. Rank	Overall Cluster Rank	Overall Business Environm. Rank	Overall Micro-economic Rank
Finland	4	7	2	2
UK	5	5	3	3
Germany	7	3	4	4
Sweden	9	14	8	6
Netherlands	14	10	10	7
Denmark	22	21	9	8
Austria	16	11	12	12
Belgium	25	16	15	13
France	21	13	21	15
Ireland	10	26	22	20
Italy	1	4	24	24
Spain	30	18	25	25
Portugal	32	38	32	36
Greece	67	58	41	43
EU average	19	17	16	16
EU (GDP weighted)	14	11	13	12

Source: Ketels (2003)

In recent years, the European Commission has increased its focus on the examination and support of clusters, and it has supported a range of research projects. They have developed specific bodies whose main focus is to enhance cluster activity. Example of these bodies are European Cluster Collaboration Platform (ECCP), European Cluster Observatory, European Cluster Alliance, European Cluster Excellence Initiative, TACTICS group, PRO-INNO Europe (Clunet) and the European Cluster Policy Group, (Kind and Köcker,2012). As examined by ECCP (2019) to date, 1,061 clusters have been mapped (out of which 103 are external to Europe) with 3,000 statistical industry clusters represented in the EU. These provide a key contribution to 54 million jobs and attributing to salary increases of 3% for firms within clusters compared to companies not in an industry cluster (Ketels, 2003).

Figure 2.9: Schematic Diagram of Cluster Overlap in the US Economy

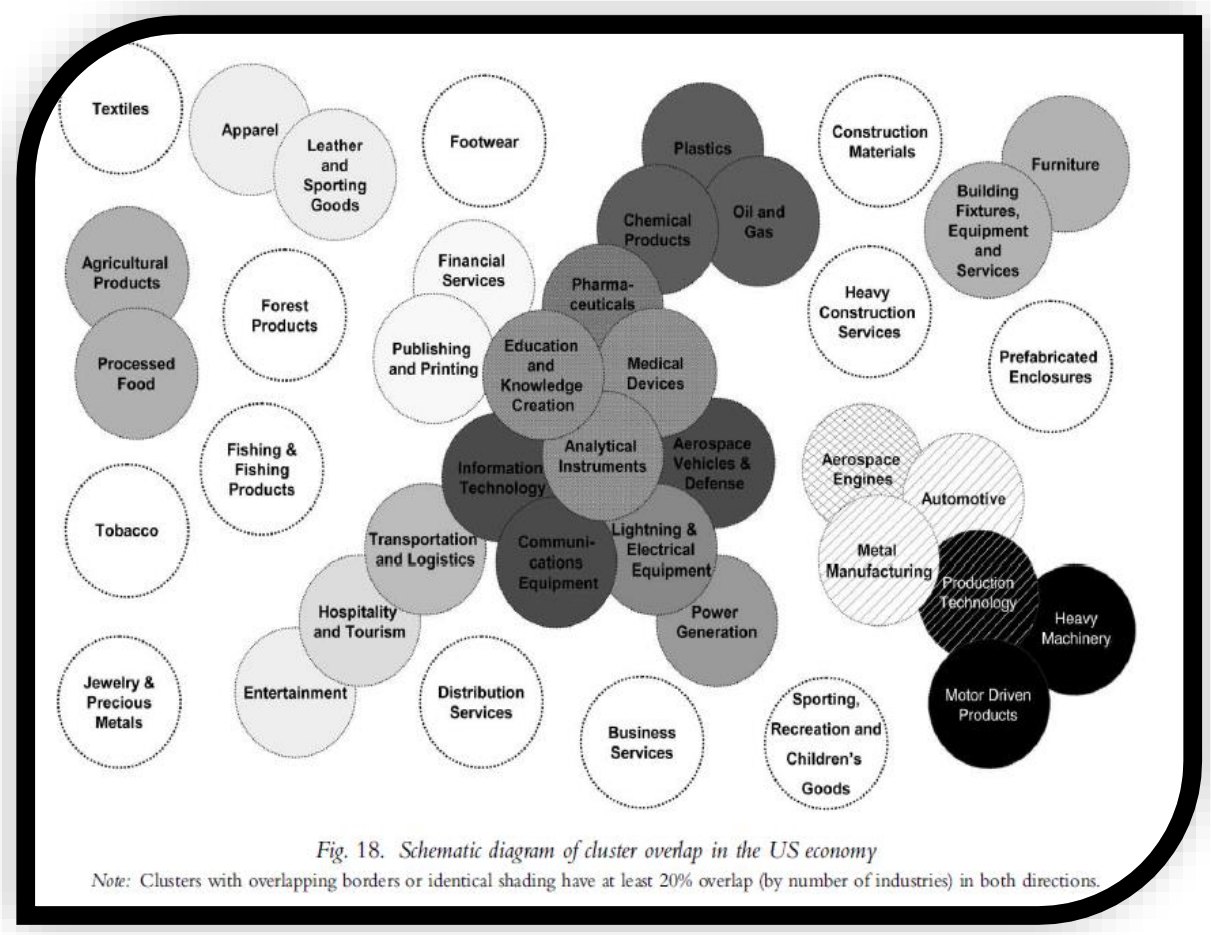


Fig. 18. *Schematic diagram of cluster overlap in the US economy*

Note: Clusters with overlapping borders or identical shading have at least 20% overlap (by number of industries) in both directions.

Source: Porter (2003 p.16.)

It is interesting to note that in reference to this Table 2.6, the Italian context's stage of cluster development ranks the poorest at (1). Their overall cluster rank is also quite low at (4) in comparison to how well Greek clusters are performing. This would suggest that there is a significant opportunity for more clusters to emerge in Italy and improve its economic landscape. Arguably, The Republic of Ireland is maybe performing at a 'catch-up' level (see Section 3.11) (Enterprise-ireland.com, 2019).

One could propose that clusters are important to industry sectors as they help to incorporate common technologies, skills, knowledge and purchased input. According to Porter (2003), there is an occurrence of 'overlapping' (refer to Figure 2.9), of industry sectors across clusters

in the US. He goes on to state that 'overlapping' within clusters means being connected with numerous others. For instance, schooling, knowledge enhancement and systematic instruments, whereas other clusters are mainly independent. The importance of overlapping clusters has been further examined in Table 2.7. Porter has further suggested that overlapping in clusters can cause double calculations of employment for industries. He explained that *broad* and *narrow* cluster definitions are the solution to double counting of employment. Broad clusters are simply all the industries which are within a cluster (Delgado et al.,2010). Based on the year ending 2000, US statistics, the main cluster was business services which had 4,667,320 workers. It can be argued that based on this table, the typical cluster had 854,352 workers and the smallest cluster which was footwear had only 23,962 workers in 2000. Clusters should be categorised differently in relation to employment, wages, growth in employment, and growth in wage rates.

Saxenian (1994) and Oakey (1985) have examined the international clusters of Silicon Valley (chipmakers) and Boston Route 128 (minicomputer companies) (see Section 2.8) (the world's leading centres of innovation in electronics). Robust university, governmental support, and industrial links (Etzkowitz, 2002) have helped to augment the growth of these clusters. Both regions were lagging in the 1980s coupled with the global recession at that time. The participants/stakeholders saw an opportunity to create an alliance, in order to nurture and improve their economic output, as a result, a business cluster formed. Saxenian (1994) further argued that successful new start-ups, spin-offs, and the rejuvenation of existing firms in Silicon Valley, Northern California, became a trend after this cluster formed. It can be argued that national and international cities with business cluster strategies tend to grow much quicker than non-clustered cities (Rocha, 2004; Baptista and Swann, 1999; Breschi and Lissoni, 2001), hence the development of Table 2.7 below.

Table 2.7: EU Linkages between Clusters and Emerging Industries

Emerging Industry	Cluster Category	Overlap Cluster (100%) part of the industry)
Digital Industries	IT Communications Medical Devices	IT Communications
Logistical Services	Transports	Transport
Creative Industries	Bus. Services Marketing Video Music	Bus. Services Marketing Video Music
Experience Industries	Tourism Performing Arts	Tourism Performing Arts
Biopharma	Biopharma Downstream/Upstream -Chemist	Biopharma
Advanced Packaging	Paper Plastics	Paper
Mobility	Aerospace Metal Working Automotive Lighting Appliances Upstream Metal Production Tech	Automotive Aerospace
Environ Services	Downstream metal Electric Power Environ Services Agriculture Wood Production Oil & Gas	Electric Power Environ Services
Medical Devices	Medical Devices Appliances IT	Medical Devices
Blue Growth	Fishing Electric Power	Fishing Electric Power

Source: Adapted from Literature Review by Author

The ten emerging industries as illustrated in the framework above partially overlap and thus, have clusters which link them. Subsequently, this exposes linkages between clusters and emerging industries. As discussed by Bieńkowsk and Creţu (2016) in Section 2.2, clusters emerge and Ketels and Protsiv (2014) explained that industries emerge. Therefore, as they both emerge, there must be an underlining connection between them, which enhances the overarching enterprise landscape and competitiveness of firms within that environment. Among the ten emerging industries in Table 2.7, there are a number of different 'branches' which have been included. The clusters are the connection between the industries and some of these connections have been identified as being relatively narrow (Delgado, 2015; Porter, 2003; Oakey, 2007), based on only one cluster category. Others are broader (Feser, 1998; Porter, 2003; Delgado et al., 2010), with a range of clusters having 'bridges' between the emerging industries (Ketels and Protsiv, 2014). As a result, some clusters and emerging industries have more in common than others which one could argue helps to improve REG and entrepreneurship (refer to Section 2.6.3).

2.6. Clusters and Entrepreneurship

The entrepreneurial process can be regarded as an important factor for cluster growth. The number and scope of firms in a cluster are normally influenced by the activities of entrepreneurs, who may form new businesses as spin-offs or in the wake of layoffs (Icma.org, (2012). Chinitz (1961) stated that a vital requirement for entrepreneurship is the existence of a structure of smaller suppliers, as entrepreneurship would be greater in regions which have smaller suppliers.

> *Small firms themselves caused further entrepreneurship by lowering the effective cost of entry through the development of independent suppliers, venture capitalists, entrepreneurial culture, and so on. The supply of entrepreneurship differs across space* (Chinitz,1961).

As a result, some regions just have a higher number of entrepreneurs. As stated by Glaesar and Kerr (2009), *"the presence of small suppliers and workers in relevant occupations is associated with a higher level of new business creation".* Glaeser and Kerr (2009) also highlighted that, "s*ubsequent employment growth is further aided by small establishments in other industries. Having small independent suppliers and customers is beneficial for entrepreneurship. Entrepreneurship will be higher and establishment size lower in high amenity places among industries with lower fixed costs".* SMEs are continuously receiving specialised consideration as they are extracting and producing *"economies of convergence and agglomeration",* (Delgado et al., 2010). This is the benefit which businesses attain when they locate adjacent to one another and create successful new enterprise developments. Existing firms in a geographical area which rely on strong regional clustering as described by Oakey (2007), focus on the importance of 'anchor' or multinational firms which encourage spinoffs and entice corporations for related industry sectors. Consequently, there is a difference between Oakey (2007), Porter (2003) and Delgado et al (2010) and (2011). They agreed that clusters enhance economic activity and improve the proximity and business environment in which they are located. It can be argued that related firms and business sectors that locate adjacent to one another can nurture the development of successful new enterprises.

Delgado et al. (2010) found that a strong cluster environment which surrounds an area in the industry *"enhances the incentives and potential for entrepreneurship*". The geographical location of clusters is of major importance, as it contributes to the effective output of shared local resources, comparable technologies, skills, knowledge, infrastructures, consumer demands and institutions. This, in turn, facilitates agglomeration throughout complementary and related industry sectors. Higher growth expectancy levels are met when a strong cluster environment at a region-industry level facilitates output and efficiency. Therefore, increasing the returns to business growth/expansion, capital investment, and innovation, thereby

improving job establishment and productivity levels. Entrepreneurial activity is lowered in the intense price-based competitive environment, as fierce rivalry can lead to increased pressure to innovate and increase entrepreneurial incentives (McHardy et al., 2005).

It can be argued that clusters positively influence the growth of entrepreneurship. Clusters are important for the creation of new firms and new establishments of existing businesses. Regional clusters have the potential to integrate into national and international value chains due to their stature in home markets. Clusters tend to improve entrepreneurial activity, enable innovation, and enhance business performance and productivity (Delgado et al., 2010). Firms that exist within regional, national or international clusters are on the precise path to achieve success. For example, the Silicon Valley cluster as discussed by Oakey 2007, is one of sheer innovation and idea generation, thereby facilitating enterprise development and cluster environment success. This may improve economic activity and performance. Certainly, regional areas are crucial to the overall performance of economies. This performance varies in relation *"to wages, wage growth, employment growth and patenting,*" (Porter, 2003). Performance is influenced by trade clusters which can shape wage rates in national industry sectors. Furthermore, strong cluster vitality and innovation may influence regional economic performance.

2.6.1. Importance of Clusters to Entrepreneurship

Clusters matter for entrepreneurship. Industries located in regions with strong cluster experience show higher growth rates in new business formation and start-up rates. The link between clusters and entrepreneurship is twofold since entrepreneurial culture also influences regional performance and can further strengthen local clustering processes. However, it is the entrepreneurial culture of Silicon Valley which allowed it to grow into a global hub for semi-

conductors, as Saxenian explained, when contrasting the regional performance of Boston Route 128 and Silicon Valley (Saxenian, 1994; Lämmer-Gam et al., 2016). However, it is key to point out that many other factors drive entrepreneurship in regions, such as local demand characteristics, specialised institutions and the structure of the regional business and social networks (Delgado et. al., 2010).

After examining the advantages and disadvantages of clusters in Section 2.3.2., they contribute to higher entrepreneurial rates. The co-location of firms, customers, suppliers and other institutions also increases the view of innovation opportunities, while in turn augmenting the pressure to innovate. It can be proposed that since entrepreneurs are essential agents of innovation, a robust cluster environment should nurture entrepreneurial activity. The presence of a robust cluster milieu can decrease barriers to entry and growth and thus, become a vital driver of entrepreneurial dynamism (Porter, 2000). Porter (2000a) asserted that clusters influence competition in three ways: (a) Increasing the productivity of cluster firms; (b) Increasing the innovation capacity of firms; and (c) Stimulating new business formation. There is a consensus that research has developed linking clusters, with improved economic performance. However, they are not the only drivers of regional success. Firms within clusters are found to have increased levels of innovation, thus enhancing the entrepreneurial environment (Audretsch and Feldman, 2004; Fornahl et al., 2010; Delgado et al., 2014).

2.6.2. Developing an Entrepreneurial Environment in Clusters

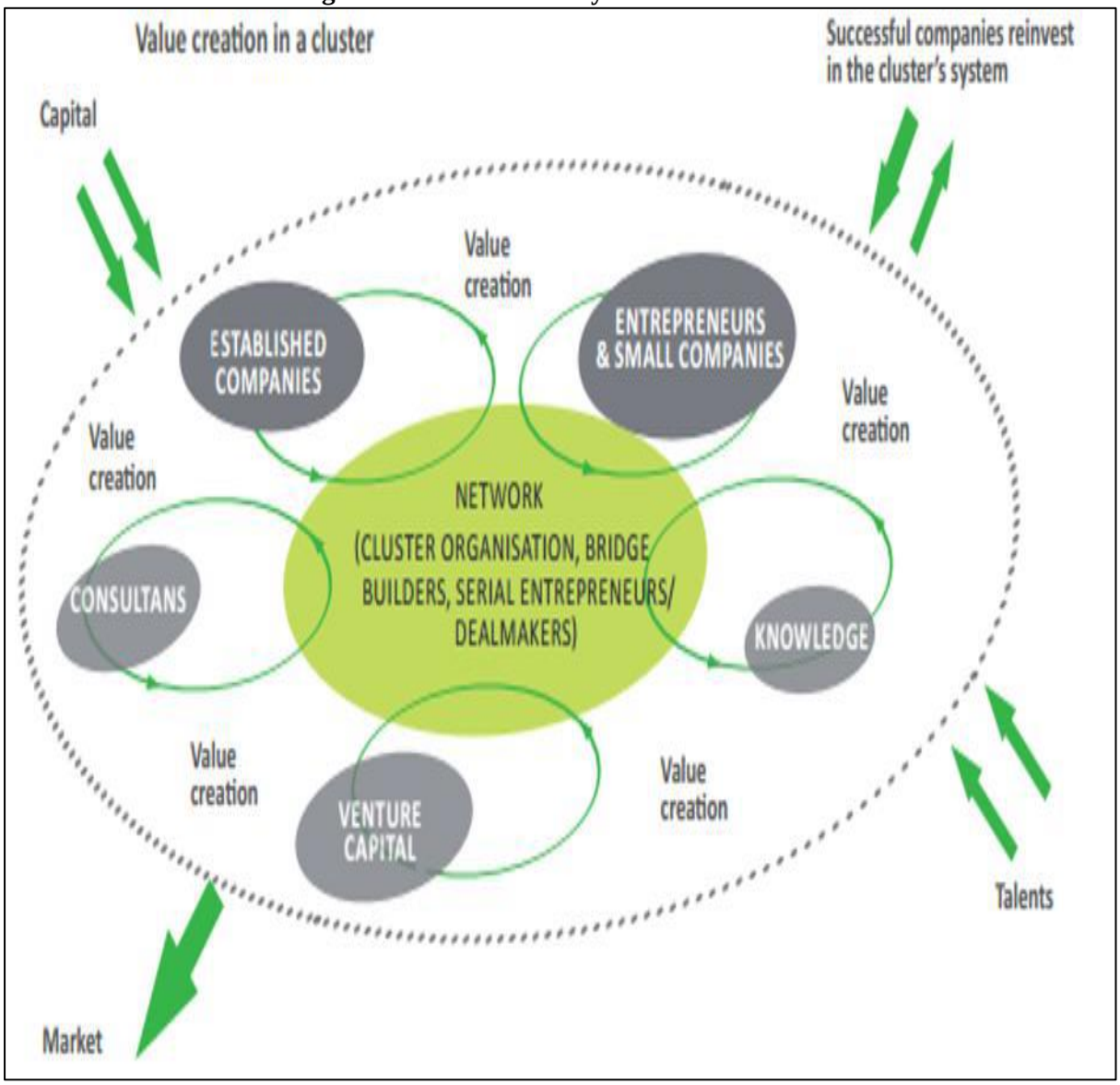
Clusters are also known to stimulate entrepreneurship and the development of new companies. They provide many of the supports needed for entrepreneurship to take place, such as: Access to networks; external assets; lower costs; and ‘anchor’ firms, which upsurges new firm creation (Guiso and Schivardi, 2007; Feser et al., 2008; Glaeser and Kerr, 2009; Delgado et al., 2010).

Survival rates and firm growth are higher in clusters as well (Audretsch and Dohse, 2007; Delgado et al., 2010). The cluster entrepreneurial environment results in more pressure on firms to innovate. This is due to competition, easy comparison with rivals and close relationships with suppliers or MNCs with high standards. The cluster environment of formal and informal connections, trust, and sharing of ideas is a rich source of innovation. Sölvell and Protsiv (2008) noted that clusters have a significant influence on its commercialisation, not only the creation of knowledge enhancement. Previous case studies which focused specifically on knowledge spillovers in clusters have shown that knowledge emerges easily in clusters (von Hippel, 1988; Saxenian, 1994; Dahl and Pederson, 2004). Baptista and Swann (1998) found that firms are more likely to innovate if own-sector employment is strong, although the effect of robust employment statistics in other industries did not appear to be significant due to congestion effects.

2.6.3. Cluster Entrepreneurial Eco-system

The word ecosystem (see Section 2.3.1) has become synonymous with explaining a complex network or interconnected system of an entrepreneurial environment (e.g. Silicon Valley's entrepreneurial ecosystem) (Engel, 2016; Saxenian, 1990, 1994). With regard to clusters, the word ecosystem incorporates the community of interacting stakeholders, much like an entrepreneurial ecosystem, (firms in an industry or product/service market, firms along the supply chain, government agencies, research and academia and bodies for collaboration), in a defined geographic area (Mason and Brown, 2013). The common term 'ecosystem' has been defined as, *"a biological community of interacting organisms and their physical environment"* (Oxford English Dictionary, 2012). Napier and Bjerregaard (2013) argued that cluster analysis requires more than measuring a possible cluster and contend that it is equally important to identify the cluster stakeholders, their cooperation, dynamics and cohesion.

Figure 2.10: Cluster Ecosystem Stakeholders



Source: Napier and Bjerregaard's (2013)

They define the stakeholders of their cluster ecosystem model as: (1) Large established and collaborative companies which act as flagships and reinvest their success in the cluster; (2) Entrepreneurs and small innovative companies that create innovation in the cluster; (3) Relevant knowledge stakeholders that bring new knowledge to the cluster; (4) Venture investors who are willing to invest in innovation and (5) Service providers who can support companies in their development and innovation cooperation (see Figure 2.10 above).

Understanding the influence of clusters on economic growth after examining the area of entrepreneurship can be described as forming an important part of this research study.

2.7. Understanding Cluster-Based Economic Growth

Ketels (2015) argued that with the presence of strong regional and economic clusters comes *prosperity* (employment generation, increase in wages), *entrepreneurship enhancement* (development of new firms and survival of existing firms) and *structural change* (emergence of new clusters). He further stated that within cluster-based economic growth (see Figure 2.10), there are three key issues: (1) Emerging clusters; (2) Impact assessment; and (3) Clusters and competitiveness. Cluster-based economic growth has been extensively examined by authors such as Porter and Ketels. They have both argued that clusters can be regarded as a market-based tactic to the development of economic policy that cultivates new roles for government and firms, as well as for universities, research institutions, trade associations and others (Ketels, 2004). Various other scholars and studies such as the site Icma.org (2012) have stated something similar: "*Cluster-based economic growth strategies are interventions designed to improve a cluster's performance by addressing the common needs of businesses within the cluster".* Clusters can be described as geographic concentrations of rival and collaborating businesses which tend to stimulate innovation practices and higher than average incomes.

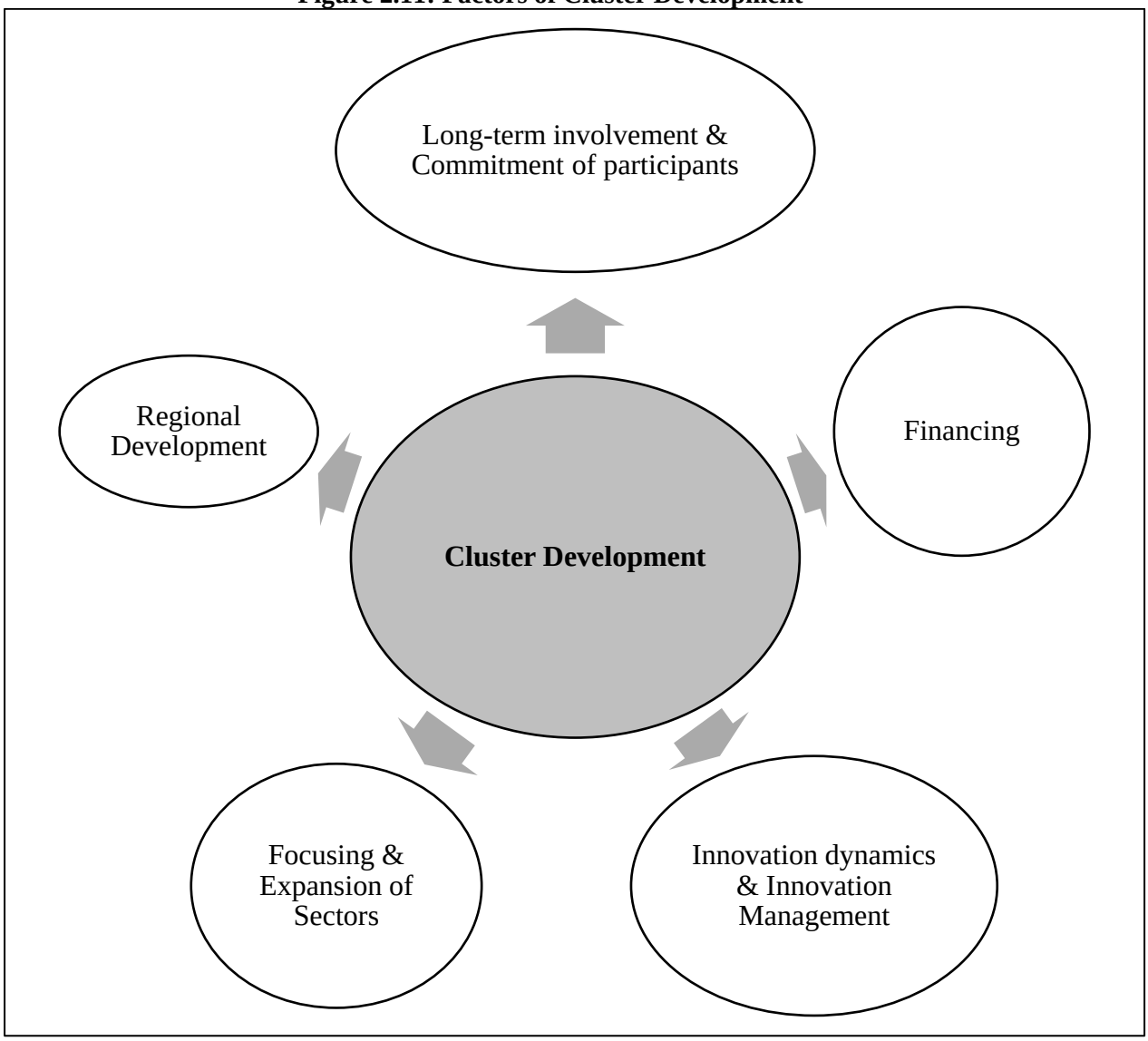
Ketels (2004) has further proposed that in terms of cluster-based economic growth, they are crucial engines in the economic structure of national and regional economies. They can help recognise important challenges in the national or regional enterprise landscape and can provide new roles for government, firms and other associations in economic enhancement. Dreyfuss (2011) posited that cluster-based economic growth is supposed to be an alternate approach to current economic development policies. Arguably, cluster-based economic growth transpires based on the premise that a region should ascertain a small number of industries which are the

focal point for the region's growth strategy. According to Bieńkowsk and Creţu (2016), it is interesting to note their opinion on how clusters develop as they have argued that clusters are in the vast majority of cases not 'created' but accidentally emerge. Their perspective and viewpoint is that different geographical locations offer different types of prospects, for specific corporations to invest, succeed and grow:

> *Clusters are the result of a cumulative process, where the success of one company paves the way for others to follow. Such processes take a long time and are inherently unpredictable. Cluster evolution is a natural process, but it is not automatically a successful one* (Bieńkowska and Creţu, 2016).

Ter Wal and Boschma (2009) have disagreed with this perspective as they have argued that it is not clear how clusters emerge or how they are formed, what their main drivers are and what processes they involve. Rosenfeld (2000) has recommended that there must be a process of development in place for clusters to transpire, develop, and grow and that there are different scales/stages at which cluster development can take place (i.e. local, regional or national level). He has discussed the four scales/stages. The first is the *embryonic cluster*, which through *"innovations, inventions or inward investment"* progress into a growing cluster. The second, a cluster which is at the *growth stage* is one *"where markets have developed sufficiently to spin off and attract imitators and competitors,"* so that enterprise and entrepreneurial activity is encouraged. The third, a growing cluster cultivates into a *mature cluster* once *"the processes or services become routine and when more 'imitators enter the market"*. The fourth and final one only when *"products become fully replaceable by lower cost or more effective substitutes,"* does the maturing cluster divulge into a period of *decay or decline* (Rosenfeld, 2000). These four development stages can be compared to that of Malakauskaitė and Navickas (2011) cluster life cycle pattern. Arguably, people, planning, processes and projects are the other necessary elements involved in the development of clusters (Rosenfeld, 1997).

Figure 2.11: Factors of Cluster Development



Source: Adapted from Literature Review by Author

Alternatively, Kind and Köcker (2012) suggested that cluster development is a set of complex tasks which demands a long-term perspective. Kind and Köcker have proposed that five fundamental factors are significant for long-term, effective and successful cluster development. These five key factors have been illustrated in Figure 2.11 above. They are: (1) Long-term involvement and commitment of participants; (2) Financing; (3) Innovation dynamics and innovation management; (4) Focusing and expansion of sectors; and (5) Regional development are the core factors of cluster development., whereas Lagos and Courtis (2008) argued a different perspective (see Table 2.8 below).

Table 2.8: Key Lessons for Cluster-Based Economic Growth

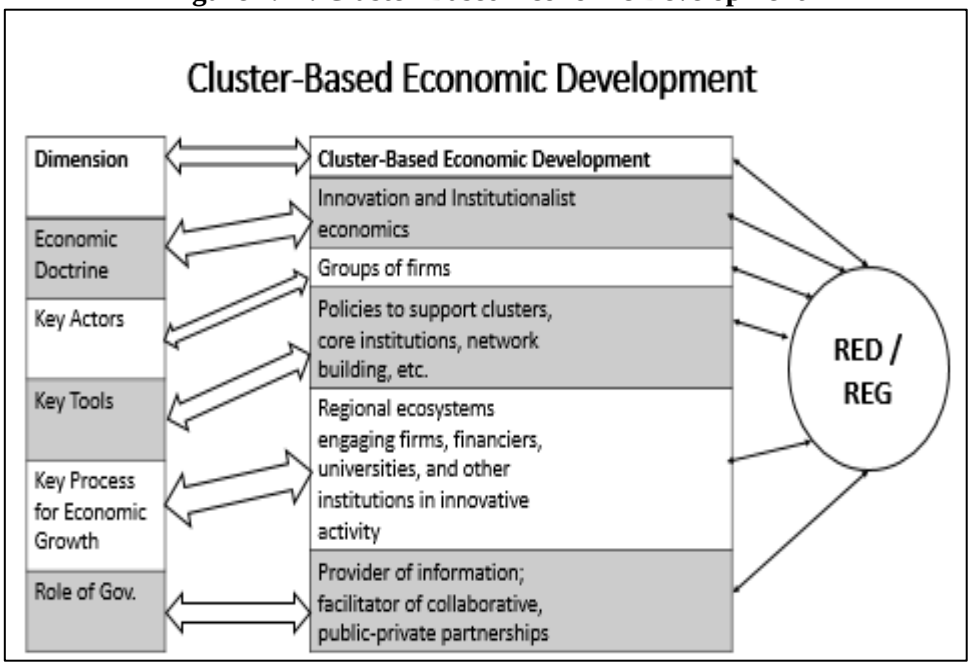
Key lessons for economic development policymakers and practitioners that summarize the use of cluster-based strategies
1. Cluster analysis can help diagnose a region's economic strengths and challenges and identify realistic ways to shape the region's economic future 2. Different regions have different sets of economic development opportunities. Not every place can or should become another Silicon Valley 3. The foundation of a regional economy is a group of clusters, not a collection of unrelated firms. 4. Successful development strategies are usually those that extend, refine, or recombine a region's existing strengths, not those that indiscriminately chase companies or industries. 5. Identifying a cluster's competitive strengths and needs requires an ongoing dialogue with the firms and other economic actors in the cluster 6. It is more important and fruitful to work with groups of firms on common problems (such as training or industrial modernization) than to work with individual firms 7. Economic development subsidies and recruitment efforts aimed at individual firms, if used at all, should be focused on firms that fit within an existing cluster 8. It is difficult for public policy to create new clusters deliberately. Instead, policymakers and practitioners should promote and maintain the economic conditions that enable new clusters to emerge. Such an environment, for example, might support knowledge creation, entrepreneurship, new firm formation and the availability of capital 9. Cluster policy and practice are not: just a public-sector activity, a program, a means of "picking winners", a one-size-fits-all approach to economic development.

Source: Adapted from Cortright (2006 p.35) and Brown (2006)

One could argue that whilst clusters emerge (Bieńkowsk and Creţu, 2016; Perry, 2005; Rocha, 2004; European Commission, 2013), to continue to develop they need consistent support from many stakeholders. Their development can benefit their region or location if conducted effectively. Arguably, the successful development and application of a business clusters strategy is not a short-term fix. The critical foundations must be orchestrated properly, the superstructure must be established cautiously, the internal organisations must be carefully connected, and ongoing maintenance becomes an essential part of the business cluster (Roy, 2001). On evaluation, it can take time for clusters to develop as they are not a phenomenon that just suddenly appears or disappears overnight. Developing a business cluster is a complex

issue, although it can be achieved. Muro and Katz (2010) have developed a framework which highlights the cluster-based economic development process and an adaptation of this has been developed below (see Figure 2.12) for the purpose of this study.

Figure 2.12: Cluster-Based Economic Development



Source: Adapted from Literature Review by Author

As shown above in Figure 2.12, groups of firms, polices, eco-systems, universities and the role of government, are the key factors required for cluster creation and the subsequent development of an economy and its regions (Muro and Katz, 2010). With the competitiveness of regions in mind, both Porter (2008), and Roberts and Enright (2004) have examined that an economy excelling efficiently through continuous innovation is highly important. The encouragement of business clusters and empirical evidence to create new solutions and meet new demands by doing something different is vital to regional growth.

2.8. Empirical Evidence of Cluster-Based Economic Growth

Scant literature focused on assessing the effects of clusters in terms of the broad, cross-cutting way that this research study, along with Porter, Cortright and others, define them (Wolman and

Hincapie, 2014; 2015). Engel and del-Palacio (2011) have explored the Israeli cluster environment and have argued that Israel is a cluster of entrepreneurship and innovation like Silicon Valley (Saxenian, 1994). Furthermore, it is the most prominent place for entrepreneurship as approximately 1,000 new firms are added each year. Moreover, Engel and del-Palacio have highlighted that Israel has the second-highest number, (in absolute terms) after the U.S., of start-up firms worldwide due to the increasing significance of cluster activity:

> *Economic activities that are in clusters account for about 39% of EU jobs and 55% of EU wages - EU has 2,500 strong clusters. Roughly 45% of all employment in traded industries is located in strong clusters. Employees in strong clusters earn 11% higher wages than their colleagues in the same industries but located outside of clusters. Strong clusters have job growth of 0.2% annually in the post-crisis period (2008-2014), while traded industries outside of strong clusters have lost 1.7%. Research in the US has shown that new business formation is higher in strong clusters and that new firms are more likely to succeed and grow if located in strong clusters. Regions that have a higher proportion of their employment in strong clusters register higher overall levels of prosperity. The research has provided increasingly robust evidence that clusters are an important feature of modern economies. It also points strongly to a positive link between the presence of clusters and the economic performance of the firms in these clusters and their regions(Bieńkowska, and Creţu, 2016).*

Alternatively, Ketels and Protsiv (2014) have argued that between 30% to 40% of all employment in the European Union is in industries which concentrate, or 'cluster' regionally, within their study of the EU Cluster Observatory. It can be said that the European Cluster Observatory has allowed, for the first time, a quantitative analysis of European clusters based on a fully comparable methodology. This shows that clusters are an important part of the European economic reality. Based on this analysis, approximately 38% of all European employees work in firms which have some form of cluster involvement. According to a European Commission report (2013), in some regions, this share surpasses 50% while in others it decreases to 25%. Furthermore, this report has suggested that about one-fifth (21%) of these

employees are working in regions which are more than twice as focussed in a specific cluster category as the standard norm.

There are 30 clusters in Catalonia's Cluster Programme (north-eastern region of Spain), which are home to 2,300 firms and more than 309,000 employees. They account for a turnover of over 74 billion euros (Catalonia.com, 2019). It can be argued that Europe is lagging behind the United States in terms of cluster activity and strength. Both from a regional and industrial perspective. One could suggest that the inclusion of a comparison analysis between the EU and US can form an important basis for this study.

When considering these matters, European regions can be described as having a smaller share of employment in robust clusters, *"i.e. regional clusters in which a region is more than twice as specialised as the average region"* (European Commission, 2013). For the standard region, Europe's share of employment is 25% lower than in the United States and for the median region, the gap is even more significant at about a third. One might conclude that while the European regions with the most robust cluster cases can be comparable to their U.S. peers, the dissimilarities are more noticeable among the weaker regions where Europe lags. According to Ketels and Protisvi (2014), there is a gap in creating a network of stronger IT clusters in Europe in order for the EU to become a key driver in the further improvement of IT, in comparison to the US. Ketels and Protisvi (2014) conclude that European methodological data is of poor quality compared to the U.S data, severely limiting its use for cluster analysis (European Commission, 2013, pp.12-15; Ketels and Protsiv, 2014). Conversely, according to a report from European Commission (2013), 38% of the workforce within the EU are active within clusters and that some 2,017 regional clusters exist within the 27 EU nations (ranging from one star – lowest cluster activity to three stars – highest cluster activity/strength) (see Table 2.9 below).

Table 2.9: 27 European Countries: Cluster Mapping (2,017 Regional Clusters)

One star	**Strength - *Low***	**Number: 1338 (67%)**
Two stars	Strength - *Medium*	Number: 524 (25%)
Three stars	Strength - *High*	Number: 155 (8%)

Source: Adapted from Literature Review by Author

An interesting insight into the benefits of being associated with clusters has been investigated by the European Cluster Excellence Scoreboard. They have argued for a number of selected emerging industries and regions from 2010-2013, 33.3 % of firms in clusters exhibited employment growth greater than 10%, compared to only 18.2% of firms outside clusters (EU Cluster Portal, 2016). On the other hand, Muro and Katz (2010) have argued that cluster embedded start-ups generate more jobs, higher tax payments, and higher wages overall than those outside of cluster paradigms. More broadly, it can be said that clusters are confirmed to foster productivity and growth. Across 218 urban areas, Henderson (2003) found that the existing presence of other established firms in the same sector, increases firm efficiency.

Nakamura (2008) has found that clusters are successfully associated with. *"higher productivity in Japan and the U.K. for manufacturing, retail, and wholesale industries as well as finance".* Alternatively, Spencer et al. (2009) found that the geographical clusters in economic activities can lead to greater industrial performance. This inquiry has determined that when industries locate in a metropolitan region with a critical mass of related industries (clusters), they tend to generate both greater incomes and higher rates of employment growth. It can be said that many examples and statistics have been examined to help frame the discussion around the empirical evidence of business clusters and both national and international contexts and supports have been explored. On another note, an interesting find is that incubator infrastructures (Tarpley, 2015; Roy, 2001) are fundamental actors of cluster enhancement.

2.9. Conclusion

In understanding business cluster theory, the broad consensus is that it is an ambiguous area with many different interpretations. This study has discussed the theoretical and empirical evidence of business clusters and examined various approaches within the business cluster environment both from a national and international context. Throughout this exploration of cluster theory, it is important to emphasise that clusters can differ based on: (1) The type of goods and services that they manufacture; (2) The locational paradigms that they are subject to; (3) Their development stage; and (4) The economic environment that encapsulates them (Ketels, 2003). Rosenfeld (2002) proposed that some of the world's most successful cluster examples were accidents of circumstance, a process of events based on entrepreneurial spirit and market demand which can be linked to the aviation cluster in the west of the Republic of Ireland (see Section 4.2). Many scholars have suggested that with greater population numbers come several clusters (e.g. Toronto and Montreal) (Roy, 2001). According to Porter (2007), the government plays an integral role in cluster-based growth. This is based on incentivising cluster participants to invest in training initiatives and infrastructure to augment the cluster. Benchmark examples of national cluster policies are Pôles de Compétitivité in France and the Centres of Expertise in Finland. Whereas, Catalonia (Spain), Upper Austria (Austria), Baden-Wurttemberg (Germany), East Sweden (Sweden), and Limburg (Netherlands) are regional examples. It can be said that the rationale and logic for clusters can be likened to the motto – 'together we are stronger, more efficient and more innovative' (Baptista and Swann, 1998).

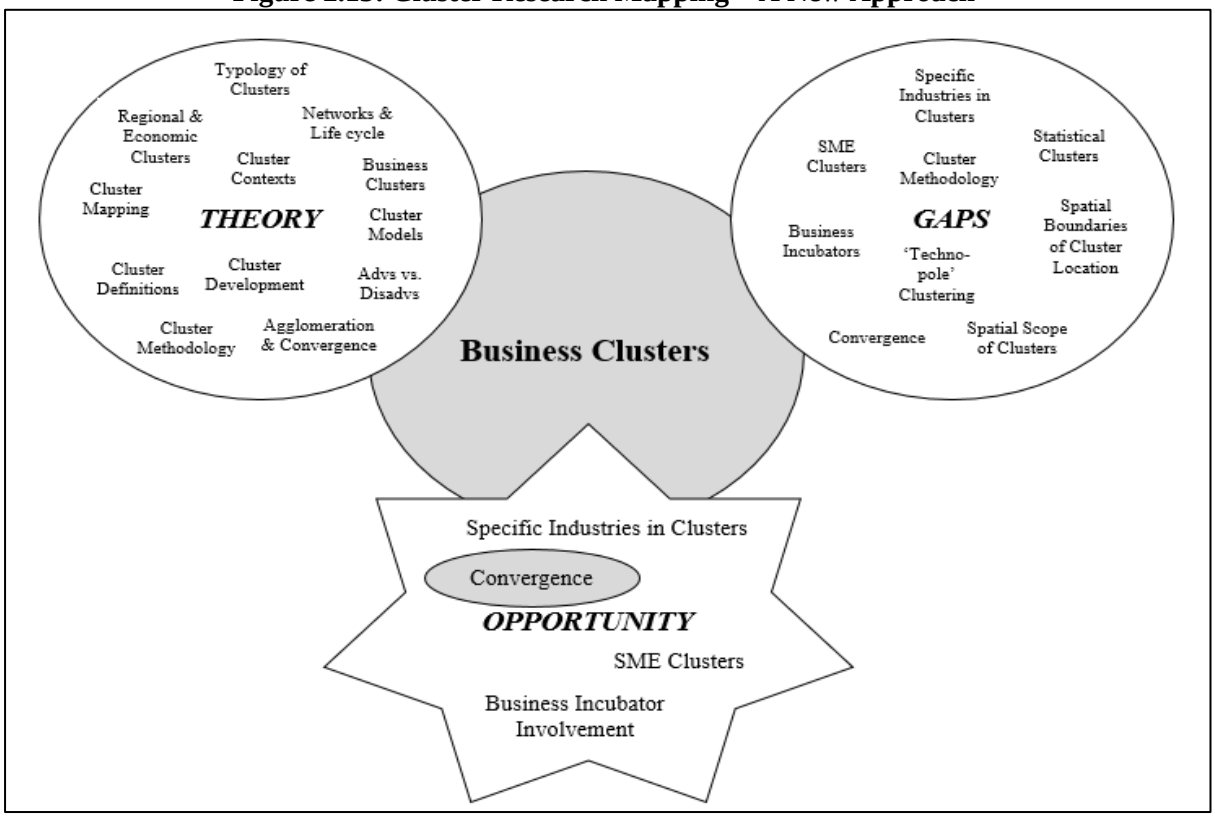
For the purpose of this study, the most pertinent cluster definition can be regarded as being that of Porter (1990, 1998, 2000, 2003) and Ketels (2003, 2013) due to their holistic nature and their reference to 'geographical location' and 'inter-related' activity as drivers of business cluster development. The term 'Business Clusters' best depicts the understanding of what is meant when one refers to clusters (refer to Table 2.5).

Table 2.5 focused on the various business cluster areas, factors and models and as such, they have helped to inform the development of the thematic sheet in Appendix G. It is imperative when developing cluster policies that there are certain support instruments in place such as: (1) Engagement of actors; (2) Collective services and business linkages; and (3) Collaborative R&D and commercialisation (OECD, 2007; 2009; Oxford Research AS, 2008; World Bank, 2009; Christensen et al., 2012). A key statistical finding from the literature surrounding clusters is that The European Cluster Collaboration Platform (ECCP) listed 246 European cluster organisations in 2016 compared to 940 in 2019 (ECCP, 2016, 2019). Therefore emphasising the continued importance of clusters. One might posit that clusters and cluster strategies can not be seen as the answer to every economic challenge faced by a community or region. Nevertheless, they do represent an important tool in which economic growth stakeholders should have at their disposal. A significant amount of research has been carried out on the 'agglomeration' (Marshall, 1920; Henderson et al., 1995; Krugman, 1991; Porter, 1990) approach. However, there is a real lack of cluster research on the **'convergence'** (Delgado et al., 2010, 2011; Barro and Sala-i-Martin, 1991) perspective (see Sections 1.3 and 1.4). Additionally, an important limitation to the research analysis of clusters and cluster theory, *"has been the lack of a systematic approach to defining the industries that should be included in each cluster and the absence of consistent empirical data on cluster composition across a large sample of regional economies,"* (Porter, 2003). Further investigation is required regarding the examination of the convergence and its effectiveness to business clusters and to the wider enterprise landscape. Moreover, clusters can influence entrepreneurial activity (Sengenberger and Pyke, 1992; Saxenian, 1994).

As part of this study, Todeva's (2011) cluster research mapping framework (see Figure 2.4) was included which has highlighted the key cluster research areas which are examined here. Based on this framework and through an extensive review of the literature, which is available,

a new cluster research mapping framework has been developed (see Figure 2.13 below). This framework has highlighted the fundamental *'cluster theoretical'* areas, the *'gaps'* in the literature that require further investigation and the key *'opportunity'* areas that need specific attention and increased research examination in terms of forming part of the 21st Century business cluster literature. This framework will be further built upon, developed, and discussed as part of a thesis chapter. Moreover, this mapping process has been informed by the various sections in this chapter, Figure 1.4 in Chapter One and will be used to contribute to the development of the theoretical framework in Figure 4.10.

Figure 2.13: Cluster Research Mapping – A New Approach



Source: Adapted from Literature Review by Author

People, businesses, workers, owners can be described as forming part of a local economy and there is no magic formula for solving any one problem (Dreyfuss, 2011). There is a general consensus that a multi-faceted approach must be taken, and cluster strategies may be one factor to a regional approach. The local-serving, non-export firms which have been identified as

important facets of convergence in Delgado et al. (2010, 2014) studies are important to a vibrant economy, which may support cluster firms, workers, and economic development policy must continue to address these industries as well. As described by Brown (2006), the education system upskills the future area workforce and is a crucial partner for economic development strategies to ensure that young adults in the locality or region will be trained to work in local industries. Overall, one might state that cluster studies can surprise and delight economic developers by providing new insights and deeper acumens of their local economy (Brown, 2006). Economies are much better viewed as linked clusters of activity *across* various industrial sectors rather than as secluded sectors. Therefore, the cluster approach is more of a lens through which a regional economy can be more efficiently explored and understood than it is a set of prescriptive policies. Certainly, once the cluster policy lens is in occurrence, the application of more traditional approaches makes more sense and is likely to be more productive. However, since the assessment of a conceptual framework is its value in understanding the world, cluster analysis easily qualifies as a significant approach (Wolman and Hincapie, 2014; 2015) to regional economic growth.

According to Ketels (2015), the future of clusters is based on *"new groups of related industries with strong linkages at the regional level that have developed within broader emerging industries"* (Ec. europa.eu, 2016; Ketels and Protsiv, 2014). However, Rosenfeld (1997) has argued that when a cluster is unsuccessful, the region's economy is ineffective. To conclude phase two of this journey, this chapter has emphasised the understanding of cluster-based economic growth through the examination of extensive literature and the creation of a new mapping framework and menu model (see Table 2.5) that incorporates the necessary business cluster convergence attributes and features needed to drive economic growth. According to an OECD (2009) report on 'how regions grow', *"this research found that simple concentration (agglomeration) is not a sufficient condition for sustained growth"*. It can be proposed that

other approaches are needed such as the convergence approach to enable regional development opportunities. The next chapter will go into an in-depth analysis of the role of convergence and business clusters in regions. The next chapter will also highlight gaps in the literature which require further research.

Chapter Three

The Role of Convergence and Clusters in Regions

3. The Role of Convergence and Clusters in Regions

3.1. Introduction

The previous chapters examined *'Understanding Convergence'* and *'Cluster-Based Economic Growth'*. An analysis of *'Convergence' and 'Clusters in Regions'* must now be explored. The purpose of this chapter is to discuss the role of convergence and clusters in regions, in order to understand the importance of this research and to examine various approaches within the regional economic environment, both from a national and international context. Similar to the last two chapters, the outcome of this chapter will develop a mapping process framework (see Figure 3.14) to highlight the key areas for this research study. Over the past decade, regions and regional economic development (RED)/growth have received increased attention as a body of research. This suggests that high levels of entrepreneurial activity in regions may exist. The work particularly seeks to identify any unique combination of structures and strategy which compares regional economic development and growth models, and whether different regions must adopt different convergence models (see Table 1.3 in Section 1.7), in order to achieve cluster-based economic growth. To support this viewpoint, Buchanan (1968) has discussed the economic importance of structural paradigms and regional economic strategies (RES) to regional prosperity. Whereas, the Devlin report (1969) has argued that local governments and authorities play the most important role. Other regional economic enhancement reports could have been included, but for the purpose of this study, Buchanan and the Devlin reports were identified as being fit for purpose (Whitaker, 1955, 1986).

These policy reports can be described as the structural foundations upon which regions and regional economic growth (REG) have been built upon. Arguably, research on regions has primarily examined the resources and organisational structures within and not the combined effect of how they can get 'bigger' and 'better' through the implementation of unique REG

models. Therefore, this research study seeks to examine what 'region' and 'regional economic growth' mean. Then, in turn, to ascertain why the entrepreneurial activity is more/less advanced in certain regions. Furthermore, Henton and Walesh (1998) suggested that regions are the most important economic engines in the new economy.

Chapter Three maps regional economic theory on: (I) Defining regional economic growth; (II) Models and frameworks for REG; (III) Culture and local development; (IV) Regional entrepreneurial environments; and (V) The importance of the relationship between convergence and business clusters. The importance of combining regional economic development (RED) and regional economic strategy (RES) into achieving regional economic growth (REG), and fundamentally enhancing entrepreneurial activity (see Section 3.6) has value for this study. When examining entrepreneurship, the original term of entrepreneurship and entrepreneurs was from 18th century France, with the first definition by Richard Cantillon in 1734. In this chapter, the work examines the issues of: (vii) how business cluster convergence factors (see Table 1.3 in Chapter One) are drivers in regional economic growth; and (viii) the cluster influence on regional economic growth.

To provide some contextualisation, extensive research has been carried out on the literature surrounding regions. It has been found that the British and Irish regional studies, along with EU based research (see Figure 3.3), are well established with regards to the development of regions. On review of the current literature, the consensus is that a significant amount of work has been undertaken around the Irish and British regions. Hence their inclusion into this research study to effectively explain why they have been incorporated. The underlining objective(s) of this research study are perpetuated by the need to explore the contribution of convergence and business clusters to regions through the analysis of their structures, models

and strategies. This in order to evaluate the potency of what combination, (if any), works best in different regions.

Table 3.1: Chapter Structure

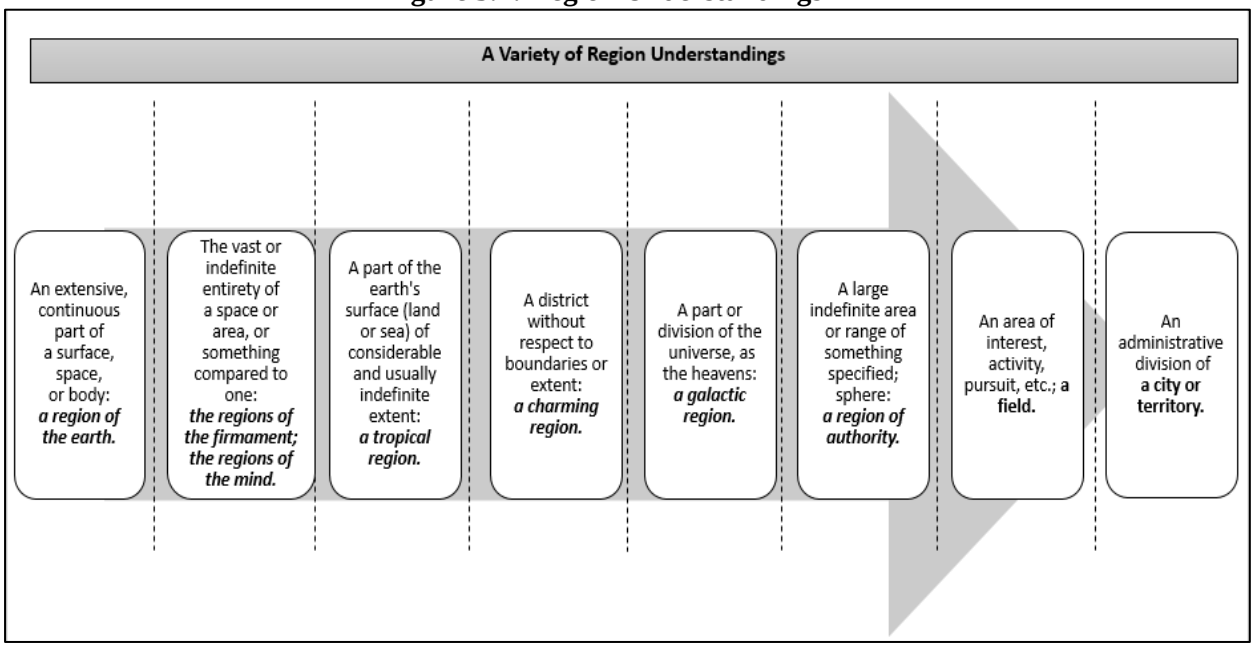
Chapter Approach
Introduction to Chapter
Historical Background and Defining Regions
Evolution of REG
Models and Frameworks for REG
Empirical Evidence
Culture & Entrepreneurship
Regional Supports
Regional Convergence and Economic Clusters
Smart Specialisation Strategies
Can Regions Create Clusters?
Conclusion
Source: Adapted from Literature Review by Author

3.2. Historical Background and Definition of a Region

The historical background of the term 'region' has been examined by Agnew (2013) and the winefrog.com (2019) site. Within their studies, they stated that it initiated from the Latin word, 'regere' (to rule direct) and 'regio' (direction/district which led to the English terminology, region). Additionally, 'Region of Origin' has been described as a part of land or a country with precise features of customs and culture, or it is known for an explicit geographical characteristic (Bailey, 1996; Meinig, 1986; Moinuddin, 2017; Smith, 2018). Furthermore, the phrase 'region' has been recorded since 1961from the Anglo-French word 'région' which defined it as a tract of land of a considerable, but indefinite extent (see Figure 3.1 below). When considering existing literature and more recent usage of the term 'region', many academics have conjured the idea that it is a homogenous block of space which has a continuing uniqueness or

distinctiveness due to its physical and cultural characteristics. One could suggest that the claim is that it is present 'out there' in the world, even if there is a previous prerequisite to consider that the world is segmented in this way.

Figure 3.1: Region Understandings

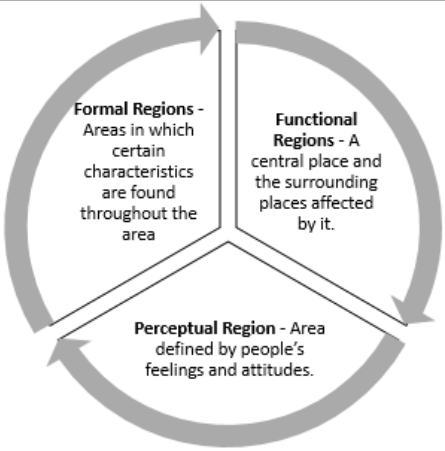


Source: Adapted from Literature Review by Author

Places are particular points within regions such as town, cities, counties and even though places may themselves sometimes be considered as regions (see Section 2.2.1). Usually, there are several places inside a region (E-Education.psu.edu., 2019). A region is normally more extensive and spatially more wide-ranging spatial entity than a place. Bailey (1996) maintained that in geography, **regions** are areas which are broadly separated by: (1) Physical characteristics (physical geography); (2) Human impact characteristics (human geography); and (3) The interaction of humanity and the environment (environmental geography). There are three main types of regions in existence (see Figure 3.2 below). Bailey further stated that, *"geographic regions and sub-regions are mostly described by their imprecisely defined and sometimes transitory boundaries, except in human geography, where jurisdiction areas such as national borders are defined in law".* Conversely, Meining (1986) and Moinuddin (2017)

suggested that a region has its own nature which can not be moved: (1) Its natural environment (landform, climate, etc.); (2) Its physical elements complex that were built by people in the past; and (3) Its socio-cultural context that could not be replaced by new immigrants (Smith, 2018).

Figure 3.2: Region Types



Formal Regions	Formal Regions such as countries, states, and cities all share the same laws, government, etc. Based on cold hard facts A place with similar attributes or characteristics (common human or physical property) such as: political identity (continents, countries, cities) climate (deserts, forests, tundra) landforms (Alpine system, Kashmir valley)
Functional Regions	Organized around a focal point (node), that include areas that are linked to them through communication patterns, transportation routes, or even television broadcasts.
Perceptual Region	A place defined by popular feelings and attitudes rather than by objective data.

Source: Adapted from Reference.com (2019) and ProProfs (2019)

It can be argued that a region is a specific area which has common features, may have common natural or artificial features, and can be based on language, government, religion, type of flora and fauna, or climate. As outlined by Agnew (2013), *"regions are the basic units of geography. Due to plate tectonics, or the movement of the Earth's crust, geographic regions are constantly being created and destroyed over time".* Based on a review of the current literature regarding regions and regional geography specifically, it gained popularity in the United States and Europe during the period between World Wars I and II. It is virtually impossible to study Earth

as one unit or region as there is so much information to be integrated. Therefore, regions can be regarded as one way to arrange and simplify this huge amount of information.

It can be suggested that the examination of various definitions of regions can be described as an effective place to further this research study. Barrington (1976) refers to regions as, *"a grouping of counties to perform a function common to them – e.g. tourist development, health services, etc…"*. Whereas, Roche and Collins (1982) described them as an area of the country having some unique character. Conversely, Cooke et al. (1996) have identified that there are four criteria for defining a region:

(1) A region must not have a determinate size;
(2) It is homogenous in terms of specific criteria;
(3) It can be distinguished from bordering areas by a kind of association of related features; and
(4) It possesses internal cohesion.

Regions are a place where people work, live, or participate in recreational events (Business.com, 2015; Aoyama et al., 2011). Hoover and Fisher (1949) have conversely argued and examined a region as a location in which most elements, due to the connection of natural resources or population statistics, undertake the same type of activity. According to Abdullah et al. (2015), regions can be described by the organisation of certain activities about some central environment or place (e.g., a local town or village) or by the homogenous dissemination of some phenomena within it (e.g., lake-district, national park, or rain forest).

The definition of a region for this research study has been outlined by Abdullah et al. (2015) in conjunction with their regional model which must be strategically positioned in-between the *'related features'* and *'internal cohesion'* factors and the need for a support structure environment (see Section 3.7). This is inclusive of industrial activity, social development groups, and economic indicators (business cluster models). It can be argued that regions must interconnect with their adjacent boundaries (regions within proximity). They must embrace

important stakeholders which will enhance the region's strategic aims and high levels of collaboration, within and between other regions. Many studies have suggested that regions do matter and that the connectivity within them is valuable for their growth and development. One such study was presented in an OECD report (2011), which has identified that regions matter as they can be described as the most effective place to make economic decisions. It is the place where investors, shareholders, and stakeholders all have a stake in the result. To support this perspective, it is the place where such stakeholders can understand where their key strengths are as well as how they can collectively engage with each other to improve their outputs (Audretsch and Keilbach, 2005; Fritsch and Mueller, 2007). Keane (1995) has examined the different definitions of regions and stated that:

> *Considerable effort has been made to develop a single, consistent set of criteria for defining regions. However, it is not clear that general criteria can be developed independently of the issue or problem under discussion. For some purposes geographic, or administrative, regions suffice; for others, regions may be defined on the basis of resource allocations, transportation networks, income levels, ethnic groupings, the nature of economic activities or institutions, physical attributes such as river basins, or any number of demographic, sociological, physical, or other characteristics.*

To fully appreciate and achieve a more effective understanding of what makes up a region and what activities are/have been undertaken, both national (Irish) and international programmes have been examined. Many national and international public programmes and associated bodies have been analysed through today's understanding of the 'region' concept (see Appendix B). There is scope for the importance of regional programmes, both nationally and internationally to be discussed. From a national perspective, it is clear that there is a lot of focus on regional development through salient bodies. These include Limerick and Dublin City and County Councils, Local Enterprise Offices (LEO's), Shannon Group plc, LEADER, DJEI, DECLG, Regional Development Centre of essential organisational DKIT and RDP.

Similarly, from an international standpoint, attention has been placed on promoting and improving regions through numerous associations and bodies such as: EU Commission; OECD and LEED; Spark Programme; PSRC; DCED; and the REIS. For the purpose of this study, the above associations have been integrated. However, it is accepted that many more could have been examined such as the Central Asia Regional Economic Cooperation (CAREC) Program, South of Scotland Alliance Rural Regional Economic Development Programme 2014-2016 (Carecprogram.org, 2013; Dumgal.gov.uk, 2014), the Bay Area Houston Economic Partnership (BAHEP) which is a regional economic development association (Bayareahouston.com, 2012), the Ireland-Wales Territorial Co-operation Programme 2007-2013 (Irelandwales.ie, 2015) or the Western Development Commission which focuses on funding and lobbying government policy for the betterment of the west of Ireland (Wdc.ie, 2016). This literature has been included as it became apparent after investigating such organisations and programmes that there is increased attention being placed on REG.

Burton (2015) has argued that REG is based on economic recovery and promoting recovery in every region. Ireland's economic stability and recovery was well underway with fewer people on the live register and increased job creations (prior to COVID-19). *"Locally-driven Regional Enterprise strategies will help each region lean on its own unique strengths and assets to power regional economic growth, benefitting local businesses and families"* (Labour.ie, 2015). Pike et al. (2007, pp. 1256-1257) have stated that, *"however defined, regional development strategies is a profoundly geographical phenomenon and does not unfold in a spatial vacuum devoid of geographical attachments or context".* It can be suggested that regional economic development is a context-dependent dynamic, a creative and innovative process of transformation (Fischer and Nijkamp, 2009; Stimson et al., 2006). Callanan (2000) stated that once governments discuss spatial dimensions to national policy, one enters the realm of RED. Stathopoulou et al. (2004) argued that REG augments the quality in standards of living in

particularly under-developed areas. It encompasses similar actors and drivers to reach the overarching outcomes of enhanced regional development and economic growth, but also structural and social evolution (Feldman, 2001; Benneworth, 2004). It can also be said that 'regional economic growth' is important as it can be clarified as the overall aims and objectives that a region or area must achieve. It can be argued that just considering how a region must grow or get better is not enough. The region must also look at how it can become sustainable, perform more effectively economically, improve its social and cultural paradigms, and augment the standard of living. However, most importantly, all these key activities must be combined to continue to better itself. REG is about the bigger picture, not just the mission, but also the vision and long-term factors.

It is noteworthy that there is a real lack of existing regional economic literature and research surrounding 'regional economic strategy'. Most academic studies, theorists, and even policy documents discuss either regional economic development, regional economic growth or a combination of both. However not a regional economic strategy. Moreover, the inclusion of RES in this study alluded to the fact that this research can be described as being somewhat pioneering and may help to improve the knowledge, understanding and importance of this field to the business landscape, and environment. Arguably, to effectively understand RES (regional economic strategy), then both REG (regional economic growth) and RED (regional economic development) must be examined. According to Pike et al. (2007), REG is to get bigger, while RED is to get better. Therefore RES can be described as how a region gets bigger and better. Subsequently, this research acknowledges that crucial contexts (business clusters) and infrastructures can be important for a region to become bigger and better.

Due to the increasing, interconnected global environment, some regions are in a more advanced position to extract the positives of globalisation compared to others. An example in this study

is the Dublin region in The Republic of Ireland. One could suggest that technological transformation has influenced regions, and regions which develop information and knowledge can be deemed as competing more effectively in that economy. Nevertheless, a region's ability to transform is not its only foundation of growth. A well-educated society, the ability to entice and retain talent, being a well-connected friendly context can be key growth factors. Having a robust infrastructure system and a well-functioning labour market are also key determinants leading to regional growth and betterment (OECD, 2009). When linking growth rates over the past decade between mainly urban and rural OECD (Organisation for Economic Co-operation and Development) regions, it has been revealed that not only do a substantial number of urban regions grow faster than rural regions, but also a significant number of rural regions out-perform urban regions in terms of GDP per capita. Arguably, this supports the convergence approach and the 'catch-up effect' as argued by Gaspar (2012). Enhanced growth can occur when regions organise their unique strengths (as discussed by Burton, 2015) and resources, rather than being reliant on support from its government (Antonescu, 2014). It can be said that taking full advantage of the resources at hand to improve a region's economic standing is a powerful determinant in shaping whether a region (rural or urban) grows or not. Nurturing growth and development, even in regions which are lagging economically, should still be important to the government (see Section 3.7). This is due to the ability to contribute to national and regional outcomes without hampering growth prospects in other areas (OECD, 2009).

For the purpose of this research study, Abdullah's et al. (2015) understanding of the term 'region' is the most pertinent, as it focuses on the resources available and its economic activities which stimulate its development. An OECD (2011) report has identified that regions matter as they are described as the most effective place to make economic decisions. Arguably, regional economic growth (REG) can be identified as particular areas within an economy which can nurture and foster its development through the utilisation and maximisation of the potential of

their pertinent resources. It can be deemed important to examine how REG has evolved over the years.

3.3. Evolution of REG Theory

Before this literature review can delve further into the discussion of regions, models of regional development, and regional economic growth, it is important to first discuss the evolution of this theoretical field's origin. The Irish context has been examined for the purposes of this research study. This section provides an understanding of the insights into the origins of local government and the development of regional economic growth.

- **British Development of REG**

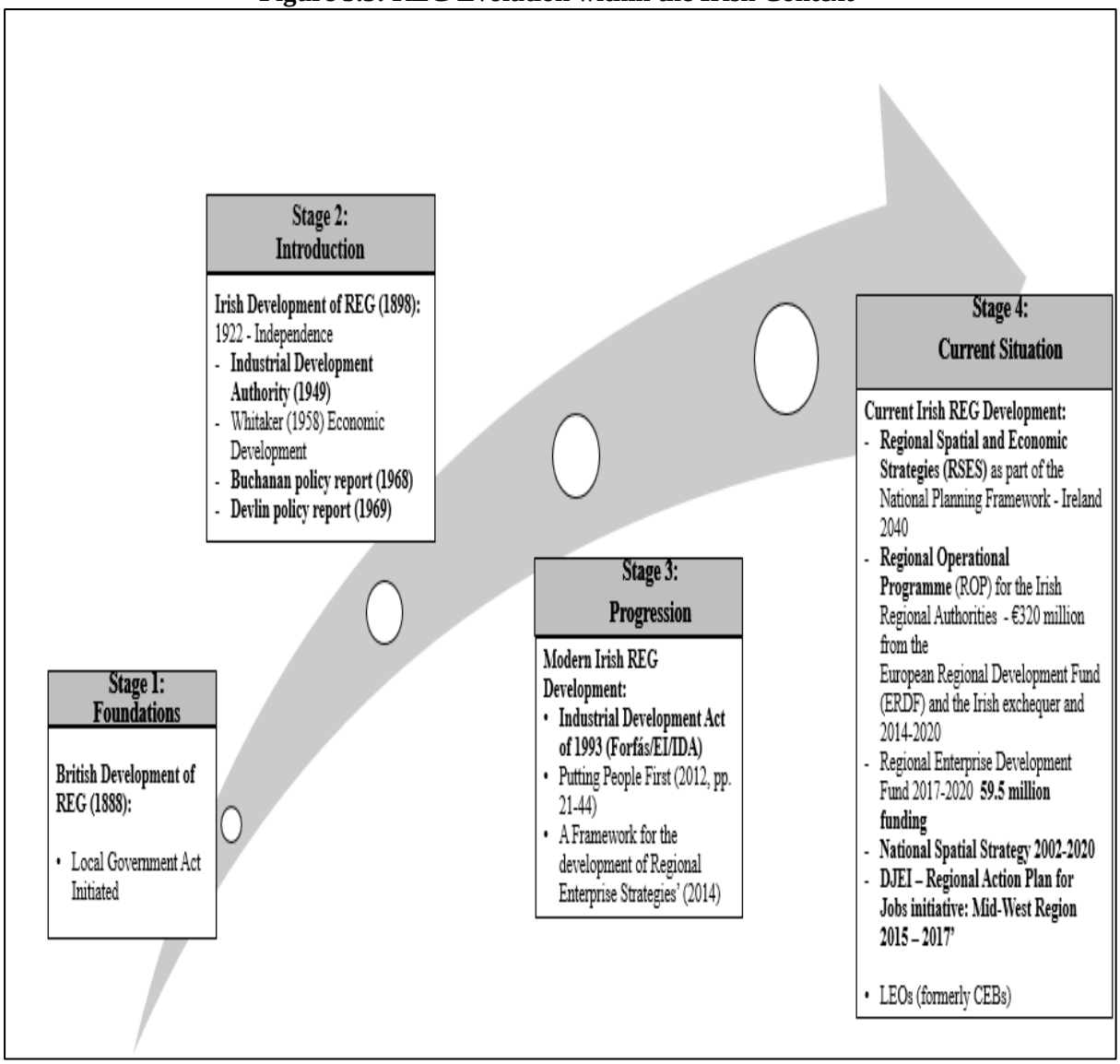
The initial step in formulating a structure of regions was developed in Ireland in 1898 under the Local Government Act (Roche and Collins, 1982). This sought to give counties and regions some meaning, and the authority to organically prosper. The Act came into effect after the British rule implemented a similar policy in 1888. Therefore, it can be suggested that the British ruling had some fundamental inputs into contemporary Irish governmental issues. Initial local governmental and regional structures in Ireland have very much been a by-product of nineteenth-century statutes of the British parliament.

- **Irish Development of REG**

According to Cooney (2008), today's economic climate in Ireland is different to that endured during the 20th century. Irish rule was based on colonial dependency as Ireland was part of the British Empire up until 1922. Independent commercialisation was affected as a result and from an economic standpoint, Ireland was much more reliant on England and its trading structures. In 1922, the founding of the new state helped to address this issue somewhat and the Industrial

Development Authority (IDA) was developed in 1949 with the strategic objective of attracting Greenfield investment into Ireland (History Ireland, 2017).

Figure 3.3: REG Evolution within the Irish Context



Source: Adapted from Literature Review by Author

This was addressed somewhat after the founding of the new state in 1922, when enterprise development, grant funding and decision making around policy procedures were a big part of the development of the government-industry board's activities, which was formed in 1952 (Lundstrom et al., (2008). *"Enterprise policy at this time focused on the regional development of the least populated, poorest, and under-developed areas,"* (Cooney, 2008). Indigenous

enterprises became a focal point in terms of policy development as part of the establishment of the Industrial Development Act of 1993. According to Lundstrom et al. (2008), three industry support mechanisms enable these policies in terms of promotion and awareness as they helped to shape, reform and lessen the overreliance on Greenfield investment:

(1) ***Forfas*** were formed as the overall state body for governance of enterprise policy and development in Ireland;
(2) **Enterprise Ireland (EI)** became the implementer of policy for indigenous industry; and
(3) The **IDA** was to remain responsible for attracting foreign investment in the Irish economy.

A structure of local enterprise players was formed in 1993, with the main aim of supporting the development and augmentation of indigenous SMEs with the establishment of City and County Enterprise Boards (CEBs). More recently they were amalgamated into the new Local Enterprise Offices (LEOs). These CEBs (now LEOs) were established in every county and large city in Ireland. They helped to establish a robust entrepreneurial and innovation systems in regard to local enterprise concerns, political issues and local representation at the national level and social strategic partnerships.

It can be argued that without the implementation of such robust regional players and strong attention to enterprise policy, Ireland's regional economic growth outlook may look bleak. Lundstrom et al. (2008) stated that the influx of foreign direct investments and the provision of support for the development of indigenous enterprises, helped to augment regional growth and the economy. Barrington (1976) concludes in Ireland, regional structures have been established for health, tourism, physical planning, and for the education institutions (both the Industrial Development Authorities and the Department of Labour have greatly influenced these establishments). It can be said that the Republic of Ireland needs to form a more cohesive regulatory support structure to provide all eight regions with some valued connotation.

The Buchanan (1968) policy document (an outcome of British ruling), had the most influence on Irish regionalism. As mentioned, (1) The Buchanan (1968) and (2) the Devlin (1969) (an Irish policy document) reports were two of the very first regional development policy and strategy implementation documents for Ireland and its regions. The Buchanan (1968) report has highlighted the importance of the form and organisation of regions, specifically urban areas, to the development of REG. Whereas, the Devlin report (1969) has argued that the focus should be more on how the local government can extend the local authorities and maintain some degree of autonomy. This Buchanan report, as argued by Cooney (2008), and Lundstrom et al. (2008), highlighted that the Government must specifically target regional centres as 'hubs' for enterprise development at the regional level. One could argue that Cooney (2008) supported the idea that business clusters were needed to improve regional economic growth. For the purpose of this research study, the Buchanan report can be regarded as being most applicable as it can be categorised as encompassing the fundamental viewpoints in terms of developing the grass root structures to improve REG.

Barrington (1976) expanded on both these reports placing an emphasis on making regions more effective based on three comprehensive issues: (1) The *moral* issue – to establish a regional consciousness and sense of commitment to the development of the region that can lead people to achieve objectives otherwise beyond the reach; (2) The *political* issue – to have representative institutions operating within the region relevant to all the main governmental activities there; and (3) The *administrative* issue – regions must be defined for all purposes, how many regions should be established, what key activities must be engaged in (such as health, tourism and education). The role local government must be defined. However, Barrington (1976) has failed to examine focal regional policy implications. Whereas, Amin (1999) has argued that regional policy has been enterprise focussed, homogenous, motivated

by rewards and most importantly, state driven. According to this report, these are the fundamentals in regard to making regions more effective.

Without such comprehensive issues, it would be difficult to comprehend the effectiveness of regions, what is effective in terms of regions and what key functions they perform. In 1991, the Barrington report was established by the 'Local Government Reorganisation and Reform' advisory expert committee chaired by Tom Barrington. The Barrington report is described as, *"more visionary than anything that went before it and represented the most comprehensive examination of local/regional government since its establishment in 1989"* (Barrington Report, 1991). An era of REG change had begun as a result. Regional development does not occur without some problems. Barrington (1976, pp.145-150) has identified two fundamental problems: (1) Under-development; and (2) Non-development and has recognised that it may be argued that a third exists, 'over-development'.

- **Modern Development of REG in Ireland**

Much of the policy discussion surrounding regional development in Ireland will be driven in the future by the National Planning Framework (NPF) Project Ireland 2040. The NPF was designed to be a high-level guide for strategic planning and development in Ireland up to the period 2040 and beyond. The central aim of the NPF is to ensure that as the population grows, that growth is sustainable in economic, social, and environmental terms. The NPF predicts that by 2040 the population of Ireland will have increased by a projected 1 million people. It highlights that to achieve full employment there will be the need to create 660,000 additional jobs by 2040. This increase in population also creates an increased need for housing with an estimated need for the completion of 550,000 more homes (Enterprise-ireland.com, 2019). Regarding this coordination at a regional level, there has been a significant change in regional

governance in Ireland over the past five years. From the period 1994 to 2014, Ireland was divided into eight Regional Authorities (see Figure 3.8). These Regional Authorities were responsible for the co-ordination of public service provision and the monitoring of the implementation of European Union Structural Fund assistance. In addition, a specific function of the Regional Authorities is to review the Development Plans of local authorities as well as the preparation of Regional Economic and Social Strategies (RESS). However, as part of the Local Government Reform Act 2014, these eight Regional Authorities have been replaced by three new regional assemblies (Southern, Northern & Western and Eastern & Midlands). The new assemblies came into effect on the first of January 2015. This significant change in regional governance has resulted in changes in the traditional avenue through which policy instruments were created and implemented. As a result, it is essential to revisit the role of all regional stakeholders and to ensure that their involvement in policy discourse at a regional level is improved and strengthened to effectively influence policy (Enterprise-ireland.com, 2019).

Arguably, the question which needs to be explored now is, *"What has changed and where is the development of REG in the modern-era?"*. The Department of Jobs, Enterprise and Innovation have developed the *'Regional & Action Plan for Jobs initiative: Mid-West Region 2015 – 2017'* (DJEI, 2015). This can be categorised as a policy document detailing the development of spatial strategies, economic recovery, and job creation issues for this region. Such spatial strategies, reports, action plans and policy documents can be described as exemplifying the modern Government's recognition of robust rural-urban division issues. Another Government spatial strategy document, *'A Framework for the development of Regional Enterprise Strategies' (2014)* which is a national regional level policy framework, was developed to highlight existing enterprise resources of regions. When considering the strategic direction and aims of both these reports, it can be argued that they significantly

contribute to today's understanding of REG (Pike et al., 2007, pp. 1256-1257), and how regions are being improved in the modern era. Adopting a balance between both views, based on economic recovery, employment generation, and utilising existing resources, can provide a strong basis to kick-start the process of REG.

It can be said that regional players such as **Enterprise Ireland** (EI), **Local Enterprise Offices** LEO and **Industrial Development Authority** (IDA-Foreign Direct Investment organisation) **Ireland**, are the key organisations which are influencing regions politically, socially, and economically (Lundstrom et al., 2008). According to a *Putting People First* (2012, pp. 21-44) spatial strategy report (which can be described as the modern local/regional government reform report), on the 'vision for local government in Ireland', the aim is to achieve regional economic development promotion through social enterprise and local community enhancement. The Irish Public Administration (Ipa.ie, 2001) has argued differently as the global economic system has the greatest impact on RED and REG, not the local context. Both perspectives can be identified as being correct, as Environ.ie (2015) has concluded that regional policy is influenced by international, national, and territorial governance through spatial planning and decision-making.

Hughes (2015), along with a National Spatial Strategy 2002-2020 (2002) focused on regional development in Ireland, as being greatly transformed through the creation of spatial strategy plans. It is interesting to note that whilst there are many organisations and spatial strategies involved in the development of REG in the modern era, there seems to be a real confusion as to who is in charge, who has the final say, or what approach is the best to take. According to existing literature studies, it can be argued that it is a combination of organisations which are in charge (see Figure 3.8), instead of an 'umbrella effect'. Furthermore, existing literature can

be described as suggesting and supporting that many factors which influence RED and REG such as:

(1) Resources and contexts;

(2) Spatial strategies;

(3) Organisations, local government/authorities and communities; and

(4) Entrepreneurs' and Entrepreneurial activity.

It can be suggested that a combination of all these factors above would be the best possible solution for regional prosperity (Hughes, 2015). Yet, different regions (especially rural contexts), might not have these elements at their disposal. One might propose that therefore it is up to the *people* (see Chapter Seven), the *region's paradigms* (context, structures, actors and drivers) and the *government* to try and enhance its current standing. The initial step to formulating a structure of regions was developed in Ireland in 1898 under the Local Government Act (Roche and Collins, 1982) which sought to give counties and regions some meaning and authority to organically prosper. Irish ruling was much based on colonial dependency due to being part of the British Empire up until 1922. It can be said that Ireland needs to create its own policy (see Section 7.3) and regulatory structures to give its region's some meaning.

It is interesting to note that whilst there are many organisations and spatial strategies involved in the development of REG in the modern era, there seems to be a real confusion as to who is in charge, who has the final say or what approach is the best to take. The development of REG has evolved since the introduction of the Buchanan (1968) regional report, the first main regional spatial strategy report, and many spatial strategies have been publicised since. It can be argued that work has been done, but much more is needed, in order to bridge the rural-urban regional disparity and that a more holistic regional support context is needed to enhance REG

in all regions and not confined to just a few. Therefore, the exploration of models for REG is necessary.

3.4 Models and Frameworks for REG

The purpose of mapping the existing models and frameworks for REG can be described as essential to comprehend what facets are required for regions to transpire and grow. Therefore, to create a deeper understanding of the different RED and REG models which are currently available, that expand entrepreneurial activity, a 'menu' (see Table 3.2 below) has been created which encompasses the pertinent models for this research study. It can be argued that this menu highlights the different *contexts/actors*, components, policies, enablers and outcomes issues which regions must embrace to achieve growth. As will be visible throughout this menu, business clusters, and the need for business incubators have been incorporated by authors and reports such as Prezioso (2009), URENIO Watch (2005), Colley (2010) and Jones (2016), Poole (2010) and Seas1.co.za (2012). Additionally, the integration of this model will help to establish a more succinct and effective understanding of RED and REG models, and what they encapsulate.

It can be important to note that the perspectives offered in Table 3.2 are neither fully complete nor equally exclusive. These suggestions serve to illustrate the variety of regional strategies and models which can be taken into consideration by an organisation. Critical scholars and their unique frameworks have been examined (as identified previously). Therefore, this menu type model has been developed to showcase the offerings and their importance to regions. This menu will continue to serve as a sounding board for this research study and enhance this study as it progresses. It can be argued that without RED and RES, there can be no REG. This further emphasised the need for this framework in the literature.

Table 3.2: Prospective RED and RES Models leading to REG

(1) Growth and Economic Development Models – Jones (2016) and Colley (2010)

- Community Economic Renewal
- Collaboration – Enterprise Development, People
- Infrastructures – Business Incubators

(2) The Process of Economic Development – Ketels (2013)

- Support Structure Environment – Government
- Connectivity & Collaboration

(3) BAHEP and Regional Innovation Network – Bayareahouston.com (2012)

- Constituencies and Strategic Alliances – Collaboration, Gov., Business Environment, People
- Commercialisation – SMEs/MNEs/ Startups/Entrepreneurs/Researchers

(4) RED Platform / Model: A New Engine for Economic Development – Poole (2010) and Seas1.co.za (2012)

- Incubation – Training, mentorship, business model and funding support
- Entrepreneurship – People, Regional / Local Governments, Academia, Professional Advisors

(5) Conceptual Framework of link between competitiveness / SMEs – Prezioso (2009)

- Theoretical Frameworks – Clusters, Culture, Innovation
- Basic Determinants / Fundamentals – Education, Business, Infrastructure, Gov.
- Key Drivers of Competitive Performance – Creativity, Human Capital, Connectivity
- Aggregate Regional Competitiveness / Target Outcomes
- EU, National, Regional and Local Policies

(6) RED Model – Cornett (2009)

- Conditions / Context / Structures - Innovation
- Actors / Drivers – HEIs, R&D, Entrepreneurs/Enterprises, Policies, Infrastructures, Human Capital
- Objectives / Outcomes - RED

(7) Regional Companies Model – URENIO Watch (2005)

- Funding and R & D
- Networking / Cluster Developments / Human Resources

(8) Factors Supporting RED – Mazzarol (2003, pp. 9-15)

- Climate of Opportunity / Crises
- Enterprise Initiators / Facilitators
- Support / Regulatory / Cultural / Network / Economic - Business Environment (Triple-Helix)
- Projects / Spatial Strategies

Source: Adapted from Literature Review by Author

This section examines more closely these regional strategies to better understand their importance to regional economic growth and entrepreneurial activity. Other academic scholars such as Baklanov et al. (2006) and Visan (2011) could have been included in this menu.

However, it has been determined for the effectiveness of this research study that these models are not as pertinent. This is due to that fact that they lack some of the main enablers, drivers, actors, structural contexts and objectives required. Nonetheless, they are interesting frameworks to note. It can be said that nations' need models and perspectives which are competitive, dynamic, creative, and innovative for regions to realise their economic, social and environmental objectives and full potential (OECD.org, 2015). On analysis, there are a wide variety of models available, however some are more applicable than others. Arguably, without the development of models of region activity, RED and REG would be extremely difficult to achieve. The hope is that the development of the prospective menu will enable an understanding of the requirements for REG to flourish and transpire. When considering these matters, there are different perceptions within the literature on how to enhance REG. Yet, it is important to note that an adoption of a model and tailoring it to the region in question, can be one of the best possible solutions. From examining the literature, certain factors are important for the growth of regions, including:

- Theoretical frameworks – Business clusters, entrepreneurial activity and incubators (as a basis to start);
- Economic conditions/environment;
- Support organisations/platforms/infrastructures;
- Key drivers/enables/actors – people, enterprises, entrepreneurs and culture;
- Policy developments/spatial strategies; and
- Collaboration networks and community.

In support of the above list, the fundamental factors based on the analysis of the existing literature which is required to expand entrepreneurial activity through regional strategies have been included. Many of which can be described as homogenous:

- Economic/business environment;
- Culture and Network and infrastructure;
- Policies and spatial strategies;
- Support structure environment, education and funding; and
- Community and collaboration.

The **'Conceptual Framework of link between competitiveness / SMEs'** by Prezioso (2009) followed by the **'RED model'** by Cornett (2009) have been selected as being the most relevant to this study. They can be described as comprehensively addressing the four key areas of: (1) Regions capitalising on their unique strengths to the maximum; (2) Enticing investment opportunities; (3) Supporting local SMEs; and (4) Ensuring that people can find employment in their communities and regions. To support this perspective, for a region to continue to develop and grow, clear visions, strategic objectives and aims that will signify what must be achieved in the short, medium and long-term are required. Arguably, *regions* would achieve enhanced economic growth if they were to adopt the model developed by Prezioso (2009) due to its holistic approach to REG. Psrc.org (2015) and Burton (2015) have both extensively examined the REG theoretical field and have placed an importance on strategies which allow a region to understand its unique strengths which foster and promote its activities, thereby increasing employment generation opportunities.

On further analysis, it appears that REG can be enhanced through the integration of business clusters (Bieńkowsk and Creţu, 2016). From examining the current literature, a gap was identified which highlighted the need for business incubators (Tarpley, 2015; Roy, 2001) to also be incorporated. Authors and reports such as Ketels (2013), Porter (2000), Prezioso (2009), URENIO Watch (2005), Colley (2010) and Jones (2016), Poole (2010) and Seas1.co.za (2012) have been discussed throughout. Based on the URENIO Watch (2005) study, without the

proper environmental landscape, incorporating business clusters, networks, and physical structures like business incubators, regional companies could not prosper. Therefore, considering these matters one could propose that regions require the appropriate contexts, infrastructures, actors and drivers of competitiveness to take full advantage of their potential.

On review of Mazzarol's (2003, pp. 9-15) model, every climate/region has both opportunities and crises. Therefore, it is up to the people involved and the resources at hand to take advantage of the opportunities or fall under crises. Having examined Cornett's (2009) RED framework, it appears that the right environment and people, with the right attitude at play, there is no limit to what a region can achieve.

Jones (2016) and Colley (2010) REG perspective is the only one which has specifically highlighted the need for business incubator support and development for a local/regional economic environment. One could argue that this has signified a scope for the integration of business incubation models into REG in order to enhance its continued sustainability and progress in its direction. One might propose that there is a gap in the literature which needs to be investigated further. This is since business incubators (Tarpley, 2015; Roy, 2001) can be described as the infrastructure component within a business cluster environment (refer to Section 2.7). Jones (2016) and Colley's (2010) model has embraced business support structures and platforms which suggest that an opportunity is available for the integration of business clusters and business incubators. This can improve regional economic growth, thus emphasising a gap in the literature exists. An environment and/or region which adopts a model such as this can enable new venture creation to be fostered and make it more attractive for people that work in organisations to set up their businesses (Smilor, 1986). To reiterate in order to maximise a region's potential it is essential that a strategy and an adoption of a model is put in place to enable the region to develop and grow organically. Given the difficult economic

conditions (DJEI, 2015) in recent years, developing and implementing a model which supports the augmentation of a region's economic growth environment is crucial for both national and international regional entrepreneurial contexts. The assumption could perhaps be made that local authorities/government, regional players, spatial strategies, business environment, the region's resources, and context can be characterised as having shaped what the regions are. This leads to the development of RED and RES into what is REG leading to the empirics of regions.

3.5. An Empirical Approach to the Identification of REG

It can be proposed that effectively utilising the resources at hand and making the best of the existing situation, are the key actions which regions must undertake. According to the site Wired65 (2009), *"regions are now recognised as the most important economic geographies in global economy because they provide the scale that drives innovation*." When examining economic growth in the context of regions, the most valid ideology would seem to be a geographical location encompassing an exclusive high degree of interdependence among distinct earnings (Korsgaard and Anderson, 2011). From an analysis of the current literature, there is genuine confusion around regional economic development (RED) and regional economic growth (REG) terms (Callanan, 2000). Regions can be regarded as being paramount to the development of any economy (Wired65, 2009) as they help to promote the country and improve entrepreneurial indicators such as:

• Enterprise developments; • Job creations; • Quality of life; • FDI Investment; • Attracting MNEs;	• Improving education; • The commercialisation of knowledge; • Upskilling and training the local population; and • Making it an attractive place to live.

Korsgaard and Anderson (2011) argued that regional economic growth *"is considered a major outcome of entrepreneurial activity, however it is rarely explored in other than economic terms. Without a doubt economic growth is an important indicator that provides insight into the vitality and competitiveness of regions".* Hoover and Fisher, (1949, pp.196-203) argued the converse as they have placed an emphasis on population, total individual real income (in terms of 1947 consumer purchasing power), and per capita individual real incomes. The questions 'how do regions grow' and 'why do some regions grow faster than others' (OECD, 2009) can also be crucial to regional economies.

Additionally, to support this perspective, entrepreneurship (see Section 3.6) has been identified as having a major influence on regional economic growth and development as entrepreneurs introduce new technologies, develop new resources and commercialise innovations (Birch, 1979). With REG examined, now RED can be defined. Regional economic development is not just about growth, it is also about social revolution and transformation (Berglund and Johansson, 2007). Pike et al. (2007) stated that RED definitions are varied as they require complex deliberation of, *"what local and regional development is for and what it is designed to achieve".* According to Fischer and Nijkamp (2009), RED is a dynamic, creative and innovative process which encapsulates the importance of equal and fair opportunities to all as well as making sure that the well-being of people in particularly under-developed regions are considered. Regional economic development examinations have been conventionally ruled by economic factors such as growth, income and job creation (Pike et al., 2007; Armstrong and Taylor, 2000). According to an OECD (2011) report, regional economic development is a common effort to cut regional inequalities by backing (vocational and income improvements), *"economic activities in regions through a shift from redistribution and subsidies for lagging regions in favour of measures to increase the competitiveness of all regions"*. Another viewpoint is that RED can also be described as encompassing growth in GDP and local income

as well as net employment generation and growth. However, social development comprises regional knowledge (Florida, 1995; 2003), the development of co-operation, interrelation, connection and confidence within a region (Seidl, Schelske, Joshi, and Jenny, 2003), or the formation of pride for its culture and its economy in a given region (Anderson, 2000). Spatial, territorial, and historical dimensions such as life-setting, economics, outlook, resources, institutions, politics, and infrastructure can all be included under the concept, regional economic development (OECD, 2009).

Regional economic development can be about changing human behavioural trends, socio-cultural, and economic contexts, into favourable regional situations. However, Porter (2003) has argued that the average wage, patenting, and employment generation within a region is the best way to measure its economic performance. Some theorists consider RED as comparable to regional economic growth and employment generation, whereas others would regard it as being more extensive: *"for example, social transformation, change, regional learning, and the development of regional entrepreneurial culture,"* (Cécora, 1999). Regional dissemination (refer to Section 3.3) is an important issue which requires specific attention within this research study. One could argue that Irish communities and regions have been greatly decimated. Even though the economy is on the mend, rural communities have especially been decimated (OECD, 2009). Insight (2016) proposed that rural regions required significant governmental policy attention and action. As a result, reports such as the Action Plan for Jobs: Mid-West Region 2015 – 2017 (2015) has been created. This a policy document detailing the regional strategies to be enacted upon for this area for the coming years and is part of the €250 million government regional job creation strategy (DJEI.ie, 2015).

This policy document supports what has previously been discussed with regards to defining what RED, RES and REG are. Such spatial strategies, action plans and policy documents

exemplify that the Government has recognised these rural-urban regional dissemination issues. Furthermore, a framework for the development of Regional Enterprise Strategies (2014) is another government spatial strategy document (at a national level), which has been developed. This highlighted the existing region's enterprise assets, regional plans of DEBI enterprise agencies (see Section 3.3), other regional players and actions for delivery, such as Enterprise Ireland (EI) initiatives (see Section 3.3), LEO undertakings, and IDA Ireland activities.

According to an OECD (2009) report, the 8 regional authorities (see Appendix B) in the Republic of Ireland helped to provide the basis for the study of ***'how regions grow.'*** This is important as it has demonstrated what can be achieved and how the historical development of regions in Ireland can evolve. This OECD report stated that the main factors of growth are macroeconomic components, institutions, and policies. A robust regional dimension is associated with the latter two factors, conversely business clusters (refer to Chapter Two) can be linked to these factors. Callanan and Keogan (2003, pp. 41-43) have identified that the Local Government Act 2001 was the platform by which the Irish state was divided into counties and cities for the purpose of local government which influenced regional growth. Furthermore, Callanan and Keogan (2003) argued that the development of REG can be categorised as both *ad hoc* and *imposed* in some way. Buchanan (1968) and Devlin (1969) argued differently as they believe that specific structures, contexts, organisations, and local authorities are the driving force behind any effective REG. Under the Local Government Act 2001, local authorities were recognised as:

- County borough corporations – now city councils / local enterprise offices;
- Borough corporations – now city councils (LEO's);
- Urban district councils – now town councils
- Town commissioners – now town councils; and
- County councils – now county councils (LEO's).

These changes can describe how REG has been developed and evolved. Arguably, procedures and practices can organically develop. However, it is clear that moving away from adopting British paradigms and embracing autonomy allows for a more structured REG. It can be said that regional economic growth in Ireland has been slow to develop (even in the modern era), but there is the potential to improve and the combination of the two different fields: (1) *Economic;* and (2) *Socio-cultural.* The joining of these can be crucial to its survival. One could argue that the adoption of a unique business cluster model (refer to Table 2.5) can enhance this development. There is genuine confusion around the various understandings of regional economic development (RED) and regional economic growth (REG) terms.

From the examination of the existing literature, the empirical evidence on regional economic growth theories has acknowledged and supported the idea that REG is dependent on endogenous growth factors including levels of human capital and innovation (Acs et al., 2005). The services sector, exports, education, R&D, human capital, business clusters, agglomeration economies, entrepreneurship, innovation, and technological progress are all fundamental variables which can influence the empirical evidence of REG (Maroto-Sanchez and Cuadrado-Roura, 2009; Beyers, 2005; Manca, 2012; OECD, 2009; Porter, 1990, 1998). It can be concluded that this has highlighted the significance of such variables to develop, nurture and augment REG within a geographical span. These findings are important implications for policymakers as they have emphasised the pertinence of an integrated approach to regional economic growth.

Moreover, as empirical evidence validates various arguments of the REG theories and underlining variables, one could suggest that these areas should have an imperative role in regional policy formation and implementation. Based on this suggestion, per Dineen and Lenihan (2011), business clusters are one of the most important policy framework areas which

must be extensively promoted and developed in the Republic of Ireland. However, Forfás (2009a) and the GEM report (2009) argued that entrepreneurship is crucial for regional economic growth. When considering these matters, it can be argued that both *business clusters*, *culture* and *entrepreneurship* are important enablers of REG.

3.6. Building REG through Culture and Entrepreneurship

Smircich (1983) described culture within a business context as that of which is characterised to influence decision-making practices of managers and functions as an intermediary which can guide and shape behaviour. Aoyama et al. (2011) have argued the converse as they claim culture is an organising principle and reference for decision-making which can be associated with a place (region) and economic agent (corporate culture). This definition can be described as aligning to this research study. It can be noteworthy to acknowledge that what is considered appropriate actions and behaviours at work will ultimately depend on culture (Hofstede, 1980). Cultural, social norms and the obtainability of role models can influence the level of entrepreneurial activity within a region. Hofstede (1980) has stated that an entrepreneurial culture that stimulates positivity and as a result is thriving is recognised as one of the hallmarks of a 'Smart Economy'. When people think of culture, it can be typical to think of something transient and intangible as the very word itself can be described as suggesting this. However, when it comes to business, regional growth and entrepreneurship, culture can be much more important than the more tradable resources indicated on a company's balance sheet.

A positive culture, relative to entrepreneurship within a country can make a notable difference and contribution. Silicon Valley (refer to Section 2.2.1) in the USA can be described as a classic example of this (Saxenian, 1990, 1994). Even though there are no physical natural resources, it is still the world's capital for IT (information technology) and innovation generation due to

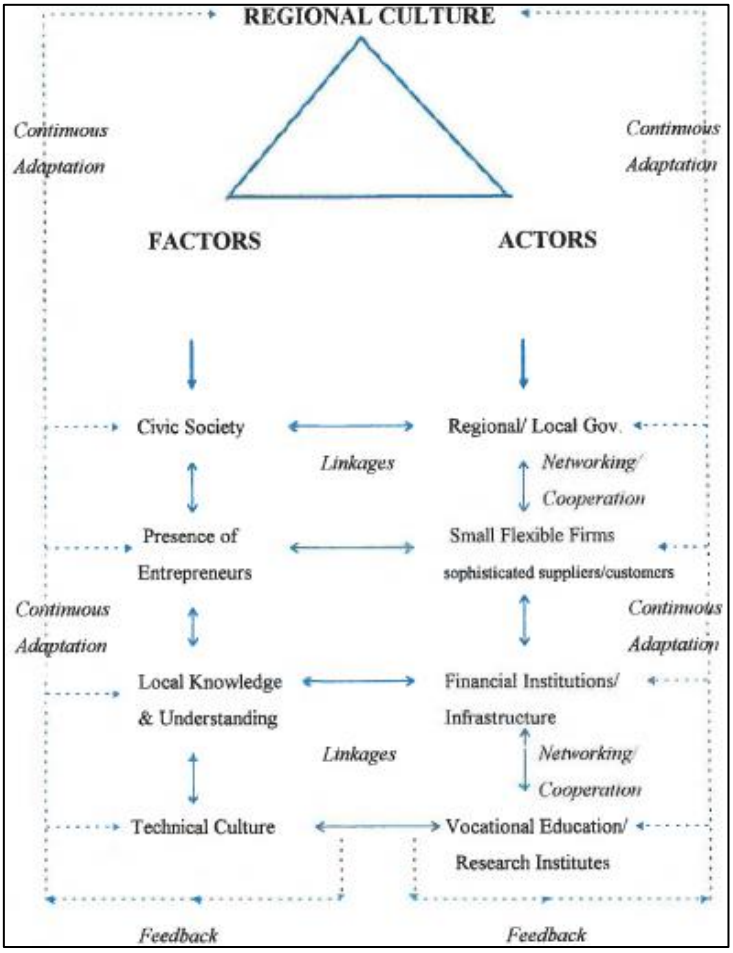
its people. Its culture of positivity, idea generation, well-educated people and talent nurturing can also be argued as essential to its success. When considering these matters, it can be said that culture is an important facet of this research study in identifying how REG occurs. It can be argued that it does not just enjoy a natural supply of skilled people from the region; it entices people from nations/regions across the globe due to its popularity, image and culture of dynamism.

According to Business Culture (2017), the culture in Ireland is based on, *"business communication, business etiquette, business meeting etiquette, internship and student placements, cost of living, work-life-balance and social media guide".* Spilling (1987) identified the role of the cultural sector, along with culture generally as a dynamic factor in the development of an entrepreneurial regional environment. The degree through which high levels of creativity and innovation, is another aspect for which culture is capable of influencing facets in regional development (Spilling and van der Ros, 1988). Some other scholars have also seen that culture can be a vital determining factor in local development. Gustafasson (1986) has analysed the local cultural context in many regions and has found it to be an important determining factor in economic development. They conclude that culture provides a platform for entrepreneurship. It can be suggested that community and cultural entrepreneurship are holistic perspectives on regional development. Based on this, cultural and community entrepreneurship may be interpreted as the action of implementing tasks aimed at changing the defining culture of an area (Spilling, 1991). As discussed by Mitchell and Wall (1989), culture can be a determining factor regarding how people define or perceive their role in society.

A regional culture can have an influence on local work discipline, attitudes towards innovation, entrepreneurship, success and openness to change. These are all major issues in regional development (Myerscough, 1988). If culture represents an important driving force for creative

and dynamic regional areas, the promotion of culture and business cluster development will hopefully inspire the development and growth of a region. The cultural facet itself can also prove to be a significant element in local and regional development, as it is the basis for many jobs in many industries (Mitchell and Wall, 1989; Myerscough, 1988; Framke and Jensen, 1987). Some effects of economic growth of the region, arising from culturally related initiatives can include: Increased visitor/tourism numbers; reputation as a residential area; marketing effects such as cultural events; and unique available resources. From analysing the framework in Figure 3.4, the fundamental 'factors' and 'actors' which make up a regional culture have been highlighted. This framework envisages a strong regional culture, as one that encompasses certain factors and actors, as the foundation of an effective and sustainable regional system.

Figure 3.4: A Regional Culture System



Source: Douthwaite (1996)

The regional actors are inherently linked to the factors. For instance: *"a strong civic society is as much a result of a strong local government system as it is its instigator, entrepreneurs require sophisticated customers and suppliers to encourage further innovations as much as they, in turn, rely on these innovations for their survival,"* (Douthwaite, 1996). Furthermore, it can be said that agencies and institutions thrive on local knowledge and understanding. Particularly the financial sector, while a technical culture cultivates and grows from an efficient employment and research sector. Arguably, it is key that these variables/facets are encouraged and promoted by regional stakeholders, therefore leading to the perpetual adaptation of the regional system, which is a necessary feature to warrant its sustainability.

Spilling (1987) stated that culture from a business context is capable of influencing mechanisms in regional development. Mitchell and Wall (1989), discuss culture as a determining factor, in regard to how people define or perceive their role in society. The cultural sector itself is also a significant element in local and regional development, as it can be the basis for many jobs and firms in many sectors and industries (Mitchell and Wall, 1989; Myerscough, 1988; Framke and Jensen, 1987). *Culture* is vital for a region's entrepreneurial performance and capital gains (see Section 6.4.2). Moreover, Keane (2012) has stated that a new culture is on the way for entrepreneurship and businesses in The Republic of Ireland. Keane emphasised that the old culture is too traditional and reactive (inward focussed), rather than modernised and proactive (outward focused). Therefore, it can be suggested that the level of entrepreneurial activity within a region can be greatly influenced by its cultural dimensions.

3.6.1. Entrepreneurship

Burke (1995) highlighted the fact that governments are the crucial facilitators who must take an active role in encouraging entrepreneurship and regional development through their

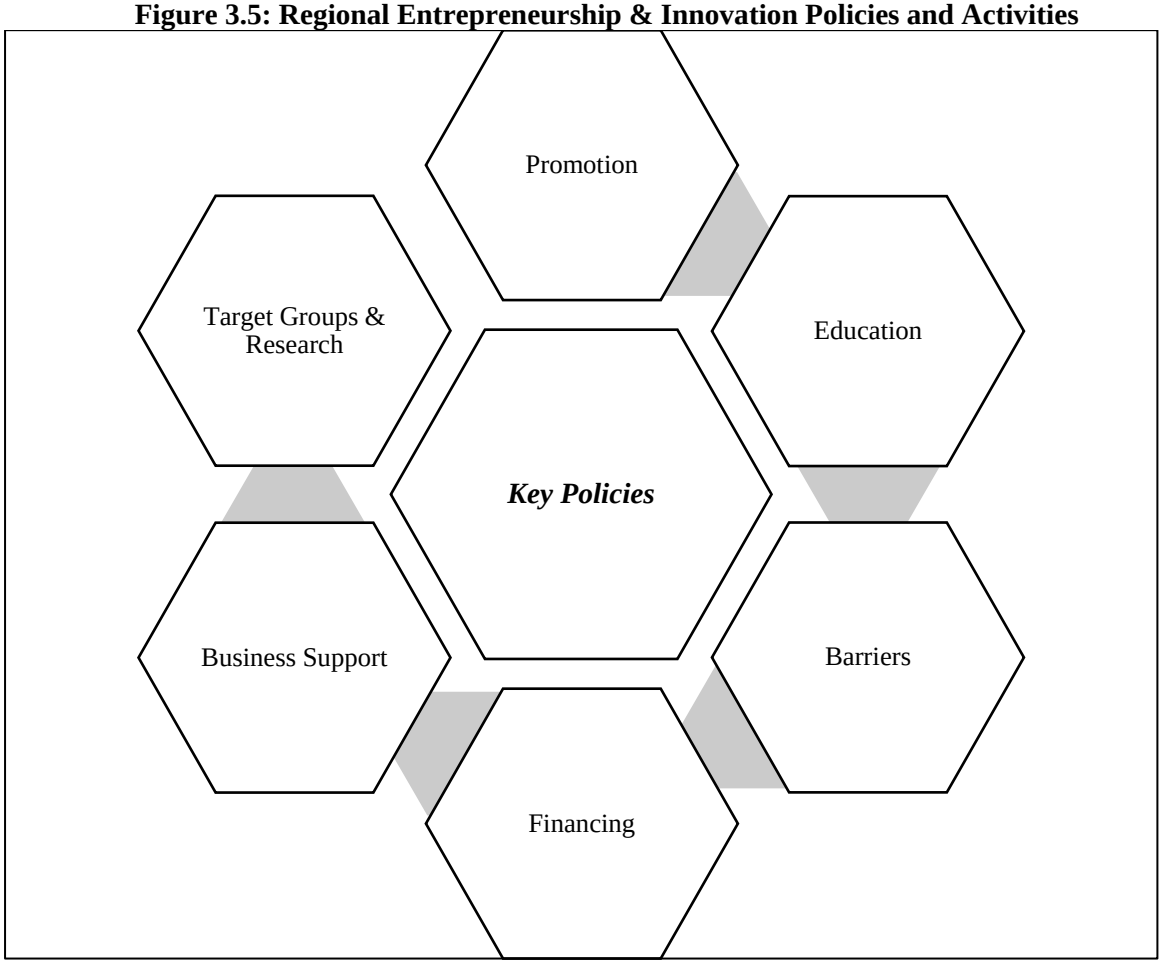
policymaking decisions. The policies suggested by North and Smallbone (2006, pp.15-20) are the most applicable as they can be described as more holistic. These are more relevant to regional economic growth. Arguably, without the development of robust entrepreneurship and innovation policies, regions and their key players would find it difficult to grow. The development of key regional policies regarding opportunities for improved *"programme provision, greater efficiency, better access, transfer and progression routes, and improved interaction with enterprise,"* have been described as strengthening REG (Charles, 2006; Hudson, 2006; Konu and Pekkarinen, 2008; Goddard and Kempton, 2011). Cooney (2008) has argued differently, as he has identified that the key policies for regional entrepreneurship are related to the following elements: Promotion; education; barriers; financing; business support; target groups; and research (see Figure 3.5).

According to Lundström and Stevenson (2001), entrepreneurial policy is primarily concerned with creating an environment and support system, which will foster the emergence of new entrepreneurs, along with start-ups and early-stage growth of new firms. Based on this approach, it can be suggested that Cooney (2008) has argued that regional policy *"is necessary to facilitate debate regarding the production and evaluation of research on policy and policy making in different contexts within Europe".* Lundström and Stevenson's (2001) research has been built upon the objective to understand to what extent key policy actions at national and regional levels in each country are applicable. Variables such as the structure for policy development and implementation, how long policy has been in place, and to what extent policy measures reach all stakeholders in economic growth, can be described as forming the foundations for the strength of each country's policy.

Lundström and Stevenson (2001) have identified key policy areas regarding the development of start-ups, early-stage growth of entrepreneurial businesses, and entrepreneurial businesses

who engage in innovation, as important to local, regional, and national policy issues. Two policy areas have been examined which can be classified as highlighting the importance of policymaking: (1) To identify the key stakeholders in national systems of innovation and entrepreneurship; and (2) To examine the relationship between diverse approaches to innovation and entrepreneurship policy (Cooney, 2008). Therefore, it can be said that emphasising the importance of innovation, creativity, and entrepreneurship can improve regional policies, which can in turn lead to better regional prosperity (see Figure 3.10).

Figure 3.5: Regional Entrepreneurship & Innovation Policies and Activities



Source: Adapted from Literature Review by Author

Hisrich and Brush (1985) have argued that entrepreneurship is, *"the process of creating something different with values by devoting the necessary time and effort, assuming the accompanying financial, psychological and social risks and receiving the resulting rewards of*

monetary and personal satisfaction". Whereas, Anderson (2000) has maintained that entrepreneurship, *"is the extraction and creation of value from an environment or context."* One might conclude that entrepreneurship is embedded within the philosophy of 'turning an idea into a viable business,' and the process of creativity and innovation to create change. To provide a brief insight into the process of entrepreneurship and how it has evolved, Murphy et al. (2006) mapped the evolution of entrepreneurship. This suggests that regional development can be described as being influenced by entrepreneurship in regards to: Employment generation and growth (Acs and Armington, 2004; Audretsch and Keilbach, 2005); local knowledge; education; learning; and understanding (Florida, 2007, 2003); and social and structural change (Berglund and Johansson, 2007; Feldman, 2001; Benneworth, 2004). Furthermore, to fully understand the development of an entrepreneurial environment within regions, it is necessary to clearly define the terms: (1) 'Entrepreneur'; (2) 'Entrepreneurial activity'; and (3) 'Entrepreneurship' as there are many interpretations. In discussing the three key terms in more detail, Ahmad and Seymour (2006) have defined them as:

> ***Entrepreneurs*** *are those persons (business owners) who seek to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets. The word entrepreneur itself derives from the French verb entreprendre, meaning 'to undertake'.*
>
> ***Entrepreneurial activity*** *is the enterprising human action in pursuit of the generation of value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets.*
>
> ***Entrepreneurship*** *is the phenomenon associated with entrepreneurial activity.*

As shown in Table 3.2 and Figure 3.6, entrepreneurial activity plays an important part in the development, growth, and continued progress of regions. O'Gorman (2013) stated that 'entrepreneurs' play an essential role in regional economic growth. Additionally, the EU Green Paper on Entrepreneurship (European Commission, 2003) outlined the rewards of entrepreneurship as: (1) Job creations and growth; (2) Competitiveness; (3) Unlocking personal

potential; and (4) Of societal interest. By improving a region's job creation and growth, competitiveness, personal potential, societal interests, and its unique resources, it contributes to the improvement of regional activity, thus perhaps making it a more attractive place to live and practice enterprise undertakings.

Arguably, the type of entrepreneurial environment which is required to augment regional growth is down to factors such as its ‘resources’, ‘competitiveness’, ‘structures,’ ‘contexts’, ‘potential to generate jobs’, ‘innovation’, and its ‘people’. The development of the entrepreneurial environment within regions requires particular factors such as care, attention and investment (both time and monetary efforts). Therefore, developing the entrepreneurial environment within regions is crucial to regional economic growth. Conversely, Malecki (1995) listed twelve critical factors (see Table 3.3 below), that characterise an entrepreneurial regional environment as compiled by Bruno and Tyebjee (1982).

Table 3.3: Entrepreneurial Regional Environment Factors

• Venture capital availability • The presence of experienced entrepreneurs • Technically skilled labour force • Accessibility of suppliers • Accessibility of customers or new markets • Favourable governmental policies	• The proximity of universities • Availability of land or facilities • Accessibility to transportation • Receptive population • Availability of supporting services and • Attractive living conditions.

Source: Adapted from Literature Review by Author

These factors are relevant to this research study as regional economic growth, convergence, and business clusters can be aligned to each factor (Sleuwaegen and Boiardi, 2012). For business clusters to thrive, they too require such factors. As such, business clusters need to be included in an entrepreneurial regional environment. This is a finding which supports the theoretical study of how business cluster convergence can enhance REG. Moreover, a regional

entrepreneurial context comprises: Talented and skilled people; availability of unique resources; favourable economic and socio-cultural conditions in which to do business and live; accessibility to educational institutions and attractive living conditions that enable an improved standard of living; and the quality of the region to be enriched. Sleuwaegen and Boiardi (2012) have discussed specific elements which are required for regional development to take place (refer to Appendix C).

They have set the scene by examining the importance of: (1) Institutions; (2) Intelligence; (3) Inspiration; and (4) Infrastructure to regional development. According to Sleuwaegen and Boiardi (2012), with these correct initial structures and enablers of competitiveness, regional development can occur. The triangulation approach of 'entrepreneurs', 'entrepreneurial activity' and 'entrepreneurship', as discussed by Ahmad and Seymour (2006) can be classified as critical to the success of this model. Therefore, the entrepreneurial environment within regions can be argued as being the crucial indicator to its successful development, continued growth, and sustainability, along with increased prosperity levels which allow them to meet target outcomes and goals (see Table 3.3). As such, regional enhancement is related to how entrepreneurial the region is or how much entrepreneurial activity is going.

Entrepreneurship has been presented as an essential means of developing, retaining, and sustaining the quality of life, and quality milieus in disseminated populations (Fuller-Love, Midmore, Thomas, and Henley, 2006). It supports regional economic growth through creatively employing, *"valorising and (re-)combining the often limited resources available,"* (Anderson, 2000; Baker and Nelson, 2005; Pike, Rodríguez-Pose, and Tomaney, 2007). With all this in mind, according to Pike et al. (2007) without 'entrepreneurs', 'entrepreneurial activity' and 'entrepreneurship', arguably regions could not get better (RED), bigger (REG), or bigger and better (RES) (see Section 3.3).

3.6.2. Global Entrepreneurship Monitor (GEM)

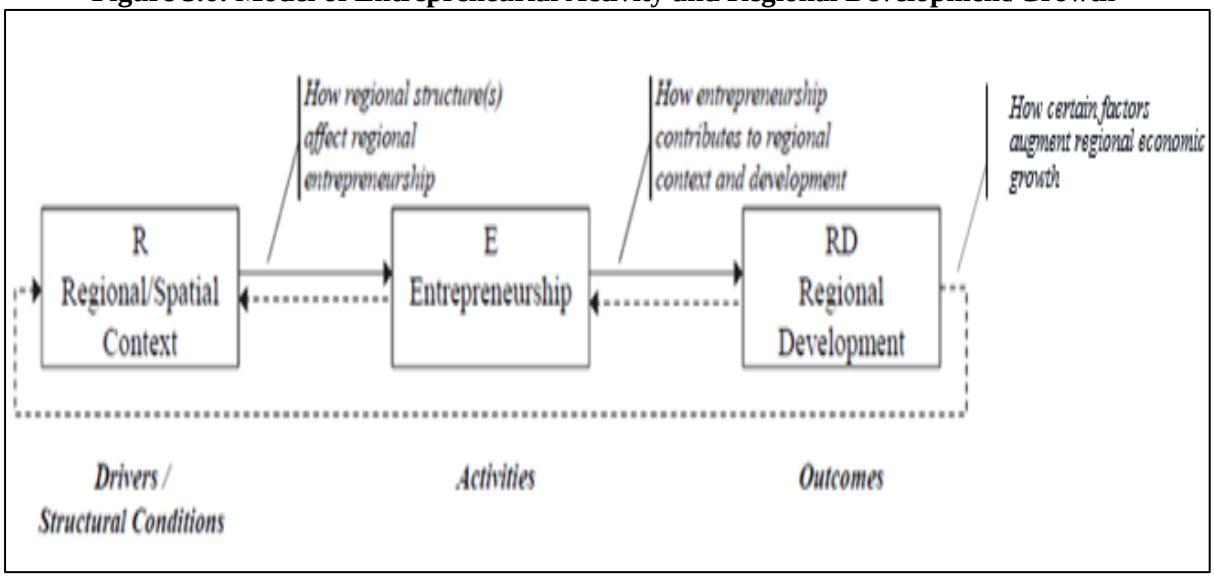
The role of entrepreneurship in national and regional economic growth is highlighted throughout the Global Entrepreneurship Monitor report. It is an excellent indicator of entrepreneurial performance within a country. The GEM report has discussed the various types of entrepreneurs such as: Aspiring; nascent; new; and experienced. In 2012, the then published GEM report for the Republic of Ireland specified an upsurge in the rate of 'Total Early-Stage Entrepreneurial Activity' (TEA), amongst the adult population aged between 18-64 years for 2011. This increase was up 7.3% from 6.8% in 2010. Whereas, the rate of nascent (initial stage entrepreneurs) held firm at 4.3%. The upsurge was accounted for by an increase in the number of people developing a new enterprise in regional areas which were 3.1% in 2011 up from 2.6% in 2010. On analysis of these statistics, entrepreneurial activity has increased in recent years even during difficult economic times. It is estimated that an average of 2,200 individuals start a new enterprise every month, both nationally and regionally (Fitzsimons and O'Gorman, 2012).

Chinitz's (1961) view of entrepreneurial performance is important to address as he has discussed the vital requirements for entrepreneurship. Chinitz has argued that a structure of smaller suppliers is required, as entrepreneurship tends to be greater in regions which have smaller suppliers. *"Small firms themselves caused further entrepreneurship by lowering the effective cost of entry through the development of independent suppliers, venture capitalists, entrepreneurial culture, and so on. The supply of entrepreneurship differs across space,"* (p.9). Some regions just have a higher number of entrepreneurs. Regional areas (Chinitz, 1961) and performance indicators such as the GEM report, are crucial to the overall performance of regional, national, and international economies. The GEM model encapsulates social, cultural, and political contexts. Along with entrepreneurial framework conditions, entrepreneurial

opportunities and capacity, and regional and national economic growth. This is strategically aligned with this research study.

Lowe's (1993) model of entrepreneurial activity and regional development (see Figure 3.6) can be related to the '*Entrepreneurship', 'Entrepreneur'* and *'Regional Development'* model (Anderson, 2000; Schumpeter, 1934; Kirzner, 1973; Stathopoulo, Psaltopoulos, and Skuras, 2004; Berglund and Johansson, 2007; Florida, 2003; Pike et al., 2007). They both place an importance on entrepreneurial activity and the regional/local contexts which influence regional economic development/growth. Lowe (1993) has concluded that entrepreneurship is an initiator of REG and previous studies such as Berglund and Johansson (2007), tended to focus on how entrepreneurship has contributed to regional development and growth. This focus is on clusters, finance, community development, culture, human capital, education, *inter alia*. Lowe's approach takes the 'side-side' approach encompassing regional and spatial contexts, and entrepreneurship, as the key drivers of regional economic development and growth.

Figure 3.6: Model of Entrepreneurial Activity and Regional Development/Growth



Source: Lowe (1993)

Naudé et al. (2008) stated that regional environments can either limit or enable the start-up and growth rates of SMEs. It is important to note that entrepreneurs, entrepreneurial activity, and

entrepreneurship can play a crucial role in the development of regions. However, the correct contexts, structures (regional models) and resources are needed (Prezioso, 2009; Cornett, 2009; Porter, 2000; Ketels, 2013). Phan et al. (2008) have argued that without innovation, creativity, and entrepreneurial activity, regions achieve lower levels of economic growth. Ahmad and Hoffman (2007) have argued that the key entrepreneurial performance indicators are firms, employment, people, and wealth. Based on this standpoint, therefore it can be suggested that entrepreneurial activity within regions can be the catalyst for improved REG.

3.6.3. Entrepreneurial Building Blocks to Enhance REG

What distinguishes regions and local communities in terms of entrepreneurship, is not the lack of entrepreneurial talent, but rather the obstacles in the realisation of the entrepreneurial potential, within that region (Fanning, 1986; Mitra, 2012). Considering that REG (through the lens of entrepreneurship) is now being examined, arguably Schumpeter should be included in this discussion. Schumpeter (1934) stated that entrepreneurial activity generates, *"new methods of production, services, new organisational solutions and new markets and plays an important role as a change agent that destroys existing economic structures within".* In this way, entrepreneurship has an important part to play in REG as entrepreneurship creates variations and disseminates new technologies within society (Birch, 1987). Entrepreneurship can be seen to be encouraging, *"driving force for regional economic growth and development"* (Schumpeter, 1934; Storey and Johnson, 1987; Reynolds, 1987; Acs and Armington, 2004). This is due to new venture creations yielding employment opportunities, new capital, and innovation facets that, *"fuel the economic vitality of regions and societies"* (Romanelli and Schoonhoven, 2001). According to Taylor (2006, pp. 6-17), human and financial capital, the tax and regulatory environment, physical infrastructures, business culture, and entrepreneurial milieus, are key factors which help to make a region entrepreneurial.

Existing studies have revealed that there is an encouraging link between new venture creation on employment generation and regional growth, even when factoring failed businesses into account (e.g. Reynolds, 1999; Acs and Armington, 2004; Audretsch and Thurik, 2001; Audretsch and Fritsch, 2002; Thurik, 2003; Mueller et al., 2008; Baptista, Escaria, and Madruga, 2008). An interesting find by Kalantaridis and Bika (2006) is that normally entrepreneurs who create new jobs are inclined to hire regionally and locally. This discovery shows that underdeveloped contexts and regions, with smaller population sizes, face challenges such as *"outmigration"*. The creation of jobs and growth rates are some of the most studied effects of entrepreneurship on regional economic growth (Fritsch, 2011). The existing literature is inclined to support the idea that under-populated regions experience lower business creation rates, in comparison to urban areas, due to factors such as structural contexts, drivers, actors, outcomes, and people. Generally, regional studies and entrepreneurial theorists have concluded that entrepreneurship is largely reliant on its milieu (Smallbone et al., 2009). Regional entrepreneurial activity is lower in different regions due to many inherent factors, particularly in rural disseminated regions like in the west of Ireland (refer to Appendix D). Unique entrepreneurial undertakings can still prosper, such as Dairymaster in Causeway, Co. Kerry, Ireland (Dairymaster, 2015). This undertaking has successfully utilised the resources at hand within its region and converting those into a viable firm (Anderson, 2000). One might say that context-specific aspects (business cluster networks), enablers (firms), and actors (triple-helix engagement), can influence the entrepreneur and entrepreneurial support potential of regions.

3.7. Regional Support Environment

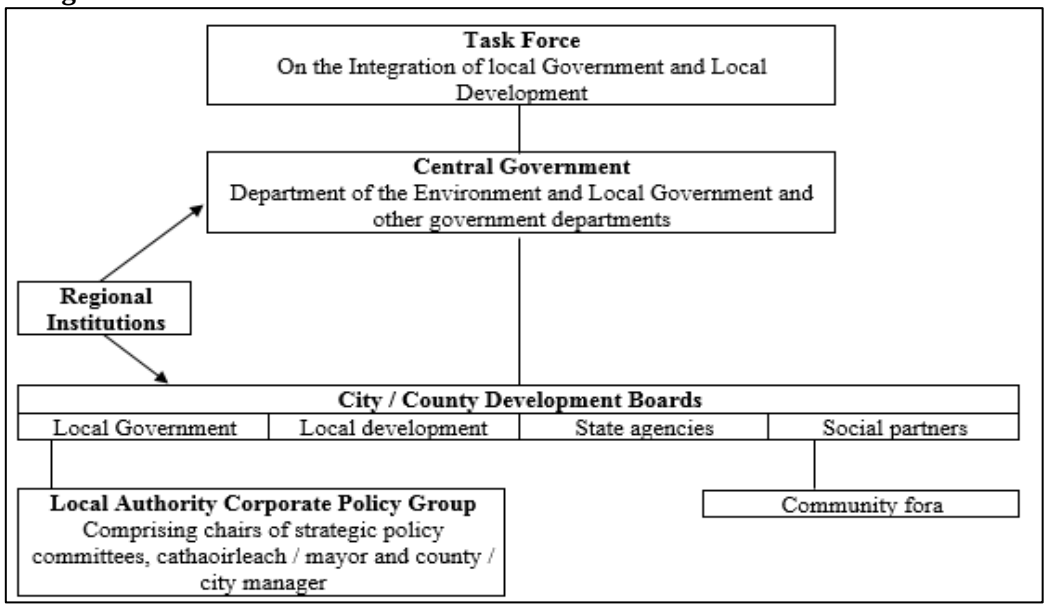
Specific spatial or strategic plans have been developed by the Irish Government such as the 'Mid-West Action Plan for Jobs 2015-2017' (DJEI.ie, 2015). This strategic plan outlines the road to economic recovery in the Mid-West region, and it has pledged 23,000 employment

opportunities. This will enhance the region's overall strategic objectives of continued self-sufficiency (see Section 3.5) and growth (Irishexaminer.com, 2015). It has the capabilities and resources to augment the REG profile of Irish regions (Environ.ie, 2015). In summary, rural and urban regional development, local authorities, local government policy, and community development are all impacted, positively or negatively by the Irish Government. Another national plan is the '**vision for local government in Ireland**' (Putting People First, 2012) which is related to the distinguishing of the local/community development, local services and local enterprises which are available in Ireland and aims to achieve economic development promotion (pp.21-44). According to the Irish Public Administration body, Ireland's regional economic development and growth context is continuously restructured by the global economic system. Moreover, the importance of government and business clusters to this research study can be exemplified below:

> *Models that highlight the role of local government and local economic development agencies within regional economic development strategies have been trialed in other countries (Botchway, Goodall, Noon and Lemon 2002). These suggest the need for long-term strategic planning, medium-term emergent positioning comprising policy responses to internal and external environmental change, and ongoing activities designed to collect data, build alliances and implement strategies within the wider community. Such models are likely to have value when applied by local government or regional development agencies although many may not be as proactive in the face of uncertainty as might be desired. Lack of coordination between the three tiers of government or their agencies is a critical area for consideration and attention. Government agencies and policy makers can assist in the formation of new business ventures leading to the creation of business clusters (Walker and Greenstreet 1990). However, their influence is frequently indirect and may be best applied via attention to the development of public infrastructures such as the education system (Romanelli 1989), or the establishment of business incubators (Young and Francis 1989). Government policy directed at encouraging enterprise within regions should focus on "removing obstacles, relaxing constraints, and eliminating inefficiencies" rather than attempting to 'pick winners' or decide the composition of the industrial landscape (Porter 2000).*

Irish regional policy is influenced by national and territorial governance through spatial planning and policy decision-making (Limerick2030.ie, 2017). According to the Ipa.ie (2001), regional development policy in Ireland has been greatly transformed through the development of national development and spatial strategy (Hughes, 2015; National Spatial Strategy 2002-2020, 2002) plans by the Irish government. A defining of local authorities study has been conducted by Citizensinformation.ie (2015) and described delivering a broad range of public services in a local area. Furthermore, local authorities promote the key interests of a local district, *"including the social, economic, environmental, recreational, cultural, community,"* or overall growth of a region. Callanan and Keogan, (2003) discussed the Local Government Act of 2001 which stated, *"that local authorities have a role to provide a forum for the democratic representation of the local community and to provide civic leadership for that community".* In Ireland, the local government capabilities include: (1) Housing and building; (2) Road transportation and safety; (3) Water supply and sewerage; (4) Development of incentives and control (planning); (5) Environmental protection; (6) Recreation and amenity; (7) Agriculture, education health and welfare; and (8) Miscellaneous services (Keady, 2015).

Figure 3.7: Local Authorities and Local Government Institutional Framework



Source: Callanan and Keogan (2003)

To support these capabilities, Figure 3.7 illustrates the support framework in Ireland for local authorities and local governments. Some organisations which affect local development are LEADER (promotion of rural areas), County, or City Enterprise Boards (CEBs). A change in local politics has led to the unification of the local authorities, the CEB's nationally, and dissolution of others. Arising from this, the government determined that a *One-Stop-Shop* within these territories was required. As such, the DJEI and Local Authorities worked together on forming the new Local Enterprise Offices (LEO's), as previously it was DJEI only (Callanan and Keogan, 2003). The LEOs were previously known as County and City Enterprise Boards. Arguably, the Local Enterprise Office is the *First-Stop-Shop* for anyone who is seeking information and support in the development or growth of a business in Ireland. They operate so that enterprise activity in Ireland functions more effectively. It has thirty-one dedicated teams across the 'Local Authority' network in Ireland, which offer one a comprehensive range of experience, skills, and services, for all potential, nascent, and existing entrepreneurs.

The main goal of the LEOs is to nurture people who are interested in setting up a new business or have an existing business. These include entrepreneurs, early stage businesses, start-ups, and small to medium-sized enterprises who seek to expand their ventures (Localenterprise.ie, 2014). LEOs are administered by the Department of Jobs, Enterprise and Innovation, now the Department of Enterprise, Business and Innovation (DEBI). The development of the LEOs by the Irish government is a significant step towards the augmentation of the regional and local economic policy milieu within the Republic of Ireland. Therefore, it can be suggested that this is one way to continue the trajectory of successful REG enhancement. The LEOs enable the promotion of firms and provide necessary grant funding. They also providing training and mentorship support (Enterpriseboards.ie, 2010). The City and County Councils endeavour to remain a core element of local government activity.

> *Local government will be the main vehicle of governance and public service at the local level - leading economic, social and community development, delivering efficient and good value services, and representing citizens and local communities effectively and accountably. (Putting People First, 2012).*

To demonstrate how local government will be the main vehicle of governance in the Republic of Ireland, there are 124 local or regional agencies, comprising 80 town councils, 5 city councils, 29 county councils, 8 regional authorities, and 3 regional assemblies currently in existence. Promotion of the overall well-being and quality of life standards of citizens local communities, and regions is the decisive aim of local governments. Therefore, it is the role of the local authorities to embrace an amalgamation of quality service distribution, regulate pertinent matters for the public interest, stimulate sustainable physical and spatial growth, and provide fair representation and accountability for all. The local authority's main objectives are presently categorised into seven wide aspects, including historical local authority functions in terms of*: "Roads, traffic, planning, housing, environment, recreation and amenity services,"* (Putting People First, 2012). According to the key 'Action Programme for Effective Local Government' strategy document, the roles of local government are being revived in the following facets, in particular:

- *an enhanced and clearer role in economic development and enterprise support;*
- *close involvement in community and local development;*
- *devolution of specific functions from central level and delegation of greater authority or relaxation of specific central controls on local authorities; and*
- *widening the reach of local government by using its capacity to undertake functions with or on behalf of other sectors and performing a broad co-ordination and leadership role locally"*

(Putting People First, 2012).

As previously discussed, in The Republic of Ireland, there is an existing system of Local government which encompasses 31 Local Authorities. Both local government and the rights of local self-government are a foundation of any modern democratic system. Arguably, the Irish

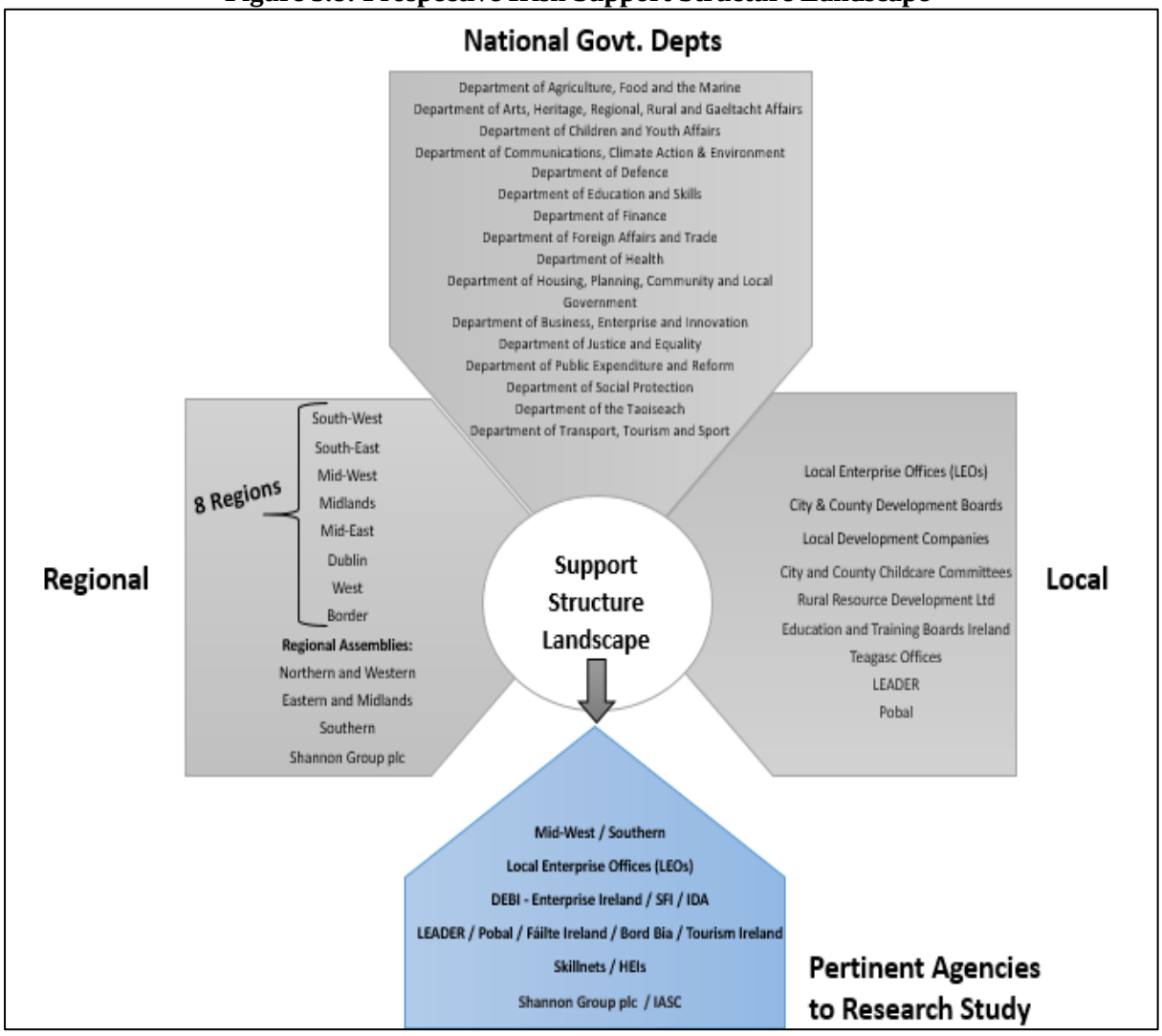
Local Authorities are the most accessible system of government for people in their local area. Local Authorities also have an obligation in the distribution of comprehensive services in their local community, with an emphasis placed on regenerating towns and cities, making them more attractive places to live, work, and invest (Lgcsb.ie, 2011). According to the current *state of the art* literature, the government in The Republic of Ireland has determined that a *One-Stop-Shop* within local and regional territories was required. They thus formed the LEOs (Callanan and Keogan, 2003). In conclusion, Local Authorities can play a key role in economic development and growth at both local and regional levels (Gov.ie, 2015), along with the quality of the local environment.

Gibb (1987) stated that supporting the structural system reflects the accessibility of sources of expert advice and information, as well as capital (see Figure 3.8). The development of regions and firms are augmented through a supportive infrastructure of organisations and enterprise consultants (NCOE, 2000). Effective regional markets can be categorised by neighbouring regional collaboration between businesses and other institutions (OECD, 2000; Anderson, 1994). Moreover, the focus of this section has been the existing support structure environment in The Republic of Ireland which helps foster and nurture job creation, new business development, and sustainability levels. Thus enhancing regional economic growth. As discussed previously in Section 3.3, the support structure environment in Ireland is one of extreme confusion regarding: Who is in charge? Who has the final say? Or what approach is the best to take in terms of national, regional and local support? There, the following models have been developed in order to answer these questions.

According to existing literature studies, a combination of organisations which are in charge rather than an ‘umbrella effect’ or a few organisations being in charge can be more effective. From a national perspective, Enterprise Ireland (EI) under the DEBI (Department of Business,

Enterprise and Innovation), along with SOLAS (employment services) are described as having the most influence (Enterprise-ireland.com, 2016; DJEI.ie, 2015; SOLAS.ie, 2016). From a regional standpoint, institutions such as the regional assemblies and Udarás na Gaeltachta, have the most influence (Udaras.ie, 2016; Southernassembly.ie, 2016; Bmwassembly.ie, 2016). Furthermore, from a local viewpoint, the Local Enterprise Offices (LEOs), LEADER Programme, and Area Partnerships have the most impact (Localenterprise.ie, 2016; DECLG.ie, 2016; Pobal, 2016). However, with this in consideration, it is important that entrepreneurs have access to a cooperative network of both a social and professional nature.

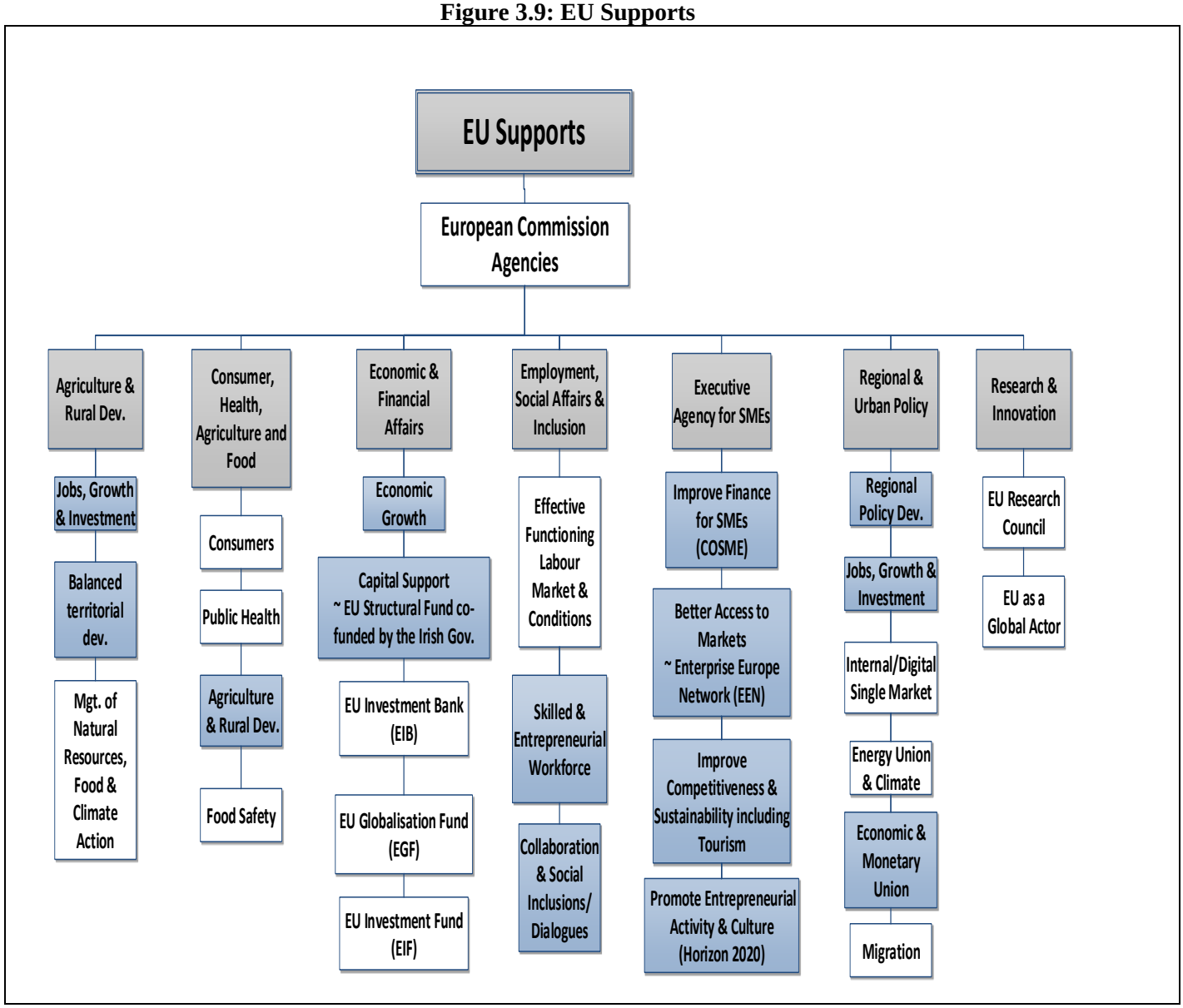
Figure 3.8: Prospective Irish Support Structure Landscape



Source: Adapted from Literature Review by Author

The most successful regions draw down support from both a national and international level, which is illustrated in the coming models. For the purpose of the literature review, it was determined that the examination of the European regional supportive landscape was of vital significance. To effectively understand the support structure in place, they can be examined through graphs (see Figure 3.9). This will help to reflect the specific entities importance and the graphs exemplify a top-down structure of the supportive landscape ranging from their importance.

Figure 3.9: EU Supports



Source: Adapted from Literature Review by Author

It can be said that the European Union (EU) is a vital entity which has provided fundamental regional and local government and stakeholder support, to all EU nations. This allows the creation of businesses and allows entrepreneurial environments to be improved (Commission of the European Communities, 2008). The key EU support areas of interest are inclusive of EU Commission Agencies which have outlined the EU Structural Funds, Horizon 2020 strategy (research and innovation), COSME (*EU* programme for the Competitiveness of Enterprises and Small and Medium-sized Enterprises running from 2014 – 2020), with an emphasis on access to finance, promotion of entrepreneurship, access to markets and funding opportunities. The European Commission has 53 Departments or Executive agencies, 16 of which are service departments. 31 are directorate general departments and 6 are executive agencies (European Commission, 2017). For the purpose of this study, 7 agencies have been examined to illustrate the EU support landscape model in Figure 3.9.

According to the Commission of the European Communities (2008), access to finance for any business and regional environment is classified as a fundamental requirement. The most vital access to finance activities for business organisations in the European Union include: EU Investment Fund (EIF); Competitiveness and Innovation Framework Programme (CIP); Eco-innovation projects; and European Investment Bank (EIB). Without these key EU initiatives, business sustainability can be challenging. The development of key enterprises can be described as a fundamental objective of the EU (Ec. europa.eu, 2015). Additionally, the EU has promoted entrepreneurship by the creation of enticing initiatives such as the European Enterprise Promotion Awards (EEPA). While in turn trying to make the EU an attractive market for enterprise development. Funding and grant aids are pivotal to new enterprise developments and key funds such as the EU Structural Fund (EUSF), and the European Globalisation Fund (EGF), can only positively enhance and nurture regional economic growth (European Commission, 2003).

Horizon 2020 (Horizon 2020, 2014) and COSME 2014-2020 (Ec. europa.eu, 2014) are two other EU funding mechanisms which effectively contributing to the betterment of the Irish national and regional enterprise landscape. Horizon 2020 is the largest ever EU Research and Innovation programme with almost €80 billion of funding available between 2014-2020. It is an initiative which is open to all and aims to create jobs and improve economic growth. COSME 2014-2020 will support SMEs through better access to finance, access to markets, supporting the development of entrepreneurs and creating a more favourable environment for enterprise development and growth with a planned budget of €2.3 billion (Ec. europa.eu, 2014). EU support is vital for the stability of Ireland's business economy and the graph above (see Figure 3.9) has emphasised their role in improving Ireland's economy. It is important to note that the EU aids the existence of both Irish governmental supports and stakeholder supports. When considering these matters, the competitiveness of Ireland's economy can be vastly enriched by the presence and involvement of the EU (Publications Office, 2011). To enhance this study further, regional convergence and economic clusters have been examined.

3.8. Regional Convergence and Economic Clusters (The Importance of Cluster Geographical Location)

Porter (1998) emphasised that the largest places (regions and urban districts) will develop multiple clusters. However, the mainstream of regions has the diminutive prospect of developing more than one or two feasible clusters (Bergman and Feser, 1999). Doyle (2015) has also argued that with the existence of a cluster context, regional economic development can occur. Doyle's view on clusters in terms of regional implications can be compared to that of Porter (1990) as economic performance, innovative capacity, competitiveness and start-ups are all more prevalent due to the cluster. Rosenfeld (2002) stated that there are barriers facing clusters in less favoured regions such as poor physical infrastructure, lack of access to capital,

weak technology, cluster hierarchies, and lack of skills. The growth of new industries and employment growth have a positive relationship with strong clusters and the area of increased innovation (Ketels and Protsiv, 2014). Regional clusters can create a favourable environment for innovative spin-off companies, which are generally related to the industry sector of the cluster (Roberts and Enright, 2004). Porter's (2008) argument has supported a theory by Roberts and Enright (2004), in which clusters do create a favourable milieu. He has recommended that clusters may impact competition in three main ways: (1) By increasing the productivity of the companies in the cluster; (2) By driving innovation in the field; and (3) By stimulating new businesses. In this regard, business clusters enhance the competitiveness of regions.

On analysis, regional clusters can often provide a focal point for direct investments as they have the concentration of labour, skills, and infrastructure which attract foreign investors. Furthermore, regional clusters can create growth for new businesses by providing better access to 'route to market' for goods and services and high-efficiency levels of clustered businesses, thus increasing the survival of new firms. Alternatively, groups of firms, polices, eco-systems, universities, and governments are key cluster factors which are required to improve the development of an economy and its region. Intense 'collaboration' and 'cooperation' between clustered firms must prevail within this double role effect which, in theory, should enhance regional economic activity and growth. Regional and economic environments can help to stimulate business clusters. Yet, agglomeration and convergence factors must be discussed as being core elements of cluster growth and enhancement.

The correlation between REG, convergence, and business clusters will now be explored. As outlined by an OECD report (2009), there are specific attributes to industry clustering in local, regional, and national economic environments. Such as the importance of innovation,

competitiveness and economic enactment. Geographical location can be categorised as crucial to the successful development of business clusters, as nearby related clusters can more easily share key elements of their success. These elements can include local resources, skills, and infrastructure (Ketels, 2013). This is a key element of the concept of clustering and cluster theory. In addition, Oakey (2007) has argued that robust global clusters often interlink with one another, further encouraging regional economic growth.

Within the current literature, there is a distinct difference between Oakey (2007), Porter (2003) and Delgado et al. (2010, 2011). They all agreed that clusters enhance regional economic activity and improve the proximity and business environment in which they are located. However, Oakey (2007) and Dunning (2001) maintained that the influx of MNEs with the idea of attracting local businesses to make its operations more productive, is the most effective approach of clustering (*Agglomeration* – see Section 1.2.2). Conversely, Porter (2003) and Delgado et al. (2010, 2011) disagreed with this approach. They believed related industry sectors and businesses should come together and share their resources, infrastructure, and comparable technologies to form partnerships and alliances which in turn create a successful cluster (*Convergence* – see Section 1.2.2). Lundström and Stevenson (2001) agreed that the formation of a business cluster convergence could enhance REG.

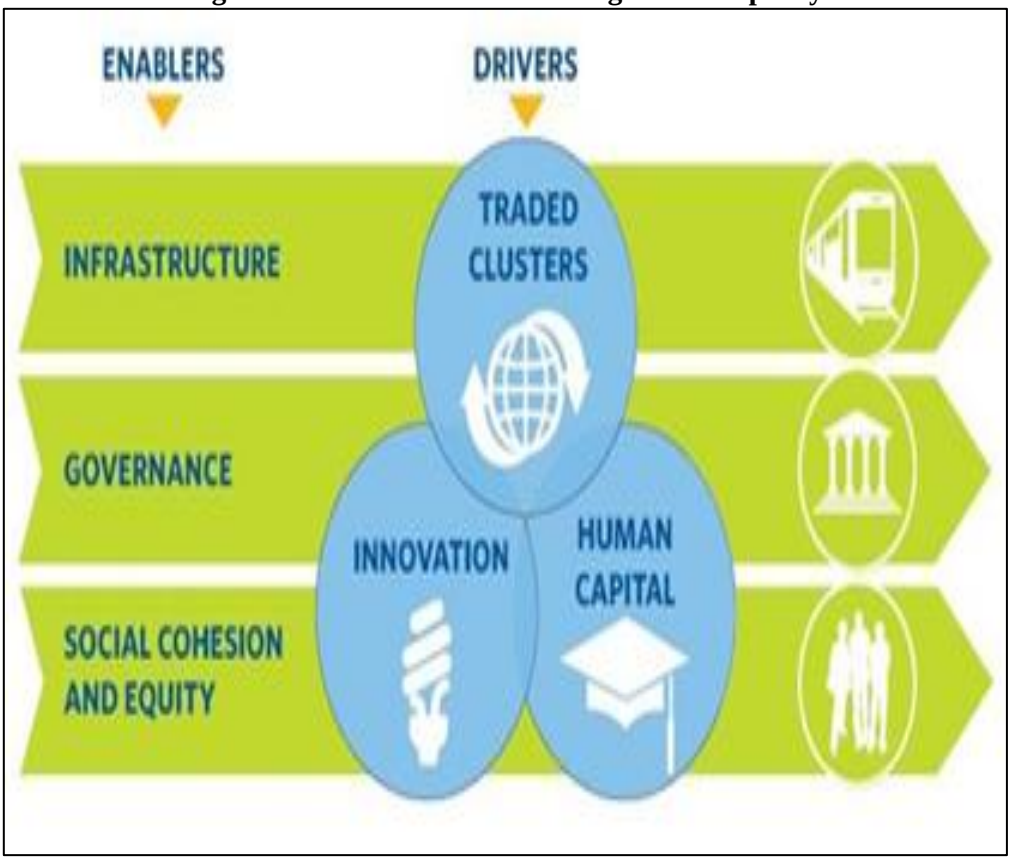
For the purpose of this research study, Porter (2003) and Delgado et al. (2010, 2011) are the most relevant in relation to the role of 'convergence' and 'business clusters' in regional and local economic development, on a more practical level (see Section 2.6.3). Porter (2000) has suggested that human capital plays a significant role in regional enhancement. According to an article in The Irish Times by Horn (2012), the core catalyst for regional growth is, of course, great people (see Section 6.7 and 7.3). He further highlighted that the collaboration of

innovators, engineers, and adventurous entrepreneurs', interlinked with robust social pools of connectors, businessmen and salesmen can attract financial gains.

When considering these matters, the regional area strengthens, enhancing prosperity and wealth. It is interesting to note that Horn (2012) has agreed that the BAHEP model in Table 3.2 is relevant and, *"if there can be a European complement to the Bay Area, then attracting and retaining truly great people has to be the key."* When considering the menu framework in Table 3.2, the key models which have been examined, improve the understanding of how REG can expand entrepreneurial activity. Moreover, it can also be described as highlighting the adoption of one (or more) of such models that can augment regions. It can be said that different models suit different regions based on the resources available. Interestingly, there has been a discussion of five key strategic clusters which could become the overall focus of policy: (1) Agri-food; (2) Biotechnology and health sciences; (3) Information technology; (4) Aeronautics; and (5) Renewable energy. This research can inform such strategic clusters and policies, through models of business clusters, which highlight how they work well in certain regions. Conversely, as discussed by Marchese and Potter (2010), there is a real sense of impractical expectations in providing 'world class' innovative clusters in high-tech sectors, rather than effectively building on existing regional strengths. Thus, the emergence of business clusters in regions must be carefully considered.

The framework in Figure 3.10 has highlighted that for regional prosperity to take place, business clusters must form part of the process. It is important to highlight that most preceding models in Table 3.2 have emphasised that clusters are either theoretical frameworks or contexts (Prezioso, 2009; Cornett 2009) and are not infrastructures (Colley, 2010; Jones 2016). When considering these matters, business clusters can be described as influencing REG, acting as key drivers of regional prosperity.

Figure 3.10: A Framework for Regional Prosperity

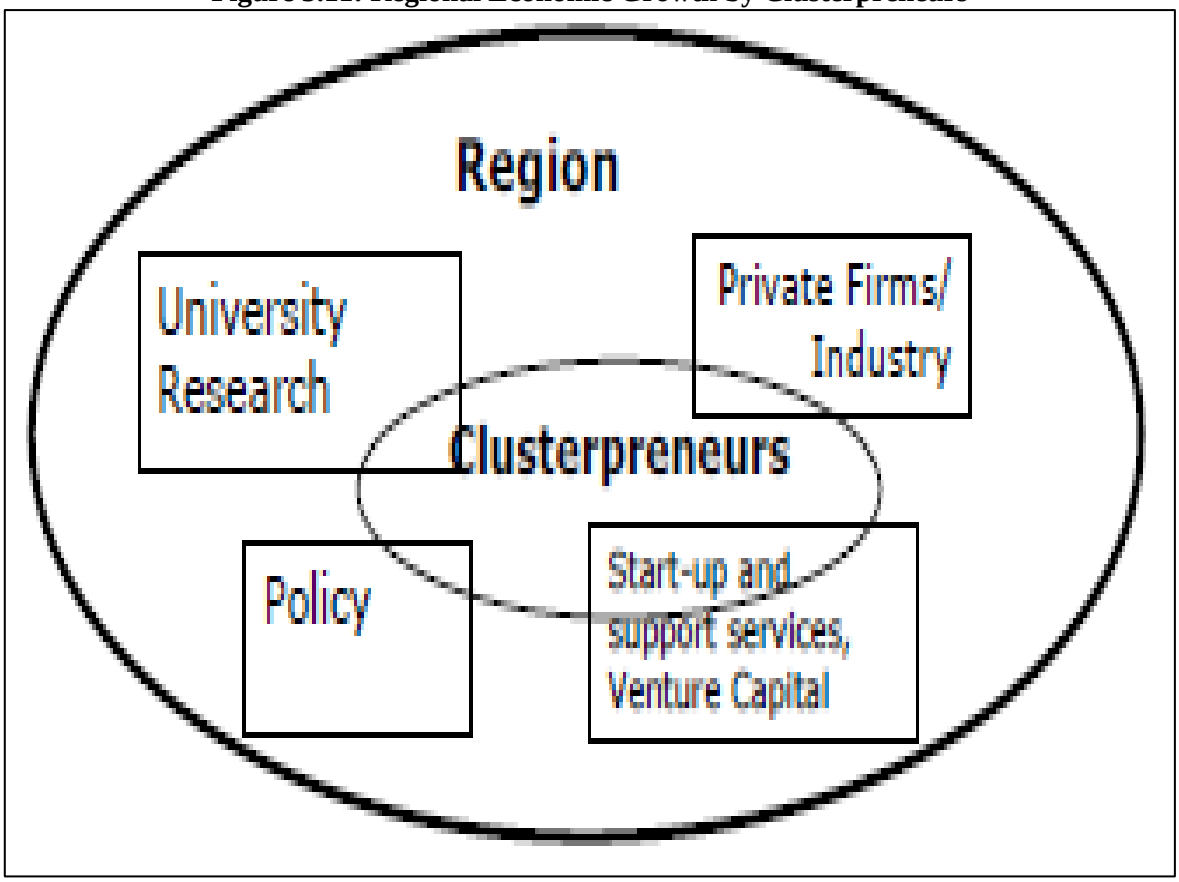


Source: Marc.org (2015)

As illustrated in Figure 3.10, Marc.org (2015) argued that clusters, innovation capacity, and human capital are the primary drivers of a robust regional economy, engendering overall productivity, employment generation, and increasing wealth. Economic drivers should be supported by strong infrastructure systems, sound governance policies, and impartial social systems, which enable strong regional economies (Porter, 2000; Kelels, 2003). It can be said that together, these highly inter-related drivers and enablers produce inclusive prosperity. For the purpose of this study, the business cluster can be regarded as important instruments in developing regions, enhancing regional entrepreneurial activity, enhancing the competitiveness of enterprises, and REG of which Rudusa (2010) has also agreed. Furthermore, the model in Figure 3.10 can be described as supporting the objective of this research study, as it has explicitly highlighted *business clusters* as *drivers* of regional prosperity, thus enhancing REG. Stoerring (2007) described cluster studies as: Exploring cluster development which is driven

by industrial evolution or policies, but fails to address the key actors and relate these actors to the type of region in which they are apparent.

Figure 3.11: Regional Economic Growth by Clusterpreneurs



Source: Stoerring (2007)

Stoerring (2007) developed the term 'clusterpreneurs' which has been assessed in Figure 3.11. Based on this model, Stoerring (2007) has argued that the process of cluster promotion is influenced by the actors who are referred to as 'clusterpreneurs.' They play a fundamental role in the cluster development process. According to Sölvell et al. (2003), "*cluster initiatives are very often started by one person with a background in the cluster who takes the lead – a 'clusterpreneuer,'"* (Raines, 2002). It can be posited that the cluster manager role is the same principle (Hobbs, 2019). The emergence of convergence and business clusters in regions must be carefully considered as a '*one-size-fits-all*' approach and is unrealistic (hence, the

establishment of the Regional Enterprise Plans to 2020 and Regional Spatial and Economic Strategy (RSES) in January 2020). A more thorough process is required similar to the Smart Specialisation Strategies (Dbei.gov.ie, 2019) which is expanded upon in the following section.

3.9. Smart Specialisation Strategies: The Concept

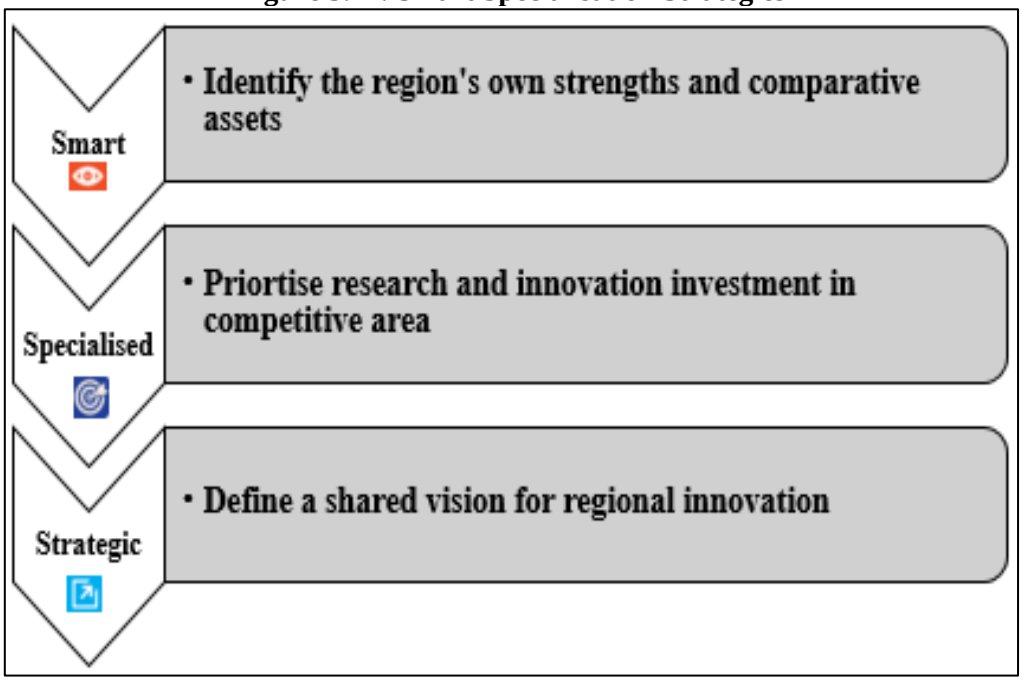
A smart specialisation strategy is an innovative approach which aims to boost growth and jobs in the Europe Union. This is achieved by enabling each region to identify and develop its competitive advantages (OECD, 2013). Through its partnership and bottom-up approach (refer to Section 1.2.2), smart specialisation brings together local authorities, academia, business spheres and the civil society, working for the implementation of long-term growth strategies by EU funds (Hobbs et al., 2018). The European Commission published the report 'Knowledge for Growth' in November 2009, the outcomes of an expert advisory group to the EU which ultimately led to the inauguration of the smart specialisation strategies (see Figure 3.12).

> *Tasked with finding an alternative to public policies that were seen to spread public investments in knowledge and innovation – research, education, public support to business R&D, etc – thinly across technology research fields such as biotechnology, ICTs, and nanotechnology, the expert group proposed that national and, especially, regional governments should encourage investment in domains that would "complement the country's other productive assets to create future domestic capability and interregional comparative advantage. This strategic proposal was coined "smart specialisation. (OECD, 2013).*

Hobbs et al. (2018) further argued that clusters can bring in the knowledge required to make smart specialisation successful, as they are a huge driving force representing 39% of all EU jobs. They further described clusters as the DNA of smart specialisation. Smart specialisation strategies have been discussed in Section 4.7 and throughout this work as policies in regional development and formed part of the recommendations section of this research study (see

Section 7.3). The ‘ecoRIS3’ (a policy to support local and regional innovation eco-systems) programme can be described as an example of a smart specialisation strategy that looks a bringing industry and academia together using the triple-helix (see Table 2.5 in Section 2.4) approach by Etzkowitz (2000) to improve regional development (Interreg Europe, 2017).

Figure 3.12: Smart Specialisation Strategies



Source: Adapted from Hobbs et al. (2018)

Energy Cork is an empirical example of an organisation which forms part of the ecoRIS3 programme and has experienced bottom-up growth (*Convergence* – see Section 1.2.2). It has grown to a cluster with 85 member organisations, from energy utilities, oil and gas companies, energy suppliers, and energy management companies (Energycork.ie, 2019). The purpose of Energy Cork is to encourage and support economic development and job creation in the energy sector. Embedded within the structure of Energy Cork is a response to the needs of members and vision of the clusters founders which is in the organisation's constitution. They are the steering group which provide management and strategic direction to the cluster led by the Energy Cork chairperson. There are 14 industry members (7 SMEs and 7 non-SMEs elected) and 14 other members on behalf of the local and regional government, development agencies,

academic and research associates in conjunction with employing one full-time cluster manager (Interreg Europe, 2017; Energycork.ie, 2019). Fundamental policy recommendations have come from ecoRIS3 such as: (a) Cluster concept definition (see Section 2.2.1); (b) Engagement with local action specifically enterprises (refer to Table 2.5 in Section 2.4); and (c) Cross-sector cluster coopetition (see Table 1.3), which can be described as pertinent elements of this research study. It could be said that these smart specialisation strategies also try to explore whether regions can create clusters or not.

3.10. Can Regions Create Clusters?

Rosenfeld (2002, p 11) highlighted that most of the world's successful clusters were accidents of circumstances, a serendipitous string of events:

> *Public policies may have been the catalyst but rarely with the intent of starting a cluster. The growth of the largest clusters has been driven by market demand and entrepreneurial spirit. Some began as large companies that originally located in less populated areas to take advantage of low wages and surplus labour markets and that later disintegrated into smaller firms.*

He believed this scenario described the origin of furniture manufacturers in both Tupelo, Mississippi, in the United States, and County Monaghan, in Northern Ireland. Others were created by transforming a common local craft into a related value-added cluster (e.g. straw hats into fashion knitwear in Carpi, Italy or plastic combs into more advanced plastic parts in Leominster, Massachusetts, in the United States). Some clusters develop as other regions do not want them (e.g. prisons tend to cluster in the North Country of New York or the western reaches of Palm Beach, Florida). Regions may, *"transplant clusters to weak economies via recruitment and incentives, but usually at a very high cost"* (Rosenfeld, 2002).

The most common example of this is the auto industry. Companies agree to use local supply chains in return for a large number of government incentives, or where regions design policies

to develop and embed supply chains. Auto supplier clusters in central Kentucky in the United States or southern Wales in Britain or even electronics in the Republic of Ireland were largely inward investment driven (Rosenfeld, 2002, p 11). Bresnahan et al. (2001, p 842) argued that, *"the processes of starting and sustaining a cluster have different economics. Starting a cluster involves building the economic fundamentals for an industry and then finding the spark of entrepreneurship to get it going".* This view is born from the idea that new clusters, including Silicon Valley (see Section 2.2.1) in the 1960s, offer substantially less support to entrepreneurship in the start-up or pioneering phase, than a mature cluster like Silicon Valley does at present. Externality plays only a small role in the early phases of cluster formation. Such benefits typically come later in the development of a cluster. Rosenfeld (2002, p 6) believed that clusters have life cycles which have been discussed previously in Section 2.3.1

Bresnahan et al. (2001, p 845) believed that embryonic clusters (see Section 2.3.1), in order to have a chance of growing and maturing, must take advantage of a new technological and market opportunity which have not been already exploited. *"They have to bet on new trajectories before they manifest their potential. This means that they have to bet on an opportunity before it is clear to everybody that it is indeed an opportunity. Risk is therefore unavoidable".* They further cited examples of the integrated circuit industry in Silicon Valley (the 1960s), such as the Internet and network security markets exploited in Ireland and Israel or opportunities such as software demand. *"The rationale for this is not hard to guess. Markets with substantial producer rents, like ICT and biotechnology, are characterised by powerful forces that make a direct assault on an existing market position unpromising"* (Bresnahan et al. 2001, p 842).

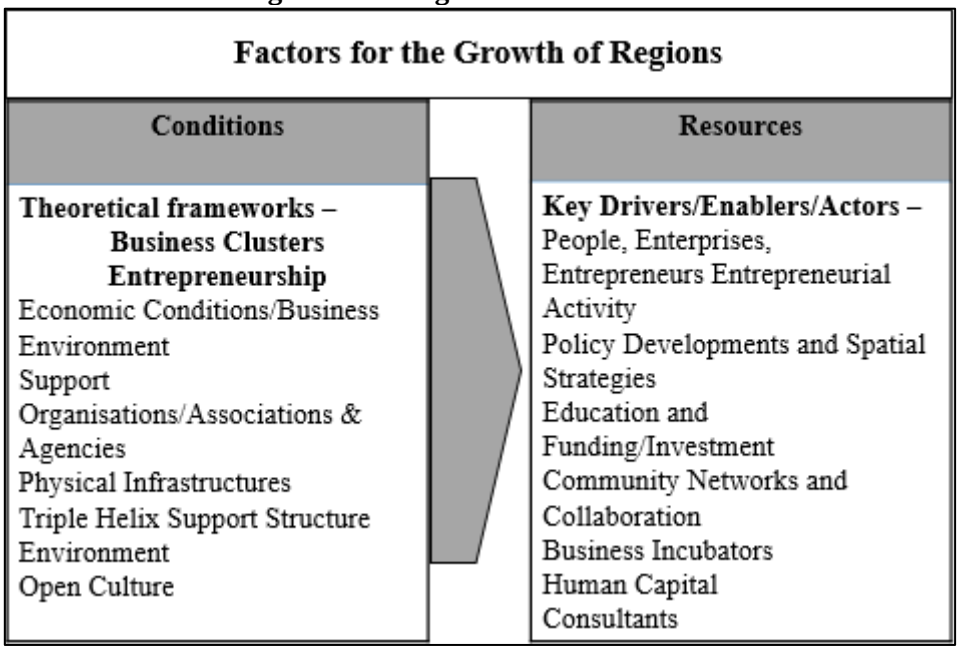
The lesson arising from Bresnahan et al.'s (2001, p 856) case study is that to blossom, new cluster entrepreneurs must turn away from established sources of profits in order to define new ones and make their relationship with existing technologies and clusters complementary, rather

than competitive. Much of the opportunity for new regions arise as old regions find themselves running up a steeply rising supply curve of land and highly skilled labour.

3.11. Conclusion

One may argue that the convergence of moving towards equality and collaboration can be regarded as being imperative to the successful augmentation of a region. Audretsch and Keilbach (2005) and Fritsch and Mueller (2007) backed this perspective from the OECD report (2011), having stated that a region is a place where such stakeholders can understand where their key strengths are, as well as how they can collectively engage with each other to improve their outputs. Furthermore, there are certain factors for the growth of regions which have been illustrated in Figure 3.13 below.

Figure 3.13: Regional Growth Factors



Source: Adapted from Literature Review by Author

In understanding regional economic growth theory, and the role of convergence and business clusters, the consensus is that these concerns require further investigation. On examination of the current literature, the most relevant definition of a region comes from Abdullah et al.

(2015). Whereas, the most pertinent definition of REG in relation to this research is Burton's (2015) explanation, due to its holistic nature (see below). Whilst each of the discussions and understandings of REG that have been outlined throughout this chapter are pertinent and have merit (see Section 3.2), this definition by Burton (2015) has been adopted because it can be described as having highlighted REG more holistically and aligns with the business cluster convergence approach. Throughout the rest of this study, this understanding of REG will be the most applicable.

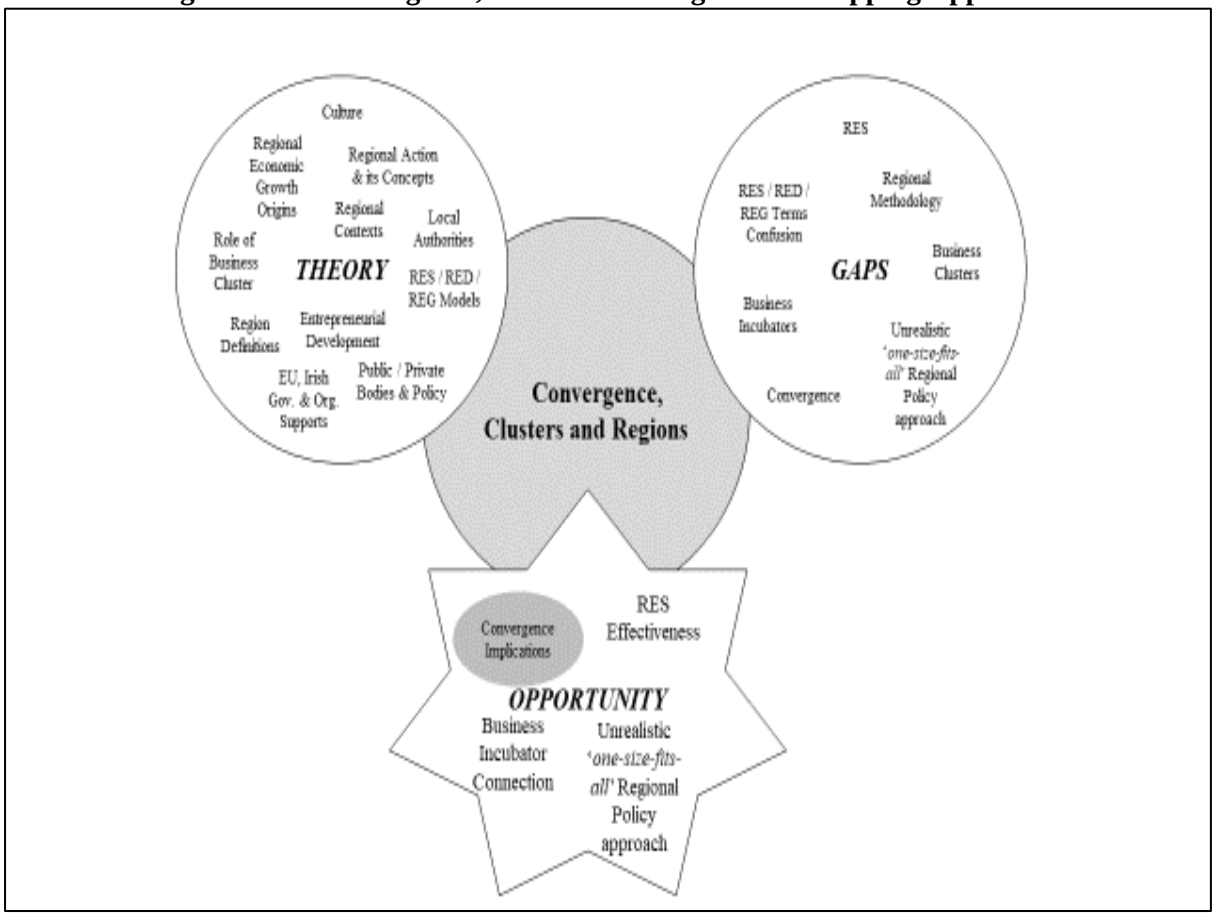
Abdullah et al. (2015) understanding of the term '*region*' is the most pertinent for this research study as it has focussed on the resources available/needed and the economic activities that stimulate the development of a region.

To enhance the value and applicability of Burton's definition, in understanding how regional economic growth may expand entrepreneurial activity, the development of a regional economic growth mapping framework has been created (see Figure 3.14). This framework illustrates the 'triangulation effect' of *theory*, *gaps* and areas of *opportunity*. The consensus can now be drawn that business clusters and the convergence approach are salient to this research. Various model combinations can be more effective in numerous regions due to dissemination (rural vs. urban). Table 3.2 illustrated various regional development areas which have influenced and informed the development and basis for Figure 3.14. Moreover, this mapping process has been informed by the various sections in this chapter, Figure 1.4 in Chapter One, Figure 2.13 in Chapter Two and will be used to contribute to the development of the theoretical framework in Figure 4.10.

REG Definition: Burton (2015) has highlighted that REG is helping every region to capitalise on its unique strengths to the maximum, entice investment opportunities, support local SME's and ensure that people find employment in their own communities and regions.

Not every model of business clusters will strategically fit or link into every region. Certain factors such as existing resources, capabilities and structural contexts, help to establish what model will be of most benefit to a region's overarching REG. Rural regions compared with urban regions also incorporate different regional economic models. As outlined in Section 3.8 a holistic regional support structure, for example the Regional Enterprise Plans to 2020 and Regional Spatial and Economic Strategy (RSES, 2020) (Dbei.gov.ie, 2019) is required. There is not a '*one-size-fits-all*' approach which has been in operation in terms of approaching regional policy in The Republic of Ireland. One could suggest that this is not an adequate process as different regions have different resources and synergies which require tailored strategies such as the need for the establishment of the 'Regional Enterprise Plans to 2020' and 'Regional Spatial and Economic Strategy (RSES)' in January 2020.

Figure 3.14: Convergence, Clusters and Regions– A Mapping Approach



Source: Adapted from Literature Review by Author

On examination of the current literature, a key finding is that more policies and regional structures are needed to give regions some valued meaning such as the Regional Spatial and Economic Strategies (RSES). Furthermore, Smart Specialisation Strategies such as ecoRIS3 have been a dynamic approach to enhancing employment creation in the EU. This is since they enable regions to explore and expand on its core competencies (Interreg Europe, 2017). The strategies bring together the triple-helix actors (see Table 2.5 in Section 2.4) and civil society to augment regional growth (Hobbs et al., 2018). One could argue that Energy Cork is a classic example of an organisation which forms part of the ecoRIS3 Smart Specialisation Strategy and promote convergence through encouraging bottom-up growth in the energy cluster (Hobbs et al., 2018).

In December 2019, it was announced by the Minister for Business, Enterprise and Innovation, Heather Humphreys TD (DEBI) and the Minister for Education and Skills Joe McHugh TD, that 12 successful cluster applicants were selected for the Regional Technology Clustering Fund (RTCF). This was the first annual competitive fund of its kind. The RTCF totalled €4.6 million and it aimed to enhance collaboration between enterprise and regionally based academic institutions such as the Institute of Technology (IoT) and Technological Universities (TU). This would stimulate productivity and competitiveness in and across the regions with the focus on SMEs and new innovative industrial value chains. The sectors supported, and the areas of cluster evolution were, furniture manufacturing, marine, connected health, industry 4.0, construction, advanced manufacturing, cyber security, engineering, bioeconomy, medtech and agritech (Enterprise-ireland.com, 2019).

In the ‘southern regional assembly – regional spatial and economic strategy’ (RSES) report released in January 2020, clusters had a strong emphasis. Moreover, the diversification of industry and the development of clusters have been discussed to augment economic resilience

and decrease economic uncertainty and risk. The hope is that by developing industrial clusters, objectives such as lower production costs, improved innovation among interrelated businesses, and augmented co-location of similar and supporting businesses can be achieved (Southern Regional Assembly, 2020). Clusters such as Internationalisation Aviation Services Centre in Shannon (IASC) (see Section 4.2.3 in Chapter Four), CyberIreland (see Section 1.9 in Chapter One), it@Cork, Energy Cork (see Section 3.9 in Chapter Three), CAV (Connected Autonomous Vehicles), Marine, Crystal Valley Tech Cluster have been examined, but no national cluster policy exists (see Section 2.2.4 in Chapter Two) which is vital to follow (Southern Regional Assembly, 2020).

A clear long-term tailored regional development policy (similar to the regional enterprise development fund 2017-2020, and regional spatial and economic strategy (RSES, 2020) should continue to be created by policymakers which should filter down to all regions as equally and effectively as possible, so that real REG can take place (Enterprise-ireland.com, 2017; Enterprise-ireland.com, 2019; Southern Regional Assembly, 2020). Mills (2017) has suggested that a balanced economy and the development of a regional ecosystem is imperative if a country is to maintain economic growth. Arguably, these findings enable the reader to effectively understand the validity of this research study's premise. As outlined in Section 3.3, many studies have suggested that regions do matter and that the connectivity within them is valuable for their growth and development (OECD, 2011). To conclude phase three of this journey, this chapter has examined, 'the role of convergence and clusters in regions' through the examination of extensive literature and the creation of a new unique REG model that has incorporated the necessary attributes and features is needed for regions' to prosper. The next chapter will provide an extensive analysis of the regions which form this basis for this research study.

Chapter Four

Regional Contextualisation Profiling

4. Regional Contextualisation Profiling

4.1. Introduction

The previous chapter examined 'The Role of Convergence and Clusters in Regions'. Therefore, the regions pertaining to this research must be presented. The purpose of this chapter is to discuss the regional contextualisation. The outcome of this chapter will be to outline the various regions which have been included to form the context for this research study. The rationale for the selection of these regions will be discussed before delving into each region in detail (see Figure 4.1) to illustrate their importance and the key factors behind their inclusion.

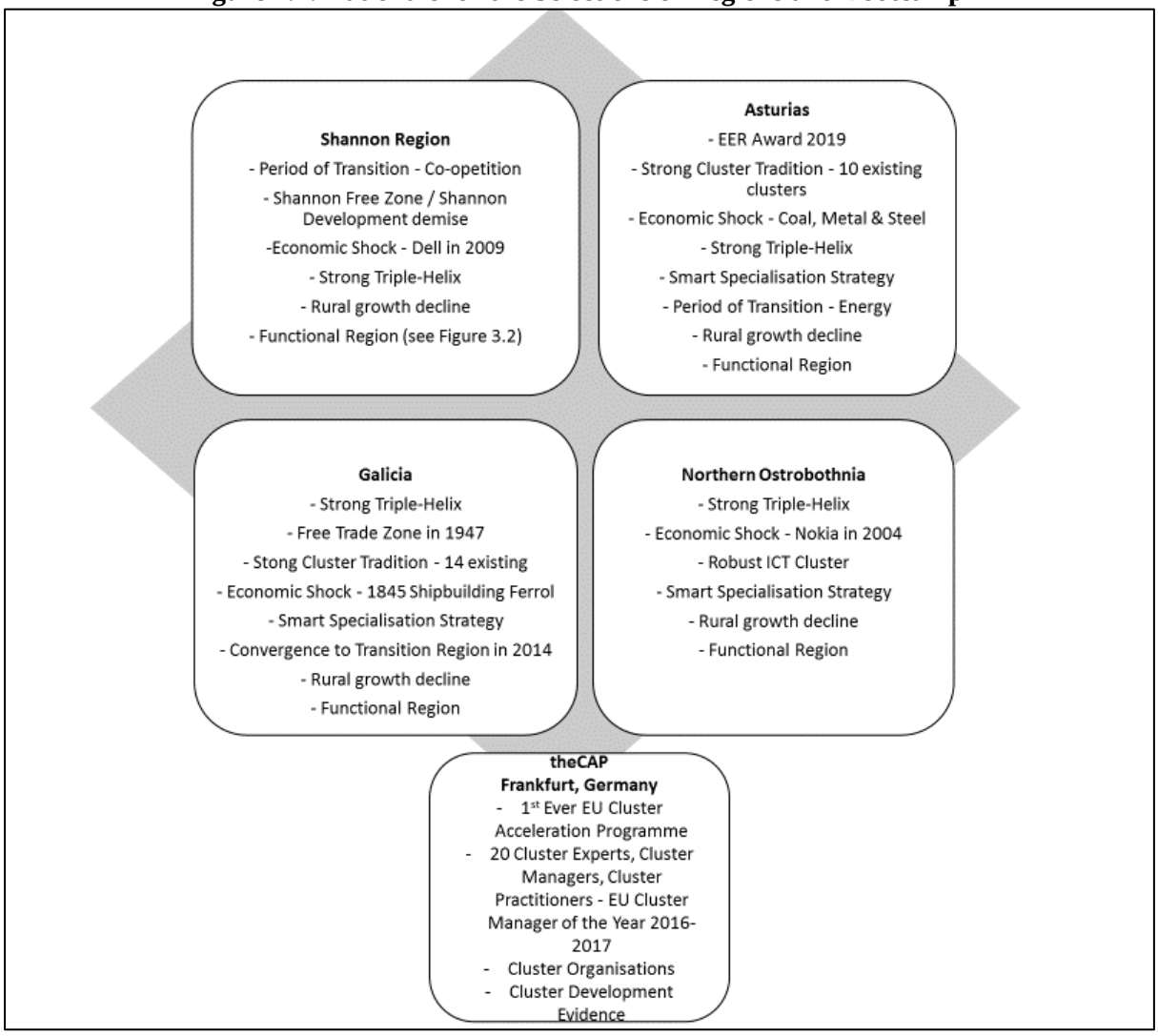
Table 4.1: Chapter Structure

Chapter Approach
Introduction to Chapter
Shannon Region
Development | Economic Analysis | Business Clusters | Future
Asturias Region
Development | Economic Analysis | Business Clusters | Future
Galician Region
Development | Economic Analysis | Business Clusters | Future
Northern Ostrobothnia Region
Development | Economic Analysis | Business Clusters | Future
EU Cluster Acceleration Bootcamp (The CAP)
Comparison of the Contexts | Positioning the Literature Review
Conclusion
Source: Adapted from Literature Review by Author

Each region will be examined in terms of their historical context, development of their social and economic standing, their regional economic growth, economic analysis position, business

cluster analysis, and their future. The regions which make up this examination are the Shannon region in The Republic of Ireland, The Principality of Asturias in Spain, The Galician region in Spain, and Northern Ostrobothnia in Finland.

Figure 4.1: Rationale for the Selections of Regions and Bootcamp



Source: Adapted from Literature Review by Author

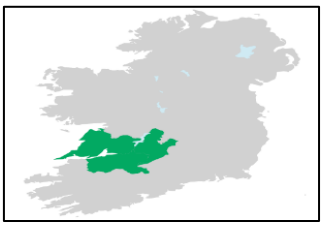
The Shannon region in The Republic of Ireland was selected due to the period of transition which it has endured. With the demise of the relevant regional agency 'Shannon Development', Shannon Airport Authority became independent in 2012 and the Shannon Group was formed to foster innovation and regional development (Callanan, 2000; O'Regan, 2019). Agglomeration or top-down growth (see Section 1.4), and FDI investment have been a main

strategic focus for this region to achieve regional economic growth over the years. However, these have slowed and a more modern bottom-up collaborative approach is needed as described by Downes (2019). In addition, The Principality of Asturias has been selected to form part of this research study based on their success story of winning the European Entrepreneurial Region (EER) project in 2019. The European Entrepreneurial Region award signifies a unique opportunity to merge stakeholders and policies, by developing a new set of original and unique EER activities. The aim of the EER award is to promote long-established entrepreneurship and SME measures and activities (European Committee of the Regions, 2019). The international recognition of such a valued EER award is difficult to attain due to its competitive nature. As identified in the 2019 EER award publication (RIS3, 2019), innovation, inclusivity, and sustainability were pivotal aspects which fundamentally led to Asturia's success. After receiving the prestigious EER award, this label can be regarded as a valuable opportunity to bring together the entire regional stakeholders' efforts. These efforts have been outlined as: Develop synergies and sharing knowledge and resources to promote and support entrepreneurship; providing linkages to extra-regional best practices; and rewarding and promoting entrepreneurial role models (Cor.europa.eu., 2019).

The economic profile concerning the Free Trade Zone (1947) in Galicia and the ICT cluster in Northern Ostrobothnia have similarities and differences to learn about, *inter alia*. The first-ever EU Cluster Acceleration Bootcamp (TheCAP) in Frankfurt (Germany) in October 2019 was selected to form part of this research study as 20 participants consisting of cluster managers, cluster experts, cluster policymakers, academics and cluster practitioners were in attendance. *"Participants will work on their own cluster challenges and learn the crucial keys to cluster management, how to build innovation ecosystems for systemic change, and how to apply practical tools and innovative methods to their specific cluster/ecosystem needs"* (Dragomir, 2020). TheCAP was the first Bootcamp of its kind to be held in the EU and may be

regarded as an excellent opportunity to learn international best practices concerning cluster development and the management process involved along with the EU Cluster manager of the year forming part of the initiative.

4.2. The Shannon Region



Shannon's historical enterprise background has dated back to the 1940s and has experienced somewhat linear challenges and success stories as part of its development journey (Sidc.ie, 2017). There is a lack of research on the Shannon region, but Callanan's (2000) case study on Ireland's Shannon Story is one of the main works which is incorporated into this research. Andreosso-O'Callaghan and Lenihan (2008) have outlined the Shannon region (SR) as geographically situated in the Mid-West of Ireland encompassing 10,000 square kilometres geographical area. The Irish counties/areas which make up the region comprise of Clare, Limerick, South Offaly, North Tipperary and North Kerry (Donovan, 2017). In total, these areas have a population of approximately 450,000 people (Eolas Magazine, 2019). The region is named after the country's longest river, the Shannon (240 miles long). The river is popular with tourists who also visit Shannon's many attractions, bringing in €391 million in revenue to the local economy (Eolas Magazine, 2019).

The main employment sectors across the Shannon region are in order of magnitude are manufacturing, construction, wholesale, and retail. A significant number were employed in the health and education sectors, along with small numbers employed in property, hotels, and

catering. All of which were badly affected by the economic downturn. However, manufacturing remains strong, as does the services sector (Eolas Magazine, 2019). According to Andreosso-O'Callaghan (2000), in 1959 the Shannon region inaugurated the first modern free trade zone in the world (Shannon Free Zone – SFZ, a prototype for China's Special Economic Zones) and the first technological park in the country (Plassey Technological Park). Andreosso-O'Callaghan further suggested that regional and industrial development in the Shannon region were shaped by two main enablers: (1) Shannon Airport; and (2) Plassey Technological Park, with the University of Limerick at the core of its development (Shannon Development, 2014). Shannon Airport dates to the 1940s and it has a long history as a significant transatlantic transit point. Additionally, the world's first *Duty-Free Shop* was at Shannon Airport.

4.2.1. Development of the Shannon Region

Key individuals have been paramount to the development and growth of the Shannon region. Those such as Brendan O'Regan, who has been lauded in recent times following the unveiling of his bust sculpture at Shannon Airport (Flynn, 2017). To provide some background on the man himself, Callanan (2000) has devoted an entire section within his study to this instrumental individual. Brendan was born in County Clare on the West of Ireland and was involved in the political and social area at an early age due to his father's involvement as chairman of Clare County Council (see Section 1. 5.4). His career in the hotel industry, firstly in Clare (Ennis Old Ground Hotel and Falls Hotel Ennistymon) and then Dublin (St. Stephen's Green Club), was a key driver behind the network which would lead to major opportunities in the years ahead. Back in Foynes, County Limerick, the flying boat base was created before the Second World War acting as the major tech stop (refuelling hub) for air traffic between Britain and North America, thus enhancing the Irish Aviation scene.

The Taoiseach at the time, Eamon de Valera who was also a Clare politician, was troubled to see British Imperial Airways in charge of catering operations at that site and thus called for change. De Valera consulted with the Minister of Industry and Commerce (inclusive of air transport responsibilities), Sean Lemass who built a rapport with Brendan as a regular visitor of the St. Stephan's Green Club. It was then that O'Regan at just 25 years old, found himself as Foynes Catering Comptroller in 1943. However, his tenure at Foynes was short-lived as Shannon Airport opened at the end of the war with commercial business and catering operations transferring with it.

Brendan O'Regan was also one of the key drivers behind the creation of the regional development agency Shannon Free Airport Development Company (SFADC), later Shannon Development. This agency was one of the powerful forces in the early 1960s behind the development of Ireland's newest town, Shannon Town, which as of 2017 had a population just shy of 10,000. Furthermore, the Shannon Development agency produced Ireland's first regional industrial development plan in 1969. The success of the airport and the industrial zone spearheaded the development of Shannon town, thus further enhancing the tourist attractions of Bunratty Castle which ultimately gave rise to Shannon Heritage. This is one of Ireland's largest tourist experience operators with sites in Clare, Galway, Limerick and Dublin (Flynn, 2017). Shannon Airport acted as a bedrock and catalyst for the development and growth within the Shannon region. It can be said that both the region and the airport are conveniently located on the west coast of Ireland. The north side of the Shannon estuary acts as a gateway for transatlantic enterprise activity (both from a shipping and commercial aviation perspective), with a particular emphasis on robust alliances with American organisations. Furthermore, Shannon was the first gateway for the entry of export based Greenfield investment into the Republic of Ireland in the 1930s and that it is still the largest single site concentration of Greenfield investment in Ireland (see Appendix K).

4.2.2. Economic Analysis of the Shannon Region

Exogenous factors (MNEs and international firms' entrepreneurial activity) have been key to the successful industrial development of the Shannon region. However, that indigenous-based robust research, aligned with HEIs and the SFZ are imperative to the future 'innovation strategy' of the Shannon region (Andreosso-O'Callaghan, 2000, pp.84-85). This highlights the benefits and purpose of this research study. O'Regan (2019) developed Shannon 2.0 study around the theme of 'Our Story is one of constant reinvention' and highlighted that the Shannon region is renowned for innovation, diverse opportunities, and an idyllic area. This helps to make Shannon-based firms and its educational institutions known worldwide. 8,000 people are currently employed across 170 companies compared to 7,000 people employed in 100 international and national companies in 2017 (Shannon Group, 2017).

These statistics emphasise that employment generation opportunities and firm attraction levels are improving. The Shannon Group focuses on building communities, enhancing the quality of life, promoting aviation and boosting tourism (Shannon Group, 2017). The Shannon region has evolved to become more than a business hub for aviation with some 19,000 people employed in indigenous manufacturing and internationally traded services businesses, in the locality and the wider mid-west region. Russell (2019) stated that Shannon has been a beacon for economic growth and regional development and can become a model for how our society and people can thrive, despite globalised challenges (Downes, 2019). Downes argued that for sixty years, Shannon had a revolutionary era of inward investment and tourism growth around Greenfield attraction. However, a bottom-up growth approach with higher levels of collaboration between the key regional stakeholders is now required as this region is home to the largest concentration of FDI investment outside of the Dublin region.

The triple-helix collaboration between **academia** (UL, LIT, MIC), **industry** (aviation, tourism and manufacturing) and **government** (EI, IDA, Shannon Chamber and LEOs) has been crucial to the continued regional growth of Shannon (Russell, 2019). Close triple-helix collaboration is paramount in meeting the needs of local firms, with a ready pipeline of capable graduates (e.g., Northern Trust opening, Ei Electronics and Zimmer Biomet) (O'Reilly, 2019; O'Regan, 2019). The corridor between Limerick and Galway, along with the towns of Ennis and Shannon, has become critical to infrastructure links whilst enhancing the industrial heartbeat of the region. Harris (2019) proposed that the Shannon region attracts investment from global players as more than 4,000 jobs have been created in the last three years with 58 IDA supported firms. €3 billion in exports can be directly linked to Shannon with firms such as Lufthansa, Molex, Intel, Edwards Lifesciences and Jaguar. In 2018, Edwards Lifesciences selected the Shannon region as the base for their new €80 million manufacturing facility, further suggesting regional resilience Dennis Curran of IDA Ireland suggested that this surge is due to several factors such as talent, infrastructure, education, commercial property solutions, utilities and place-making (Harris, 2019).

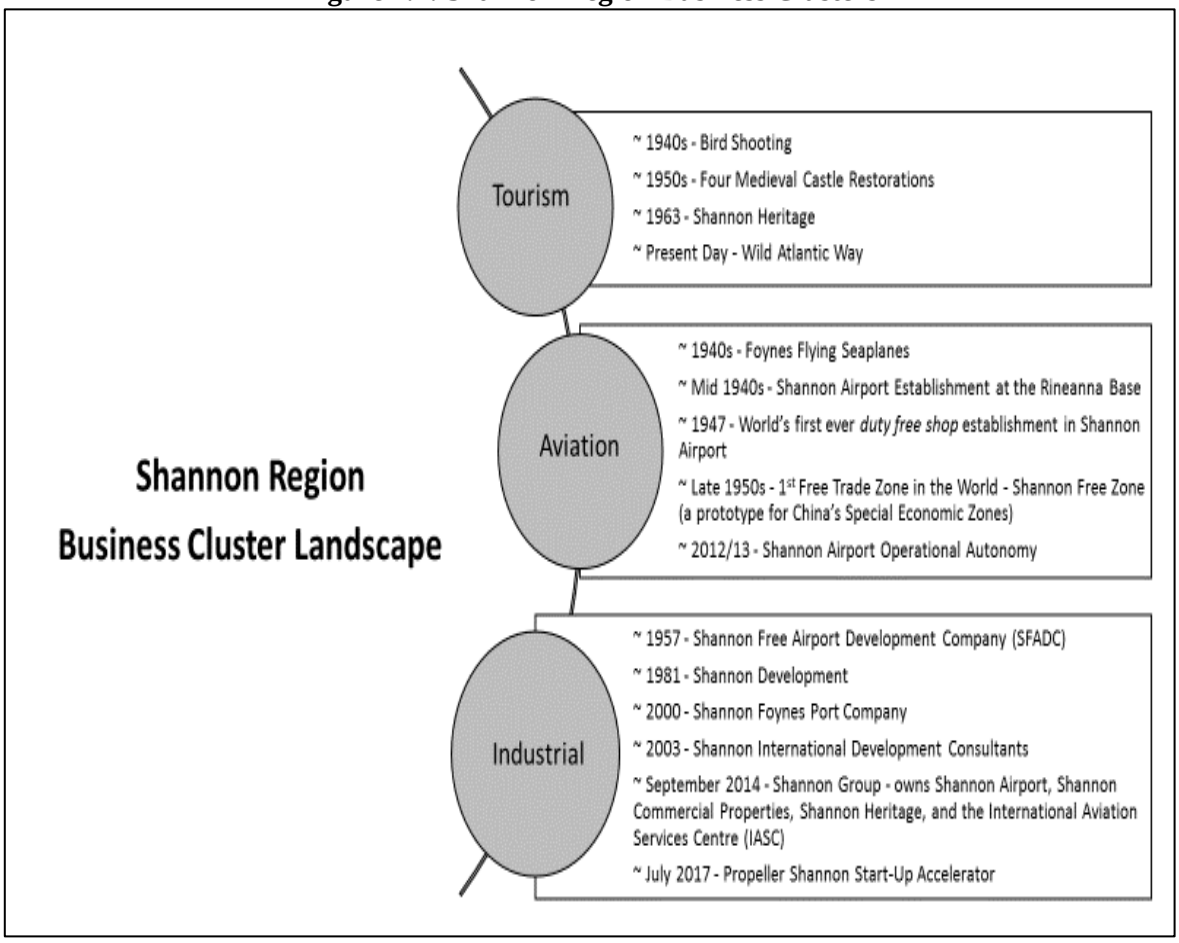
4.2.3. Business Cluster Profile

This section will examine the various clusters (tourism, aviation and industrial) within the Shannon region and their influence on its economic growth position. In 2012, the Irish Government made Shannon Airport independent from the Dublin Airport Authority (DAA) Group, which includes Cork Airport Authority (CAA), as the future of the airport was in doubt. This was due to passenger numbers falling from over 3.5 million in 2006 to almost 1.8 million in 2010 (Palcic and Reeves, 2011). This independence unlocked the potential of the Shannon Group plc organisation, developing the existing aviation cluster to enhance its REG and to enable a more autonomous policymaking system.

- ***Tourism Cluster***

To provide some context, wild geese and duck shooting was a major attraction within the townland of Rineanna ('meeting place of the birds'), near Shannon, Co. Clare. This was due to the muddy flat terrain which made the conditions ideal for aviation. This tourist attraction was the initial spark for the aviation space in Shannon. Subsequently, the aviation cluster developed in the Shannon region, and it received attention from governmental authorities, which saw the area as an opportunity for growth. Therefore, leading to the industrial and commercial activity which exists today, with the movement from Foynes to Shannon Airport in the 1940s (Shannon Airport, 2019). During the 1950s, the SFADC nurtured tourist attractions, combining both heritage and entertainment in re-established medieval castles.

Figure 4.2: Shannon Region Business Clusters



Source: Adapted from Literature Review by Author

Passenger numbers were slowly declining, and the focus shifted to the tourism cluster which could be enhanced. Bunratty Castle, Co. Clare on the fringes of Co. Limerick was one such attraction whilst Craggaunowen, Knappogue, and Dunguaire were the others. Brendan O'Regan and the Bord Fáilte organisation were both pivotal to the development of the Shannon tourism cluster with the development of enterprise activity across the region (the town of Killarney, Co. Kerry developed and Dromoland/Bunratty were set up). These areas have experienced further development due to the Wild Atlantic Way and the Gathering initiatives in 2013 (Sidc.ie, 2017). These were the tourist cluster areas of interest during that period whilst the Wild Atlantic Way has become the modern focal point. Shannon Heritage are now playing a pivotal role in the implementation and promotion of the tourism cluster. One could propose that this tourism cluster benefitted as a result of the aviation enterprise activity at Shannon Airport (American transatlantic passengers boosted its development).

- ***Aviation Cluster***

Aviation activity initially began at the Shannon Estuary with a seaplane base at Foynes, Co. Limerick and not at Shannon Airport. This suggests the origin of the aviation cluster in the Shannon region (Shannon Airport, 2019). In 1966, Aer Rianta, the new Irish Airport Authority body took over the administration of Dublin Airport. The SFADC, however, recognised some concerns with this and in 1967, called for a single body (separate from Aer Rianta) for non-technical services at Shannon Airport. In 2012, Shannon Airport acquired independence from the Dublin Airport Authority and gained control of their own strategy with Shannon Group plc, acting as the main engine behind its delivery (Shannon Airport, 2019; Palcic and Reeves, 2011).

Shannon International Aviation Services Centre (IASC) is the organisation which nurtures this well-established Aerospace & Aviation Cluster in Shannon. O'Regan (2019) suggested that

Shannon is a global leader in the aviation industry due to its skilled workforces dating back to the 1950s. It is also home to more than 80 aviation-related firms making Shannon the biggest aerospace industry cluster in Ireland. Furthermore, in the Shannon 2.0 study, it was recognised that talent and people have been key to attracting and retaining companies in the region with local HEIs such as the University of Limerick and Limerick Institute of Technology being pivotal (Courtney, 2019). In 2015, embedded within this aviation cluster were some 45 companies and an employment statistic of approximately 600 people (Edmond, 2015). In 2019, the number of companies has risen to 65 and employment figures have grown to 2,600 (McMahon, 2019).

This emphasises the influence of the IASC cluster on economic growth in the Shannon region. As part of this aviation cluster, it can be said that the strategic aim of the IASC is in improving existing companies, as well as trying to attract new businesses to the Shannon area and boosts the profile of the cluster (Edmond, 2015; Ketels, 2015; Doyle, 2015). Edmond (2015) further stated that to establish this aviation cluster as world-class, there needs to be an 'organisation for collaboration' and a strategic model in place. Arguably, this would suggest that Edmond (2015) supports the convergence approach to cluster-based economic growth in regions.

- ***Industrial Cluster***

The 'triple-helix' framework (see Table 2.5) can be applied to this region. In order to attract quality investment, it is believed that a strong technologically 'university-government-organisational' link is needed (Andreosso-O'Callaghan and Lenihan, 2008; Donovan, 2017). In 1980, Shannon's chief executive Vincent Cunnane, was the first chairman of the University of Limerick (Ireland's first technological university). This helped to forge closer ties between academia, government and industry (the university's president was appointed to the Shannon Development board). Based on these perspectives, in the 1980s one of the first innovation

centres in Europe was developed on a site adjacent to the university campus. This centre was completed in 1984 and was the country's first-ever technology park. This was developed to foster stronger relationships between key stakeholders and increase regional development activity. Other forms of business infrastructures (see Figure 3.10), were established with Shannon Development's influence to cater for a diverse enterprise system, growing levels of entrepreneurial activity, and numbers of entrepreneurs (GEM, 2009). The infrastructures and initiatives included: (1) An enterprise centre network; (2) Innovation centres; (3) Business incubator units (Tarpley, 2015); and (4) A specialised food industry centre (business cluster promotion). Considering the current literature, the current business cluster environment in the Shannon region supports Oakey (2007) and Dunning (2001) and their views on 'top-down MNEs. This view includes setting up in the region to exploit the available resources and to enhance their own enterprise activities, thus leading to the enhancement of the region. There is a need to highlight the business cluster convergence approach which has been briefly outlined by Delgado et al. (2010, 2011).

Clusters can aid the creation and sustainability of businesses in Ireland due to sharing and gathering of key resources (Butel and Watkins, 2006). This enhances the region to which it belongs. To support this research study, Stohr's (1986) work was cited in Callanan (2000), and the study on Ireland's Shannon story. They maintained that development and growth should be 'from below' rather than 'from above' (see Section 1.4). This supports the viewpoint that the convergence approach influences cluster-based economic growth in regions.

4.2.4. Future for the Region

An OECD report (2012) argued that a new economic climate has been created in the Shannon region, characterised by outstanding entrepreneurial dynamism. This dynamism is embedded,

not solely in technology and industry, but also in the overhaul of towns, the adaptation of airport services, and development of cultural activities. Ring (2017) argued that the geographic location of Shannon on the west of Ireland, in conjunction with the urban-rural disparity struggle between the capital (Dublin) and the rest of the country is important. This is important as Ireland's future greatness depends on a successful outcome to that struggle. He further suggested that economic damage can occur by a congested capital, which is no longer a pleasant place in which to live because it has unbalanced the population in the rest of the country (Bruton, 2015). Moreover, the SFZ boasts over 1.7 million sq. ft of development plots for manufacturing distribution, and offices, with some 168 acres serviced sites available. Donovan (2017) stated that this SFZ generates approximately €3.3 billion in trade every year, and offers an enticing range of exclusive tax efficient incentives to businesses. This region has formed strategic relationships with established and internationally recognised HEIs such as: Limerick Institute of Technology (LIT, 2014); the University of Limerick; and the Atlantic Aviation Institute (AAI) Group. The AAI offers undergraduate and post-graduate qualifications in Aviation fields of study (Atlantic Aviation Group, 2017) attracting Global Aviation industries. For the purpose of this research study, the Shannon Group plc agency should integrate business cluster convergence to augment its overall strategic goals with a focus on the model in Table 2.5 in Section 2.4 (Edmond, 2015).

4.2.5. Conclusion

Shannon did not exist as a town before 1960, but with the development of the airport, a then multicultural community, and busy industrial centre, turned it into a thriving hub for innovation and economic growth which has enhanced the region (O'Regan, 2019). It could be proposed that the future of the Shannon region needs to be more collaborative, societal focused, and look to the promotion of the resources at hand. This can be achieved with a 'bottom-up' triple-helix

cluster approach to regional development (Stohr, 1986; Callanan, 2000; Delgado et al., 2010, 2011; Antonescu, 2014). On examination of the current literature, there is a consensus that the Shannon region is going through a transition phase (see Appendix K).

This transition phase has been influenced by: The demise of Shannon Development; independence of Shannon Airport in 2012; The development of the Shannon Groups plc in 2014; Some key individuals no longer part of its regional strategy; and the SFZ model slowing down. However, these areas can serve as an opportunity for change. From a geographical standpoint, the region is quite small in comparison to the other regions outlined in this study. However, this could also benefit the region as a whole by using this as an opportunity to bring all the key stakeholders together to provide continuous solutions for economic growth.

4.3. The Asturias Region

Asturias (capital: Oviedo) is located in the north of Spain. The region occupies an area of 10,603.57 km² and has 1,034,302 inhabitants and accounted for 2.2% of the nation's population in 2017 (Eurostat, 2018). The most important cities are the communal capital, Oviedo (Uviéu),

the seaport, and largest city Gijón (Xixón), along with the industrial town of Avilés. For centuries, the backbone of the Asturias economy was agriculture and fishing. Milk production and its derivatives were present, but its development was a by-product of economic expansion of the late 1960s. Nowadays, products from the dairy cooperative Central Lechera Asturiana, are commercialised all over Spain.

The main historical industries of Asturias were coal mining and steel production. However, both are now experiencing a decline when measured in terms of the number of jobs provided. The reason for the demise in coal mining is mainly due to the high costs of production to extract the coal compared to other regions. Regional economic growth is below the overall Spanish rate, though in recent years, growth in service industries has helped reduce Asturias's high rate of unemployment. Large out-of-town retail parks have opened near the region's largest cities (Gijón and Oviedo), whilst the ever-present Spanish construction industry appears to continue to thrive (Ec.europa.eu, 2019).

4.3.1. Development of the Asturias Region

Despite being one of the smallest populated regions in Spain, Asturias has a moderate population density. This is even with people locating to the central part of the region. Furthermore, Asturias has been influenced by the sectorial specialisation in traditional sectors (such as mining), which have undergone a decline in the last 30 years across Europe (Ec.europa.eu, 2019). A deceleration in the region’s growth raised the need to restructure the economic model. The main institutions in charge of research & development (R&D) include the regional administration, the IDEPA (Economic Development Agency of the Principality of Asturias) and the Foundation for the Promotion of Applied Scientific Research and Technology in Asturias (FICYT) (Ec. europa.eu., 2019).

Table 4.2: Asturias Smart Specialisation Strategy

- To retrieve the industrial leadership through technology: strengthen the industry through technology is the starting point of the strategy. The prominent role of industry in Asturias needs commitment to ensure its competitiveness.
- Guidance to markets and diversification: companies have to go outside and measure themselves against their competitors. They also need to target new markets, achieving new customers, some with high standards of performance so technology and innovation are crucial for responding to their demands.
- To design a new land management model based on networking and collaboration structured around poles, to incorporate social challenges. This new land management will be more dynamic and will have the capability of attracting new talent and businesses.

Source: Adapted from Ec.europa.eu (2019)

In 2019, Asturias was named one of the European Entrepreneurial Regions, along with two other regions (Thessaly, in Greece and Gelderland, in The Netherlands). Additionally, "*the regions with the most credible, forward-thinking and promising vision plan are granted the label "European Entrepreneurial Region," (EER) for a specific year* (Cor.europa.eu., 2019)". Several recommendations have been developed to determine what regions will ultimately win the EER status:

> *(a) The creation of clusters and network organisations which connect the relevant stakeholders of the region;*
> *(b) The establishment of an entrepreneurial culture in the region or city through the provision of entrepreneurial skills, awards promoting innovative business plans, as well as initiatives in schools and universities; and*
> *(c) The creation of clear-cut administrative structures that are transparent and where communication is fluent, thereby allowing for timely processes for business support.*

The EER identifies and rewards EU regions which illustrate an exceptional and innovative entrepreneurial policy strategy. This is regardless of their size, wealth, and competences. Asturias has profited comprehensively since 1986 from European Union investments in their roads and other important infrastructure, even though there has also been some debate concerning how these funds are spent (for example, on miners' pensions). As of 2008, the GDP (PPP) per capita of Asturias stood at €22,640 or 90.2% of the European average of €25,100,

whereas in 2018 it stood at €23,087. This makes the region the 12th richest in Spain, but this is a big decrease from the 1970s/1980s - the heyday of the Spanish mining industry when Asturias was commonly regarded as one of the most prosperous regions in Southern Europe. Astoria's growth has been below the Spanish national average since the decline of the mining industry and grew just 0.82% in 2008, the lowest of all regions in Spain. However, unemployment in Asturias is below the average of Spain as it stood at 13.7% in 2017 and 14.1% in 2018 (Invest in Asturias, 2019).

4.3.2. Economic Analysis of the Asturias Region

According to the Eurostat (2018), the GDP of Asturias reached €21.6 billion in 2016, which accounts for 1.9% of the total Spanish GDP, while the average income was €20,910. According to the latest Eurostat figures (2018), in 2016 GDP per capita in purchasing power standards was €23,200. The region incurred the second lowest rate of growth among the Spanish regions and its citizen's income remain below the national and European averages, at €26,700 and €29,200, respectively.

Table 4.3: Principality of Asturias of Spain Potential

Strengths	Opportunities
❖ Large urban agglomeration, +800.000 inhabitants ❖ Strong industrial tissue: metal mechanic cluster ❖ Large global industrial groups ❖ Human capital with high educational level ❖ University with +25,000 students ❖ Research capacity in key sectors ❖ Well-established social dialogue ❖ Entrepreneurship support schemes ❖ Well-developed Entrepreneurship Education, Industry and Government ties (Triple-Helix) ❖ Tourism resources ❖ High self-employment rate ❖ Regional Identity	❖ Sectorial change and Smart Specialisation ❖ Acceleration of business dynamics in knowledge-based sectors ❖ Growth of technology-based start-ups ❖ Growing entrepreneurial spirit and international activity of SMEs ❖ Silver economy, active and healthy ageing ❖ Social economy ❖ Circulation of talent ❖ Digitisation, good broadband coverage ❖ Transition to a low-carbon economy

Source: Adapted from Literature Review by Author

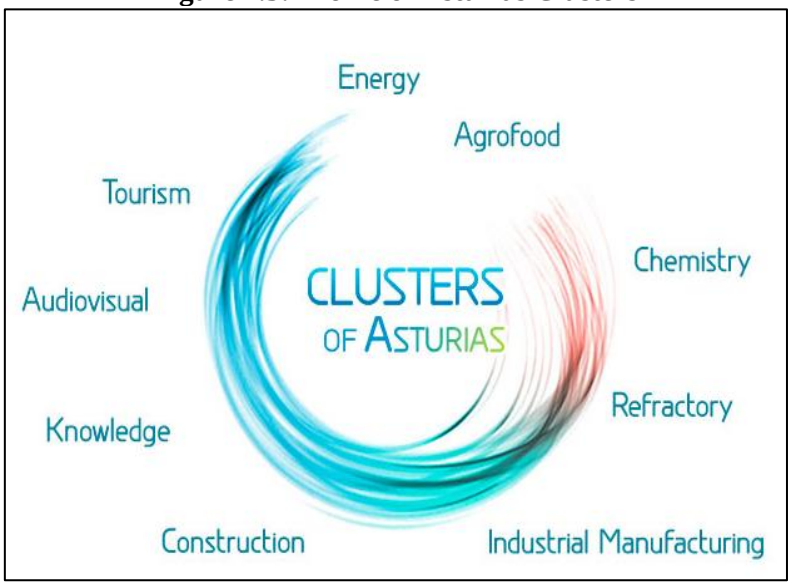
The site Eurostat (2018) argued that the main component of the regional gross value added (GVA) in 2016 is the tertiary sector, which accounts for 54.7%, followed by the secondary sector (including Construction) which weighted 43.8% and the primary sector with only 1.6% of the total share. After its third consecutive year of growth, there were 67,675 active companies in Asturias by 2016 with provisional numbers of 68,368 showing that in the present year, the number will continue to increase. Undoubtedly, the forecast is rather positive even though the figures are still far from those before the global economic crisis in 2008 (INE). Most of those businesses belong to the services sector and, as with the rest of country, the SMEs with less than 10 employees are the predominant model of business. The unemployment rate of Asturias was 13.7% in 2017 (Eurostat, 2018) with females, those under the age of 25, and above 55 years being the most affected. Although this unemployment rate is below the national average (17.2%) and has been decreasing since 2013, it is still high when compared to the EU average (7.6%).

4.3.3. Business Cluster Profile

There are currently 10 cluster organisations in the Asturias region, 5 of them rated as excellent by the Ministry of Economy, Industry, and Competitiveness. Those clusters are: AINER; ASINCAR; AEI del Knowledge; Polo del Acero; and MetaIndustry4. These five entities are part of the 'Bond Spain Cluster' brand created by the Ministry to promote clusters. This seal of excellence recognises the 100 most advanced and innovative clusters in Spain. It was created to promote national and international recognition of these organisations and the excellence of their activities. ClusterTIC is another cluster which is categorised as the ICT Cluster of Asturias acting as a non-profit organisation, created in 2003, both to improve the competitiveness of the Information Technology and Communications sector. It serves to explore the development of solutions which increases productivity and business efficiency, which in turn leads the process

of digital transformation in the region. It establishes strategic guidelines in an open, representative, collaborative, proactive, committed, and independent work environment. Cooperation strategies of seeking synergies and shared interests to address large projects through the 'specialisation' between companies are key to advancing and converging (Cluster TIC, 2019). The companies integrated within the Cluster compete, but they also cooperate. They have managed to configure a strategic sector for the economic and business revitalization of the region. Furthermore, ClusterTIC has 72 partners which directly influence 4,200 jobs and €340 million to the region (Cluster TIC, 2019). Since 2008, the Economic Development Agency of the Principality of Asturias (IDEPA) has explored the development and strengthening of clusters. They make them an invaluable tool for realising superior integration and structuring of the Regional System for Innovation (Idepa.es, 2019; Clusterasturias.es, 2019). In Asturias, there are 68,688 active companies and this represents an increase, compared to the previous year of 0.47% (Idepa.es, 2019; Ec.europa.eu, 2019).

Figure 4.3: Profile of Asturias Clusters



Source: Clusterasturias.es (2019)

In comparison with Spanish figures, their business network represents 2.06% of the more than 3 million existing businesses in the national territory. In terms of firm size, most small businesses are strong in the Asturian business make up. "*Of the 68,688 existing companies in 2017, 55.22% are productive units without employees, 41% employ between 1 and 9 workers,*

3.66% employ between 10 and 199 workers and just 0.11%, 169 companies have a workforce of over 200 workers," (Eurostat, 2018). Furthermore, the sector called 'Rest of Services' has the largest number of businesses with a total of 41,848. This sector is inclusive of: Hospitality, transportation, communications, real estate and rental activities, business services, educational, health and social assistance activities. Other types of social activities in this sector, including personal services: (a) Commercial activities include 14,844 among retail, wholesale and trade intermediaries; (b) Construction groups a total of 8,344 companies; and (c) finally, the industrial sector gathers 3,652 companies (Invest in Asturias, 2019; Idepa.es, 2019).

4.3.4. Future for the Region

Asturias will need to augment and promote regional entrepreneurship policies to nurture an innovative, inclusive and environmentally responsible entrepreneurship that includes all regional stakeholders (Invest in Asturias, 2019). The entrepreneurial vision is to continue to promote innovative businesses, entrepreneurial inclusion, and reach sustainability. Innovation must become a distinctive character of entrepreneurship in Asturias as innovative and knowledge-based entrepreneurship is critical to complete the regional diversification in line with RIS3 (RIS3, 2019). The enhanced research base and human capital become both pillars of its competitive regional economy. Promotion of entrepreneurship should be at all levels and every innovative entrepreneur must have equal opportunities. Explicit mechanisms that support social entrepreneurship are as follows: Social enterprises; social innovation; or the support to the third sector; and non-lucrative undertakings. Furthermore, it also requires processes to stimulate entrepreneurship among less-represented groups, predominantly the young or females as entrepreneurial and innovation policies must contribute to the transition to a low-carbon economy. Additionally, entrepreneurship is also required to preserve and exploit the

region's natural resources, and in order to encourage a territorially balanced development (European Committee of the Regions, 2019; Cor.europa.eu., 2019).

4.3.5. Conclusion

For Asturias, it has been identified that the main regional industry was coal mining and steel production. The steel industry is now in decline when measured in terms of the number of jobs provided, as is the mining industry due to high extraction production costs. Regional economic growth is slower than the national average, but the construction sector is experiencing increased growth in recent times. However, innovation, technological adaptation, market diversification, internationalisation, cross-sectoral collaboration and talent attraction have been identified as being critical areas that need attention (Invest in Asturias, 2019). Asturias has profited comprehensively since 1986 from European Union investment in roads and other important infrastructure and recently being part of the award for the European Entrepreneurial Region in 2019, highlighting the importance of EU support for the region (Eurostat, 2018; RIS3, 2019).

4.4. The Galician Region

Over two decades ago, Galicia was a peripheral region with poor outside accessibility and internal connectivity with a robust reliance on low production primary sectors of agriculture

and fishing. It was considered as one of the poorest economic regions in the whole of Spain (Faina et al., 2013). The Galician region is Spain's most western region, it occupies an area size of 29,574.4 km² and is bounded by Portugal to the south. According to the Galician regional government organisation Xunta de Galicia (2015), the region is well recognised as sparsely populated with approximately 2.8 million inhabitants. This accounts for 6% of Spain's overall population and 5.2% of the national GDP in 2010. Furthermore, it has a long coastline of more than 1,700 kilometres, as well as rugged land (Xunta de Galicia, 2015). Its two major economic poles are A Coruña and Vigo, with the third economic centre of Santiago de Compostela, capital of Galicia. Additionally, other main cities are Ferrol and Pontevedra, but in recent years, the economic growth distance has increased between the smaller cities and the three main economic poles. One might propose that the Lugo and Ourense areas, which are more rural and less developed, and the coastal province of Pontevedra, are lagging in terms of regional development (Hulbert, 2012). This is due to a lack of collaboration between the main regional actors.

Galicia has always preserved a strong sense of regional identity, based on its unique culture and own language. In 1980, economic instability was apparent, so when Spain joined the European Union in the 1990s, the Galician economy was capable of keeping pace with the rest of the Spanish economy (Alonso Sanz, 2009). A major strength of Galicia has been its location on major shipping routes. It carries the majority of the maritime traffic heading towards the English Channel and the main economic zones of the EU. The economic structure experienced a process of rejuvenation in the 1990s and diversification, particularly in the agriculture sector with the modernisation and size adjustment of farms (Balaguer-Coll and Tortosa-Ausina, 2010). The number of milk farms decreased from 61,000 to 14,600 between 1995 and 2007, but agriculture and fishing remain to this day, extremely important sectors. Business numbers have increased in relative terms with the national statistics at around 6%, although the vast

majority (approximately 95%) are still small firms (Blöchliger and Vammalle, 2012; OECD, 2007). Executive power is in the hands of the regional government (*Xunta de Galicia*), which is responsible for elaborating on and implementing the budget, while administering its own taxes. Municipalities, although key players in the decentralisation process, are unable to pass laws for self-government. This is in contrast to regional governments as Galicia is divided into 315 municipalities and 4 provinces.

Until recently, provinces had few political or budgetary powers, they have recently gained further importance within the regional framework. Galicia was the Spanish region with the highest average per capita GDP growth between 1995 and 2009. Its GDP has doubled since Spain's integration into the European Union (EU) over 25 years ago, reaching roughly €60 billion in 2011 (Xunta de Galicia, 2015). This represents €21,000 per capita, which places Galicia among Europe's 'transition regions' (between 75% and 90% of the EU average level of per capita GDP). Since the region has only passed the 75% threshold in recent years, Galicia will, according to EU Cohesion Policy, pass from a 'convergence region' (below 75% of the EU average) to a 'transition region'. This will take place in the new programming period which began in 2014 and may have significant repercussions for future European funding.

In terms of unemployment, Galicia also fares better than most other Spanish regions as its unemployment rate was 15.4% in 2010 is well below the national average of 20.1%. As in the rest of Spain, youth unemployment is high, reaching 35.4% in 2010 (Spanish Ministry for Territorial Policy and Public Administration, 2011; Ramos Prieto, 2011). The most significant sectors for Galicia's economy are services (45.8% of regional GDP), industry (12.7%) and construction (10.1%). Consequently, a large part of employment is focussed in commercial activities, most of all in family companies. While companies in Galicia are mostly SMEs, a

few multinational businesses such as Inditex (Zara), PSA (Peugeot), and Pescanova (Seafood commercialisation), make up a big share of the region's economic activity and exports.

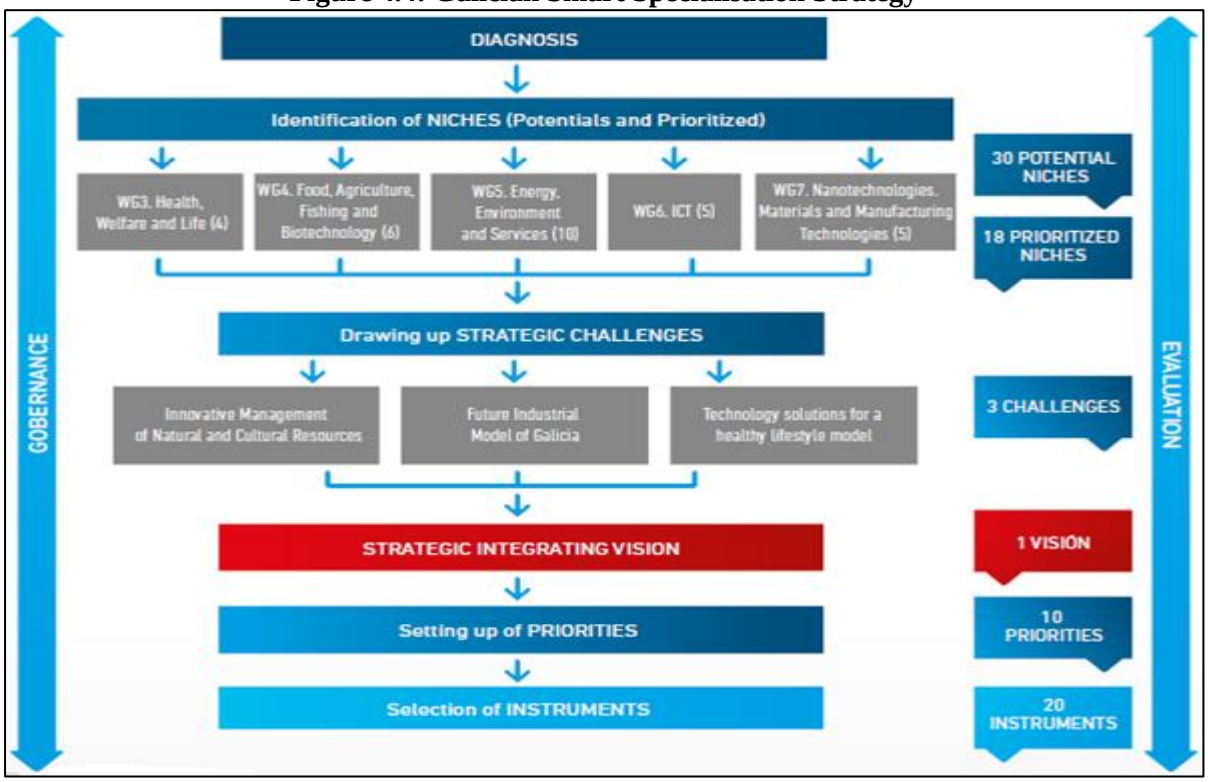
4.4.1. Development of the Galician Region

Xunta de Galicia are leading the smart specialisation strategy plan for Galicia and they have been working in recent years to provide a regulatory framework and collaborative governance which is integrated within their inter-regional context (Xunta de Galicia, 2015). The design of a Smart Specialisation Strategy for Galicia rests upon those activities based on knowledge rooted in the territory that show the greatest potential for competitiveness in the global context. Galicia has traditionally been considered an agricultural and fishing region. It still has the largest rate of employment in the agricultural, forestry, and fishery sectors in Spain. Since the 1960s, as the result of development policies, parts of the region have become industrialised (DG AGRI, 2014-2020). Large shipyards are in the northern city of Ferrol and a Citroën automobile plant was established in Vigo, are already the home of some of the most dynamic fishing and canning industries in Europe. However, the global economic crisis of the 1970s provoked a steep decline which was especially severe in agriculture and in the leading industrial sectors (shipbuilding, automobile, metal products, machinery and equipment and food industries).

GDP per capita in 1996 stood at almost €9,000, which represented 80% of the Spanish average. The failure of regional policies and assistance programmes to put it at the heart of the development strategies is partially to blame for the lack of convergence. Instead, regional policies and assistance programmes have focused on two areas (infrastructure and the attraction of FDI), which have so far proven less successful in setting the bases for sustainable economic development in the region (DG AGRI, 2014-2020). Ruiz (2019) outlined that Galicia has been,

in recent years, one of Spain's most dynamic regional economies as it is the region with the third highest cumulative growth between 2015 and 2017. In the first half of 2018, some signs of an economic slowdown became evident, particularly regarding the tourism and hospitality sectors. However, exports predominantly in the textile and automotive clusters are set to increase. Forecast predictions in terms of economic growth for Galicia have been explored by Bbvaresearch.com (2019). They stated that the economy of Galicia grew by 2.7% in 2018, 2.2% in 2019 and is set to grow by 2.0% in 2020, creating some 30,300 new jobs.

Figure 4.4: Galician Smart Specialisation Strategy



Source: Xunta de Galicia (2015)

The main challenges of the region are to promote the competitiveness of Galician agriculture through the modernisation of agriculture and forestry. This includes the installation of young farmers in market-oriented farms with capacity for economic diversification and land management. The region also requires increased productivity in the food industry, as well as forestry, by promoting the production of high added value. There is also a need to preserve and

enhance the natural heritage of Galicia, by promoting the sustainable management of natural resources and combating climate change. This will in turn improve the quality of life of the rural population, create jobs, and reduce the risk of poverty (Xunta de Galicia, 2015).

4.4.2. Economic Analysis of the Galician Region

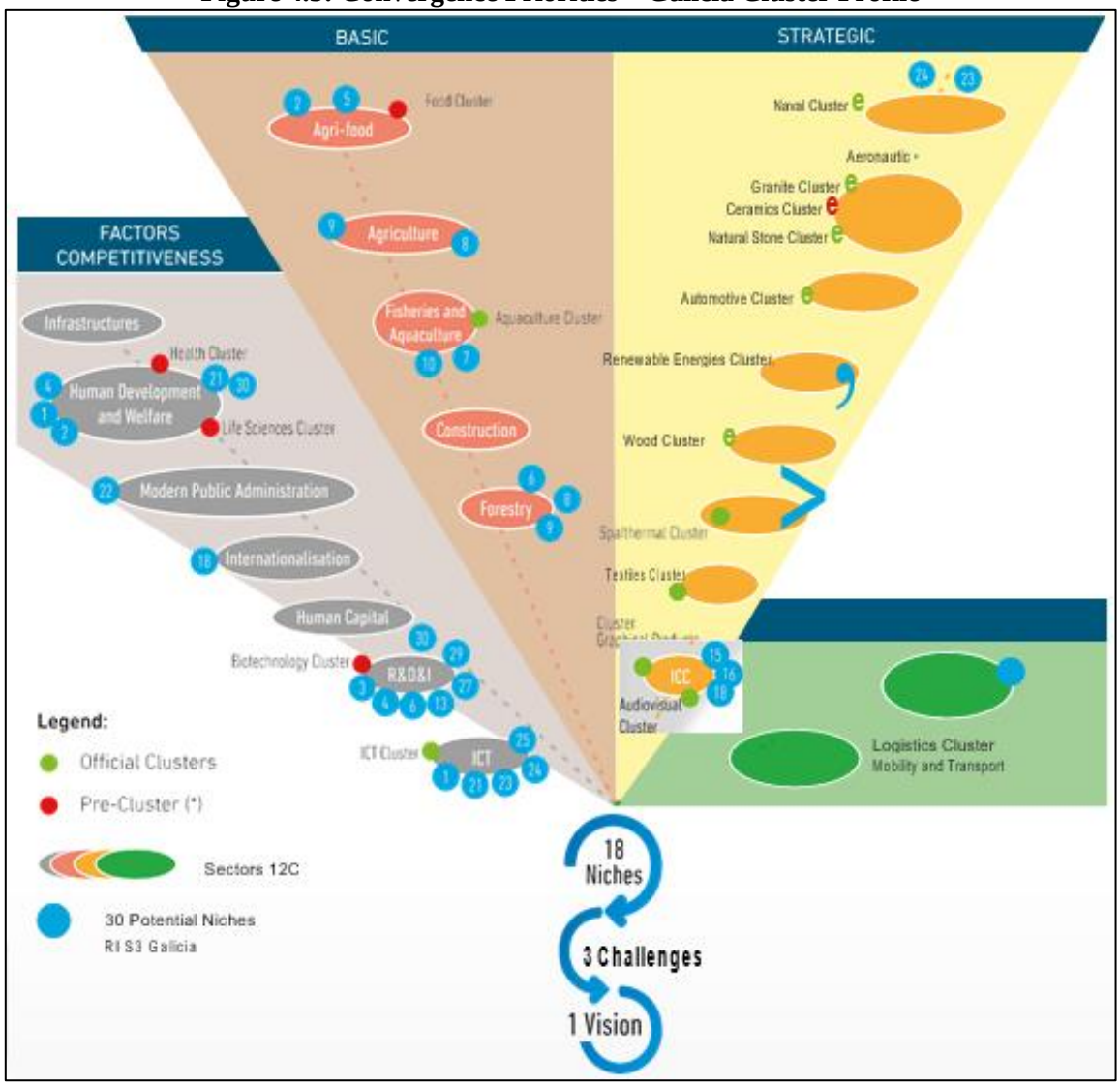
The guiding principles of the Smart Specification Strategy for Galicia have been centred around four key principles: (1) SMEs Innovation; (2) Mobilising Private Investment; (3) Opportunities for talent attraction and retainment; and (4) Knowledge transfer to market. Unemployment is still lower than the national average, but it is increasing at 20.13%. This is compared to the national average of 25.02%. The services sector is the largest employer with 69% of the population. Although, there has been a decrease in people with active employment, particularly in industry and construction. The main characteristics of Galician enterprises is the large-scale enterprise atomisation in which most enterprises are no bigger than micro-enterprise. Specifically, 95.03% of all Galician enterprises have a workforce of fewer than 10 workers. The small size of enterprises means few have the potential capacity for absorbing and exploiting knowledge, as can be seen in mechanisms for managing innovation where most Galician enterprises (70.7%) state that they promote internal innovation, but only 25.2% have innovation departments and 8.6% maintain alliances to promote innovation (Xunta de Galicia, 2015).

4.4.3. Business Cluster Profile

The Ministry of Economy and Industry is promoting, through the IGAPE (Regional Development Agency of Galicia), a common work strategy with Galician clusters. Clusters Galicia is the Network of excellent clusters of Galicia and with the support of IGAPE through

the ‘Atclusters Galicia’ project. These 14 Galician clusters enjoy the recognition of excellence at the European level (European Secretariat for Cluster Analysis). They also receive national recognition through the Programme of Innovative Business Groups of the Minetur. This is visible under the brand Clusters de Galicia their network workings. The “clustered” sectors invoice the equivalent of 75% of the GDP of Galicia. More than 90% of the members of Galician clusters are SMEs (Igape.es, 2019). The cluster concept integrates all agents related to business with the goals of competitiveness, cooperation, innovative projects and internationalization, being the main goals for cluster enhancement.

Figure 4.5: Convergence Priorities – Galicia Cluster Profile



Source: Xunta de Galicia (2015)

Companies that are part of clusters have greater internationalisation potential, with several Galician clusters exporting around 70% of their production. Members that are part of the automotive cluster (CEAGA) which is based in Vigo have saved costs with, *"83 plants that form Ceaga saved 28% in the cost of energy through a common negotiation"* (Ceaga.com, 2019). Investment is a big part of Clusters Galicia, having set up the ICT Cluster Investor Club which contributes nearly €500,000 annually to develop start-ups (Itmati.com, 2019). Many businesses in Galicia are aligned with clusters (4.5%) and they represent around 20% of those employed. Galicia is a Spanish autonomous community that has the highest number of clusters with a higher rating. This is above Catalonia, Madrid and the Basque Country, thus emphasising the importance of cluster to the Galician economic outlook. "*In the clusters, SMEs (mostly) and large companies coexist inequality",* (Clusters Galicia, 2019). A significant indicator in the most deeply rooted industrial activity in Galicia is precisely 'Clusters', which group together the companies and businesses related to a specific industrial sector. In Galicia, the Shipbuilding Cluster (Aclunaga), the Automotive Cluster (CEAGA), and the Wood Cluster (CMA) are three key clusters due to the critical mass of the companies making them up. They were the first to be set up in Galicia in the 1900s, in response to the region's industrial situation.

The automotive sector is the largest industrial sector in Galicia accounting for 12% of the region's GDP. Additionally, it has a turnover of 6,100 million euros and employing over 19,000 people, with roughly 11% of industrial employment in Galicia (CEAGA, 2019). A series of supply companies for the PSA Peugeot Citroen plant in Vigo make up the largest cluster in Galicia while the plant is the second largest production plant in Spain and the PSA's largest in globally. Likewise, the Automotive industrial activity in Galicia stands out in Spain as a whole both in terms of employment and in Gross Value-Added accounting for approximately 15% of national production. Therefore, based on the high capacity of the automotive industry in Galicia, innovation for 'transport of the future' from the perspective of the automotive industry

is an essential part of a smart strategy for Galicia. The Shipbuilding sector in Galician industry is important due to its international position as Galicia represents 52% of the shipbuilding industry in Spain, 7% in the EU, and 1% globally. It is 3rd in Europe in the number of ships. There are over 10,000 jobs, which is almost 10% of industrial employment in Galicia, in the shipbuilding sector, representing 5.2% of regional GDP (Aclunaga, 2019).

Within industrial activities, the Textile and Clothing industry is particularly important with a relative specialisation trend for growth. This sector stands out in Galicia for being a traditional one showing clear regional success, with the growth of the INDITEX Global brand. INDITEX are one of the largest fashion distribution companies in the world, selling to over 202 markets through their online platform and in their 7,000 stores in 96 markets. The group consists of eight brands: Zara, Pull&Bear, Massimo Dutti, Bershka, Stradivarius, Oysho, Zara Home and Uterqüe (Inditex, 2019). When comparing the automotive clusters and the textile clusters, in terms of turnover by volume in Galicia, the PSA Peugeot Citroen is closely followed by a clear leadership role played by the INDITEX Group.

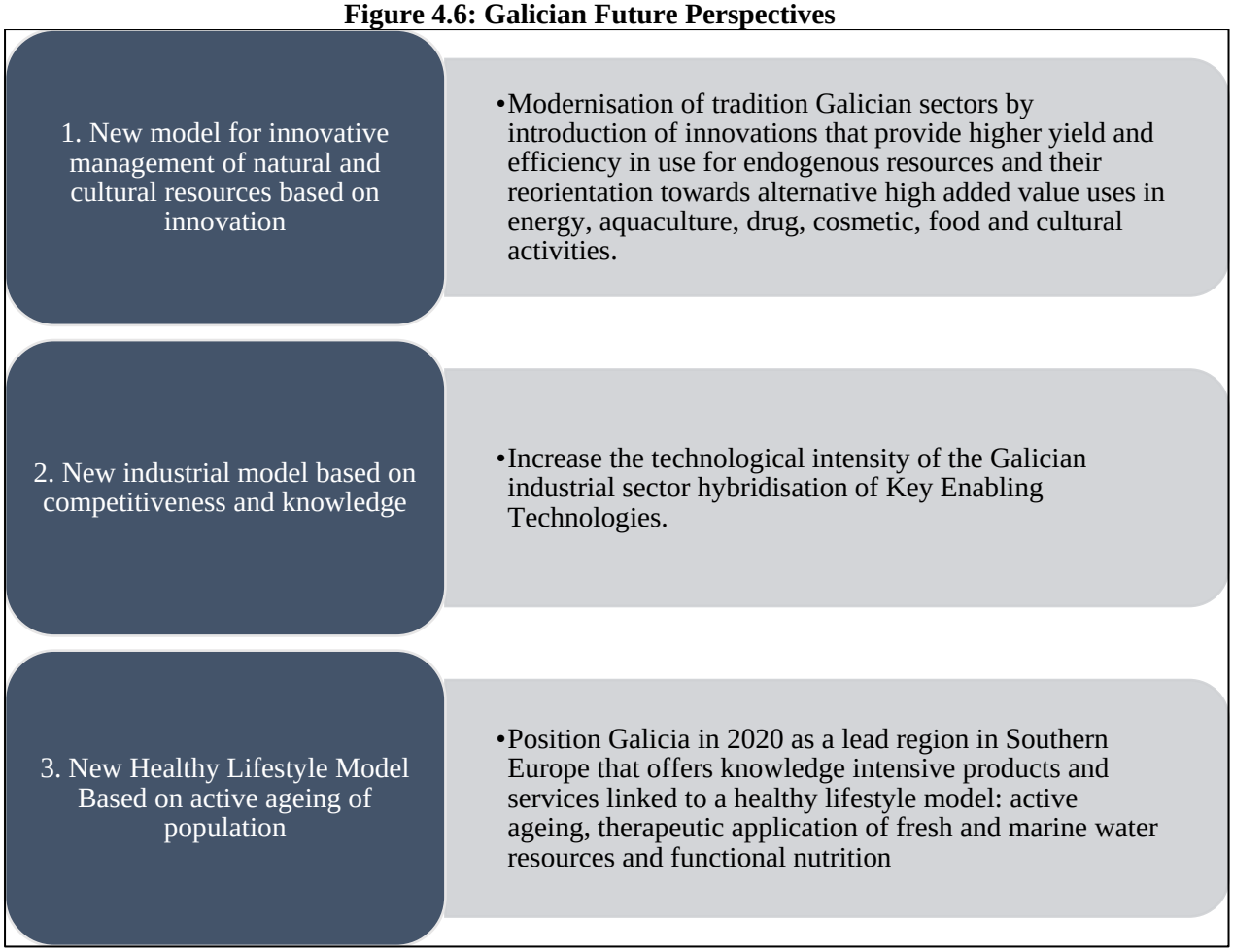
4.4.4. Future for the Region

Hulbert (2012) found that some geographical and socio-economic difficulties could hinder Galicia's economic growth in the future. Several future predictions have been highlighted in Figure 4.6. Firstly, Galicia is quite inaccessible, which remains a major problem to its development (Alonso Sanz, 2009). It is located at the western end of Spain (and Europe), together with its rugged landscape, this explains why most transport infrastructure is somewhat recent. Furthermore, their motorways were only built 20 years ago. There are also only a small number of railway lines, most of which are of poor quality. This situation is partly improved by the presence of four important ports, whose related activities are mainly fishing, maritime

tourism, and ocean freight. The port of Vigo, in particular, is one of Europe's most important fishing ports (Hulbert, 2012).

Secondly, there are disparities in demographic and economic development amongst the coast and inland area, along with population being focused in a few towns, which are mostly located on the coast. Vigo and A Coruña are the main cities, with respectively 300,000 and 250,000 inhabitants (Hulbert, 2012). One could say that the urban areas are economically well developed and benefit from good quality infrastructure. However inland areas are sparsely populated and predominantly rural. They are characterised by a very large network of small cities that account for the largest share of the Galician population. Consequently, inland territories are poorly aided by public infrastructure.

Figure 4.6: Galician Future Perspectives



Source: Adapted from Literature Review by Author

Thirdly, the region is experiencing social issues such as the birth rate. It is lower in Galicia than in the rest of Spain, despite the execution of pro-natal policies (Balaguer-Coll and Tortosa-Ausina, 2010). There is a rapidly ageing population and since 1990, the share of the population aged 0-14 dropped by 40%, whereas the share over 65 increased by 50% (Hulbert, 2012). As a result of these socio-economic trends, Galicia is now facing three main obstacles concerning public service provision and investment (Hulbert, 2012). Firstly, due to its ageing population, the share of inactive people will rise while fewer people will contribute to the labour market. This will add to the demand for certain public services while decreasing the tax base (Blöchliger and Vammalle, 2012). This will make it more difficult to achieve good public service provision. Secondly, the region's sparse population is an issue for evolving and creating infrastructure networks. Due to this, investments are often not profitable as they do not benefit an adequate number of people (OECD, 2007). One could argue that this makes it problematic to provide good quality public services throughout the territory and discourages private companies from investing. Thirdly, a short-term issue is a challenge of attracting investment both nationally and internationally.

Ramos (2011) stated that Galicia will no longer be a convergence region, thus funding from the EU will decline from 2014 onwards. Furthermore, the regional match funding of European funds will likely increase, so co-funding requirements could become more difficult to meet. Hulbert (2012) stated that EU funds represent a large part of the region's revenues. This could have a damaging impact on the room left for regional investment. Arguably, these issues are magnified by deficit targets set by the central authorities and to compensate for its degraded financial capacity, the region must improve the competency of its investments. This is specifically by improving its technical and administrative capabilities and enhancing co-ordination (Ramos, 2011; Spanish Ministry for Territorial Policy and Public Administration, 2011).

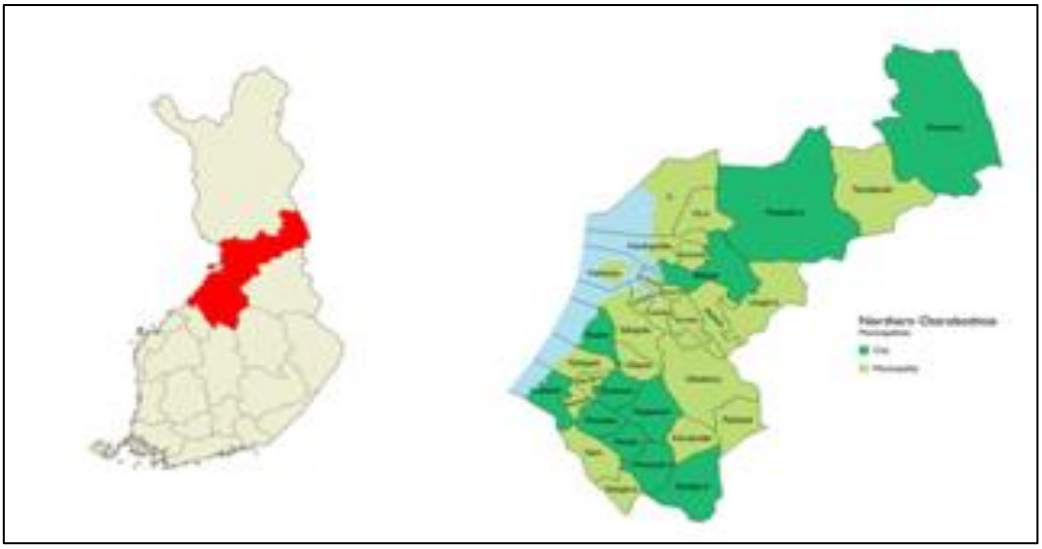
4.4.5. Conclusion

As part of the smart specialisation strategy of Galicia, the Xunta de Galicia (regional government), have developed a consolidation of the innovation policies pathways which have favoured strengthening (Xunta de Galicia, 2015). The Galician innovation system is populated by a set of agents that embody a wide technological range which considerably lessens the gap between other more advanced Spanish regions and the EU average. Regional economic growth instruments have been focused on: (a) *SME innovation* (innovative SMEs to be competitive); (b) *Innovation in Galicia* (public investment to attract public investment); (c) *Galicia Transfers* (promote the transfer of research to market); and (d) *Innovative Entrepreneurship* (opportunities for research and entrepreneurial talent) (Xunta de Galicia, 2015). Regardless of the inauguration of the first Galician R&D plan, the Galician economy has still not developed enough foundations based on innovation and knowledge to facilitate economic growth and convergence with other more advanced parts of Spain and Europe.

Arguably, innovation policies that foster 'bottom-up' growth and the coming together of the triple-helix actors to work more collaboratively could be a potential solution (Antonescu, 2014). It still suffers from a series of weaknesses or flaws in the systems which are the great challenges for the horizon of 2020. The Galician economy has experienced industrial structural changes particularly in shipbuilding and agriculture, but industry and services have continued to grow. The development of the automotive clusters (CEAGA) supplying companies for the PSA Peugeot-Citroen in Vigo making up the largest cluster in Galicia has been instrumental representing 13.2% of the regional industrial employment and 28.6% of the Galician exports. Success for the Galician region relies heavily on the Galician smart specialisation strategy 2014-2020 as a policy to foster innovation.

Although, it can be said that this will depend on the interactions between public and private organisations, including small and large enterprises, universities, public bodies, business partners and society citizens in general (Etzkowitz, 2002). The failure of regional policies and assistance programmes to put it at the heart of the development strategies is somewhat to blame for the lack of convergence. Instead, regional policies and assistance programmes have focused on two areas (infrastructure and the attraction of FDI). These have so far proven less successful in setting the bases for sustainable economic development in the region (DG AGRI, 2014-2020). The smart specialisation strategy of Galicia will endeavour to motivate all such agents, how they interact and the means of collaboration they use to confront socio-economic challenges using a broad combination of innovation measures to be implemented at the regional levels (Faina et al., 2013).

4.5. The Northern Ostrobothnia Region



Northern Ostrobothnia is a region of Finland which borders the Finnish regions of Lapland, Kainuu, North Savo, Central Finland and Central Ostrobothnia. This is in addition to the Russian Republic of Karelia. It has been regarded as a region which embodies the whole of

Finland. Its nature, economy and networks form a combination not easily rivalled, offering a good standard of living, travel and professional life (This is Oulu, 2019). The region of Northern Ostrobothnia is made up of 30 municipalities, of which 11 have city status. It can be said that Northern Ostrobothnia is an expertise-filled, globally viable business-driven region, with the city of Oulu at the centre of its growth. It is also been referred to as the Oulu region, as that is how invaluable the urban district is to the fabric of Northern Ostrobothnia. The region is categorised by wellbeing, a high standard of living and biodiversity. According to the Finland Study (2004), there are 411,856 people in Northern Ostrobothnia (Northern Finland), in a territory of 37,149.23 square kilometres and is amongst the most peripheral regions in all of Europe. Furthermore, it is far from the core of Europe with a distance of 2,500–3,000 kilometres between it and most of its neighbours in Sweden, Norway and North-Western Russia, which are poorly developed in comparison (Structuralfunds.fi, 2019). The regional development team at the Council of Oulu aims to enhance the prosperity of the region and implements the regional programme through collaboration with key partners. It allocates EU and national funding to regional development projects. The Council of Oulu are focussed on: (1) Smart specialisation; (2) RDI environments; (3) Digitalisation; and (4) Interregional and international collaboration in terms of regional development. It is the second biggest region in Finland regarding the surface area and is considered to be a developing region. Additionally, the population is well educated and has the lowest average age of any region in the country acting as a gateway and a capital area of Northern Scandinavia (Council of Oulu, 2019).

4.5.1. Development of the Northern Ostrobothnia Region

The Finnish economy has transformed from a resource-based economy to a knowledge-based economy, using education as the key component in their success (Finland, 2004). During the early 1990's Finland saw an economic decline and a high unemployment rate of 18%, with a

soaring debt of 60%. The economy recovered through adopting a knowledge-based business innovation system in the telecommunications sector. Most notably, the launch and breakthrough of NOKIA in the 1970s along with 800 high tech companies (Finland, 2004). The success of NOKIA has accounted for 64% of Finland's GDP with money invested in human capital and technology with a 'services and communication plant' still based in Finland.

Finland now ranks sixth on the Global Competitiveness scoreboard, rising from 19th just ten years earlier (Finland, 2004). Finland remains competitive in the global marketplace and continues to show dominance within the communications technologies industry (Ropponen, 2008). It has seen enormous growth and prosperity over the last decade. Their dominance in the telecommunications sector has enabled them to gain entry into the competitive international global arena (Daveri and Silva, 2004). Future alliances with those of Apple, for example, would be of great benefit in Finland achieving further economic dominance. This is due to the communications sector being a highly competitive industry, constantly changing.

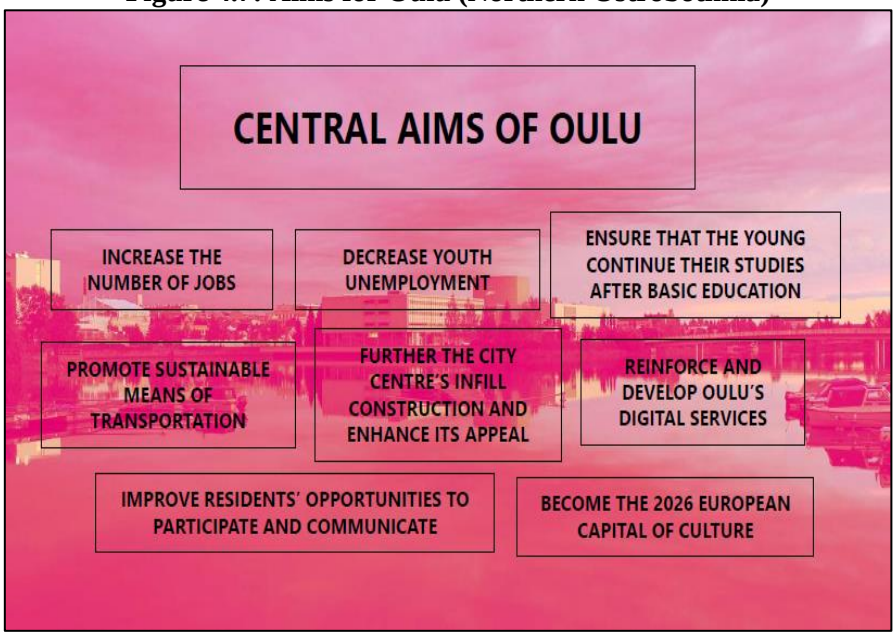
Table 4.4: The Smart Specialisation Priorities of Northern Ostrobothnia (Oulu Region)

1. Oulu´s **ICT concentration is a significant cluster** that affects the entire country and still has a strong role in international ICT development. 2. The Oulu Region is also a traditional mining region with three currently operational metal mines in Pyhäsalmi, Raahe and Nivala. **Reopening of the Mustavaara mine is under preparation**. 3. The Nivala-Haapajärvi, Oulu, Raahe and Ylivieska sub-regions are home to about 380 SMEs in the metal industry; their total annual turnover comes to nearly a billion euros. Many companies in the metal industry have also become internationalised either directly or through their parent company. **The Oulu Region has special expertise in new special steels.** Special steels are expected to bring significant growth potential to Finland´s entire metal and machine shop industry.	4. The Oulu Region has strong know-how and long traditions in utilising timber raw material in the forest and timber product industry and bioenergy. The region has good possibilities to **develop new ideas in the high-added-value bioeconomy**. 5. In the area of clean technologies, the **Oulu Region has expertise particularly related to water and air purification**. 6. The Oulu Region has an abundance of healthcare and wellness technology companies, which have their sights on the international market. The region´s strong know-how in wireless data transfer, Internet, cloud and mobile technology offers possibilities to **build wellness innovations for the future on a completely new basis.**

Source: Adapted from S3platform.jrc.ec.europa.eu. (2019)

Purkarthofer and Humer (2019) proposed that some city to regional initiatives have emerged in a bottom-up manner, such as the establishment of the Tampere City Region joint authority, thus emphasising that convergence is at play (Antonescu, 2014; Gaspar, 2012). More importantly, the policy interventions originating from the nation-state level have been decisive to put city-regions on the map. The City of Oulu is an essential regional centre, not only in Finland, but also in the north-eastern part of the EU. The Oulu region believes it would be vital for its competitiveness and economy of Northern Finland, to have a one-hour train connection from Oulu to Kokkola, and Rovaniemi and Kajaani (Council of Oulu, 2019). The increase in cargo and passenger transports calls for a double track between Oulu— Kempele—Liminka along with building roads and rail connections to the Oulu docks. These measures will support the rail refurbishment of the Oulu—Seinäjoki rail, the functionality of the city region as well as the implementation of Oulu's new deep-water channel.

Figure 4.7: Aims for Oulu (Northern Ostrobothnia)



Source: This is Oulu. (2019)

It is necessary for the growth of Northern Finland and the public transportation system to investigate the viability of the so-called airport rail link. This means building a rail connection

from the railway station to the airport life (This is Oulu, 2019; Finland, 2004). Oulu is currently bidding for the 2026 European Capital of Culture title and Future EU cohesion funds in order to support the growth in the north. These cohesion funds for the Northern and eastern Finland must remain concentrated on the economic improvements of sparsely populated areas (This is Oulu, 2019). Regional development means wide-ranging, multi-level activities, which promote wellbeing and prosperity in different regions. It is based on the interaction between ministries, counties, municipalities and other operators (This is Oulu, 2019). In regional development, the goals and measures of different counties and administrative branches are examined together. both from national and regional perspectives. According to the Ministry of Economic Affairs and Employment of Finland (2019), an essential institution contributing to the regional economic development is the 'firm' as referring to recent studies of regional development. The role of firms has been indicated and described as fundamental regional actors. The economic development plans for Northern Ostrobothnia have been based around large firms and clusters of firms as firms are significant producers, employers, and investors (Ahokas, 2010).

4.5.2. Economic Analysis of the Northern Ostrobothnia Region

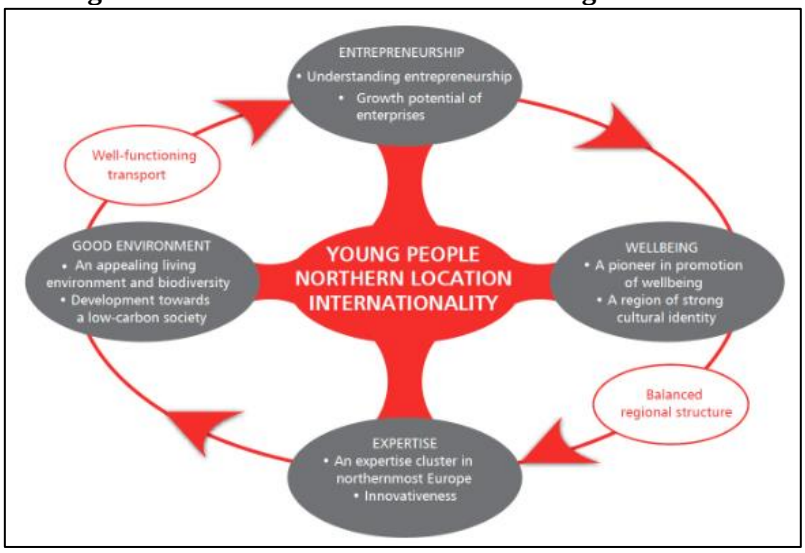
The population of North Ostrobothnia has been steadily growing since around the year 2000 and the average age of the region's population is the youngest in all of Finland. Also, North Ostrobothnia has been regarded as a significant area of innovation. It offers high-quality education and expertise, especially in the fields of technology, namely IT, and software industries, as well as metal and forest-based industries (Council of Oulu Region, 2019). The varied natural landscape, abundant natural resources and the knowledge that typify the region create opportunities to develop it further, particularly in the fields of tourism and bioeconomy. One of the biggest challenges in North Ostrobothnia is its high unemployment levels as in comparison to the entire country, the situation is mainly difficult for those under the age of 25

(In My Region, 2019). The In My Region (2019) study claimed that Northern Finland is turning into a vastly unpopulated territory, in which nomadic reindeer herding and some forestry remain pivotal foundations of livelihood. This is outside a few small administrative centres and seasonal tourism resorts. The population has been described as declining, ageing rapidly, and that regional policy is a particular combination of past, present, and future in economy and politics (In My Region, 2019). Consequently, the past regards the 'path dependency' of previous activities and political decisions The present is about natural and social resources, and political practice regarding a region, whereas the development limitations are those inherited regional structures, institutions and ideas which do not enable needed changes in a region (Council of Oulu Region, 2019; This is Oulu, 2019).

4.5.3. Business Cluster Profile

According to the article on 'Common Tools for European regional growth – ERDF in Practice in West Finland' (2019) regions can act as motors for growth. This can take place with cooperation between regions and cities acting as a game-changer in many common challenges, showing that alliances can effectively address problems. Northern Ostrobothnia's goal for the smart specialisation work is to be a 'triple-helix connected region' from the standpoint that they must embrace a business-driven innovation system. Within the smart specialisation, four main clusters with a high level of export, which indicates a high-level innovation within the clusters, have been identified. The main clusters are: (1) Energy technologies; (2) Maritime technology and services; (3) Composite technologies; and (4) Fur farming. The focus has been in various cross-sectoral technologies that support the development within the chosen clusters as such, but particularly in the opportunities for the SMEs working in close cooperation within and between the clusters.

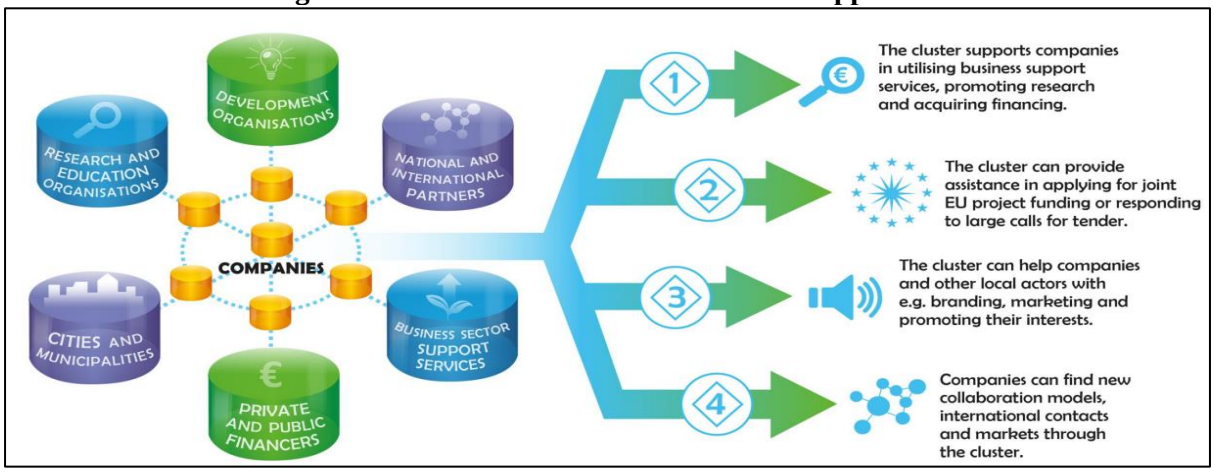
Figure 4.8: Northern Ostrobothnia Strategic Priorities



Source: Structuralfunds.fi. (2019)

The cross-sectoral technologies mentioned are renewable energy solutions, communication and control systems, design and digitalisation, automation, and mechanical system solutions. Furthermore, these cross-sectoral technologies are related to different research areas provided by research institutes within and outside the region. Regional technology platforms are networks of R&D institutions which can support several clusters (Structuralfunds.fi, 2019). Well-developed regional technology platforms may enable the innovation of new products, industries, and clusters through related varieties and entrepreneurial discoveries (Common tools for European regional growth – ERDF in Practice in West Finland, 2019).

Figure 4.9: Northern Ostrobothnia Cluster Approach



Source: Eastnorth.fi. (2019)

According to the East and North Finland in Industrial Transition – Smart Specialisation Strategy (2019–2023), clusters and their development are crucial to the future of Finland, its regions and to the enablement of economic growth. This strategic plan concentrates on coordinating projects to support and enable the implementation of the smart specialisation strategy in East Northern Finland (ENF) regions. The main aim of the project is to create a cluster development model based on the existing network of innovation platforms in the ENF area. Subsequently, the cluster model is based on a collaborative combination of centres for excellence, in which regional RDI expertise is fostered to promote SME growth and internationalisation (Eastnorth.fi, 2019).

4.5.4. Future for the Region

As part of the Eastnorth.fi (2019) smart specialisation strategy, it was documented that a successful future depends on, (besides the infrastructure considerations) the right policy choices in order to avert poor economic development, lock-ins are needed. Large university cities are engines of regional and national growth, along with employment. Therefore, employment services should be predominantly the duty of one service provider and any information barriers between parties must be addressed (Structuralfunds.fi, 2019). In the future, sustaining employment services will need innovative ingenuities and pilot projects, along with innovation funding from Business Finland, which must increase by €300 million (Structuralfunds.fi, 2019).

The University of Oulu is building a Finnish Digi Health knowledge– network. This will support the development of digital solutions, health technology research, education and innovation activities as well as act as the developer of information secure and ethically sustainable data practices. The University of Oulu’s portion of the core funding determined by the Ministry of Education and Culture (OKM) to the universities is only 9%, even though the

university's region – in Northern and Central Ostrobothnia, Kainuu region and Lapland – is home to approximately 13% of the working-age population of Finland and 15% of the youth cohort (Statistics Finland). Therefore, the current funding stream from the government needs to be examined as this figure can be regarded as being quite low considering the economic growth significance of the territory. Utilising the higher education of the ICT sector to support the growth potential will require additional funding. Furthermore, there is a consensus that the need for talent and retainment of talent are crucial to Northern Ostrobothnia. The businesses within the Oulu region have a recruitment need of 3,000 people (Eastnorth.fi, 2019).

4.5.5. Conclusion

Lambooy and Boschma (2001) found that flexibility is required for fiscal and non-fiscal government regulations. This along with sufficient behavioural and institutional variety between the development actors, and efficiency in the region's market institutions. However, in politics such selections are often based on trial and error (Lambooy and Boschma 2001, pp. 115–128). The growth of Northern Ostrobothnia in the 20th century relied heavily on national distributive policies subsidising traditional agriculture, industry, and administration. Today many scholars, such as Lorenzen (2001), claim that successful regional development depends on innovations, such as localised and interconnected processes of technological development, and on institutional learning such as the evolution of a range of social institutions. On review of the current literature, the smart specialisation strategy has been a pivotal report in outlining the future direction of the region and places a strong emphasis on the role of clusters, acting as instruments for regional economic growth (Eastnorth. fi, 2019). Geographically the region is regarded as far from the centre of the EU. However, the innovation within the ICT sector and a robust desire to create change after the economic shock of Nokia in 2004 have been instrumental to the success of the region. The competitiveness of regions depends on the ability

to organise endogenous learning processes and to create favourable resonance structures for policy learning (Benz and Fürst 2002). One new trial in regional development policy is that Northern Ostrobothnia should be globally competitive in technology and the encouragement of innovation diffusion and knowledge-intensive production is a key strategy. The competitiveness should emerge from endogenous research and development, this is facilitated by networking between the key actors in the field (Ministry of the Interior, 2004; Lambooy and Boschma 2001). Consequently, it can be argued that convergence between the triple-helix actors (Etzkowitz, 2002) may play a key role in influencing the future of regional policies in Northern Ostrobothnia. One might suggest that every actor working together to the betterment of the region placing businesses at the forefront can be an important factor and strategy for the region.

4.6. EU Cluster Acceleration Bootcamp (The CAP)

As part of TheCAP programme, 20 cluster managers, cluster experts, cluster policymakers, academics, cluster practitioners and key innovation ecosystem builders in the cleantech sector attended an intense four-day Bootcamp. The main emphasis at this bootcamp was on

meaningful and sustainable change, which is required for bold and decisive actions. The first-ever hands-on EU Cluster Acceleration Bootcamp took place between the 14th and the 17th of October 2019 at Frankfurt's Provadis School of International Management and Technology, Germany. It introduced participants from eleven European nations to tools and methodologies to take clusters to the next level. Dragomir (2020) outlined that, *"Clusters can make a big shift and multiply impact exponentially on what matters for the future of Europe. We can lead change through effective and innovative cluster approaches".* Dragomir won the European Cluster Manager of the Year award in both 2016 and 2018 and is the CEO of the AVAESEN cleantech cluster in Valencia, Spain. Dragomir is the mastermind behind the "Clusters of Change" concept and stated that as there are now more than 3,000 clusters in Europe (see Section 2.5). This means that high levels of critical mass have been reached. However, as the global enterprise landscape is becoming ever more competitive there is a need for novel business cluster models in order to challenge the status quo. This can be achieved with speed, change, and scale up fast to become the key drivers of Europe's growth globally (Clusters of change, 2020).

Cluster issues such as member interaction to financial concerns, funding models and commercialising innovation, the Bootcamp provided real-world tools and methods that each cluster stakeholder could alter for their own needs. Furthermore, the practical experience and industry know-how from the coaches fed directly and practically into the participants' current realities, be it working on a funding pitch or planning member collaboration events. Putting industry at the heart of the cluster and high levels of collaboration, inter-connection as well as cross-sector collaboration emerged as key takeaways for the participants (Provadis-hochschule.de, 2020). Arising from the programme was the need to roll out this acceleration programme continually both across Europe and internationally. This was strongly echoed by the participants (Provadis-hochschule.de, 2020).

4.7. Comparison of the Examined Contexts

The comparison of the four regions (see Table 4.5) suggests that smart specialisation strategies have been heavily utilised policies in regional development particularly in Asturias, Galicia, and Northern Ostrobothnia. However, no smart specialisation strategy has been implemented specifically for the Shannon region in the Republic of Ireland, as this strategic approach has been nationally focussed. According to Dbei.gov.ie. (2014), *"this is a national strategy with no separate smart specialisation strategies for each of the 2 regions (BMW and South & East)"*. This could be a weakness for the Irish economy and its regions as the current strategy is too holistic, it needs to be more specific to the regions at hand. Furthermore, location and resource endowment are important factors in development. Yet, historical legacies, cultural endowments and social practices are important in constructing a development model. The regions have cultural and economic resources and a 'useable past' with strong evidence of economic shocks, for example, Shannon with Dell, Asturias with metal and steel, Galicia with shipping, and Northern Ostrobothnia with Nokia, (see Section 4.1). This influenced regional economic growth (Doran and Fingleton, 2013) and these cases also show that institutional arrangements and individuals matter. Strong collaboration between the triple-helix actors is crucial to economic stability and enhanced development (Etzkowitz, 2002; Keating, 1999).

What matters is more the linkage between government and civil society, along with the opportunities for groups and associations to influence policy. Leadership is critically important in this matter, as it is in building the 'imagined community' at the right spatial level (Keating, 1999). Another aspect is the projection of success with the Shannon region being particularly strong in aviation, Asturias in metal and steel, Galicia in shipbuilding, fashion and wood, and Northern Ostrobothnia in the ICT sector. The development of clusters around successful industrial sectors is crucial to the regional economic growth of each region (Byrne, 2016,

Hobbs, 2010, Delgado et al., 2011; Porter, 2000). From an exploration of the existing literature, the consensus is that there has been an emphasis on government initiatives and public funding mechanisms for regional development. For the purposes of this research study and as argued by Antonescu (2014), a 'bottom-up' approach to regional development is required which places 'firms', 'entrepreneurship' and 'capital investment', at the heart of regional development, and that industries come together to improve regional development (Rodríguez-Pose, 2000). In all cases, the challenge is to move to a modernising regionalism, in opposition to traditionalist regionalism by exploring regional development as a framework for public action (Rodríguez-Pose, 2000). Consequently, it can be posited that this involves a conjunction of institution-building, cultural policy, and economic development.

Table 4.5: Context Comparisons

Country	Context	Area Size	Population	Geographical Areas of Interest	Main Industry	Business Cluster(s)	Triple-helix Stakeholders	Policy	Future
Ireland	Shannon	10,000 km²	450,000	Counties: Clare; Limerick; South Offaly; North Tipperary; and North Kerry	Manufacturing, Engineering, Pharmaceutical, Aviation, Tourism, and ICT	IASC Aviation, Tourism, and Industrial	**Government**: EI, IDA, Chamber, LEO, **Industry**: SIDC, Shannon Group plc., Regional SME's & MNC's, Foynes Flying Boat Museum **Academia**: UL, LIT, Mary I, AAG	▪ World's First-ever Duty Free ▪ Shannon Free Zone (SFZ) ▪ Shannon Airport Independence in 2012 ▪ Shannon Development to Shannon Group plc. ▪ Shannon 2.0 study	▪ Entrepreneurship ▪ Triple-helix Convergence ▪ Rural-Urban disparity ▪ IN4.0 – Autonomous Vehicles
Spain	Asturias	10,603.57 km²	1,034,302	Cities: Oviedo (Capital); Gijón; and Avilés	Agriculture, ICT, Fishing, Steel and Mining	ICT, Energy, Agrifood, Chemistry, Refractory, Industrial Manufacturing, Construction, Knowledge, Audio-visual and Tourism	**Government:** IDEPA, FICYT **Industry:** ClusterTIC, MetaIndustry4, **Academia:** Oviedo University, IDONIAL	▪ EER Award 2019 ▪ Smart Specialisation Strategy	▪ Entrepreneurship ▪ Innovation ▪ Human capital ▪ RIS3 ▪ IN4.0 ▪ Convergence of Cities
Spain	Galicia	29,574.4 km²	2,800,000	Cities: A Coruña; Vigo; and Santiago de Compostela (Capital)	Agriculture, ICT, Shipbuilding, Automobile, Metal products, Machinery and Equipment and Food	Shipbuilding, Automotive, Wood, Textile, ICT, Logistics Mobility and Transport, Renewable energy, and Audio-visual	**Government:** Xunta de Galicia, Vigo Free Zone, IGAPE **Industry:** EspazoCoop, Aclunaga, **Academia:** ECOBAS R&D, University of Vigo, A Coruna, Santiago de Compostela	▪ Smart Specialisation Strategy ▪ DG AGRI, 2014-2020	▪ Modernisation of agriculture and forestry ▪ Innovation ▪ Attraction and retainment of talent ▪ Marketing of the region – Tourism ▪ Triple-helix Convergence ▪ RIS3
Finland	Northern Ostrobothnia	37,149.23 km²	411,856	Cities: Oulu (Capital)	ICT, Steel and Metal, Mining, Water and Air purification, Wellness, Bio-economy, and Forestry	Energy technologies, Maritime technology and Services, Composite technologies, and Fur farming	**Government:** Ministry of Economic Affairs and Employment of Finland, Council of Oulu and Council of Lapland **Industry:** ICT (Nokia), AIF Water Ecosystem, Mustavaara mine **Academia:** University of Oulu, Innovation centre Oulu	▪ Smart Specialisation Strategy ▪ Structural funds	▪ Smart specialisation strategy (RIS3) ▪ RDI environments ▪ Digitalisation ▪ Interregional and international collaboration ▪ Marketing of the region – Tourism ▪ Triple-helix Convergence

Source: Adapted from Literature Review by Author

For this research study, one could argue that this has been more successful in Northern Ostrobothnia and Asturias. It would be a simplification to describe one or more region as a success or failure. However, all face the same challenge in building a sustainable and dynamic regional economic growth model (Storper, 1995). However, regions are not policymakers, subjected to a single global model of development, but that different strategies, mobilising social and cultural resources, are possible (Amin and Thrift, 1994; Harvie, 1994; Scott, 1998). On review of the EU Cluster Acceleration Bootcamp, cluster training, collaboration, trust, cluster cross-collaboration and speed of change can be regarded as important facets of cluster development (see Section 2.7) (Porter, 2007).

4.8. Positioning the Literature Review

The literature review in Chapters One, Two and Three grounded this research in the body of work to date and developed a theoretical framework (see Figure 4.10) in the pursuit of the enhancement of the research question. Chapter One examined the theoretical development of the field of convergence and the fundamental factors of convergence. Trust has been identified as a key factor in supporting the enhancement of convergence economies (Saxenian, 1994; Maskell, 2001; Antonescu, 2014; Monfort, 2008; Pérroux, 1955, pp. 307-340). Galor (1996) and Gaspar (2012) state that less developed regions can achieve growth and can ‘catch-up’ with developed regions if well-organised and competent institutions are developed (Soukiazis and Cravo, 2008). On examination of Table 1.3 in Section 1.7, the fundamental factors of convergence were highlighted suggesting that human capital, social capital, entrepreneurship, communities, trust, bottom-up growth, working together, enterprise developments, coopetition, content/knowledge sharing, distribution, finance, and cross-promotion play an integral role in the growth of regions.

Furthermore, dynamic *regional policies* are critical to the economic convergence of developed regions with those which are less developed, and further the need to act towards enhancing the innovation capability of particular regions (Despotovic and Cvetanovic, 2017). Winston (2019) and Sakharov (1968, 1980) identified that convergence focuses on the link between economic development and societal transformation which can be regarded as being a key aspect of this research study. Lagendijk (1999, p 23) argued that regions will benefit from business cluster convergence if they cultivate resources such as: Infrastructures; training; education; support centres and facilities; and business relationships. Consequently, these factors and the theoretical underpinning of convergence augment the literature review and allowed the completion of the theoretical conceptual framework (see Figure 4.10).

Chapter Two explored cluster-based economic growth and the empirical evidence of business clusters. Porter (1990, 1998, 2000, 2003) and Ketels (2003, 2013) argued that cluster development is based on 'geographical location' and 'inter-related' activity and that localisation is important (Marshall, 1890; Weber, 1929; Hoover, 1937). On examination of the current cluster literature, geographical location, enterprises, support organisations and the regional activity/engagement are fundamental factors which contribute to the prosperity of clusters. Ketels (2015) maintained that with the presence of strong regional and economic clusters comes *prosperity* (employment generation, increase in wages), *entrepreneurship enhancement* (development of new firms and survival of existing firms) and *structural change* (emergence of new clusters). Furthermore, that cluster-based economic growth can be regarded as a market-based tactic to the development of economic policy which cultivates new roles for the triple-helix actors of government and firms, as well as for universities, research institutions, trade associations and others (Etzkowitz, 2002; Ketels, 2004; Porter, 1990). Rosenfeld (1997) maintained that clusters are more collaborative, susceptible to change and foster the development of interconnected firms. There are barriers which must be overcome such as

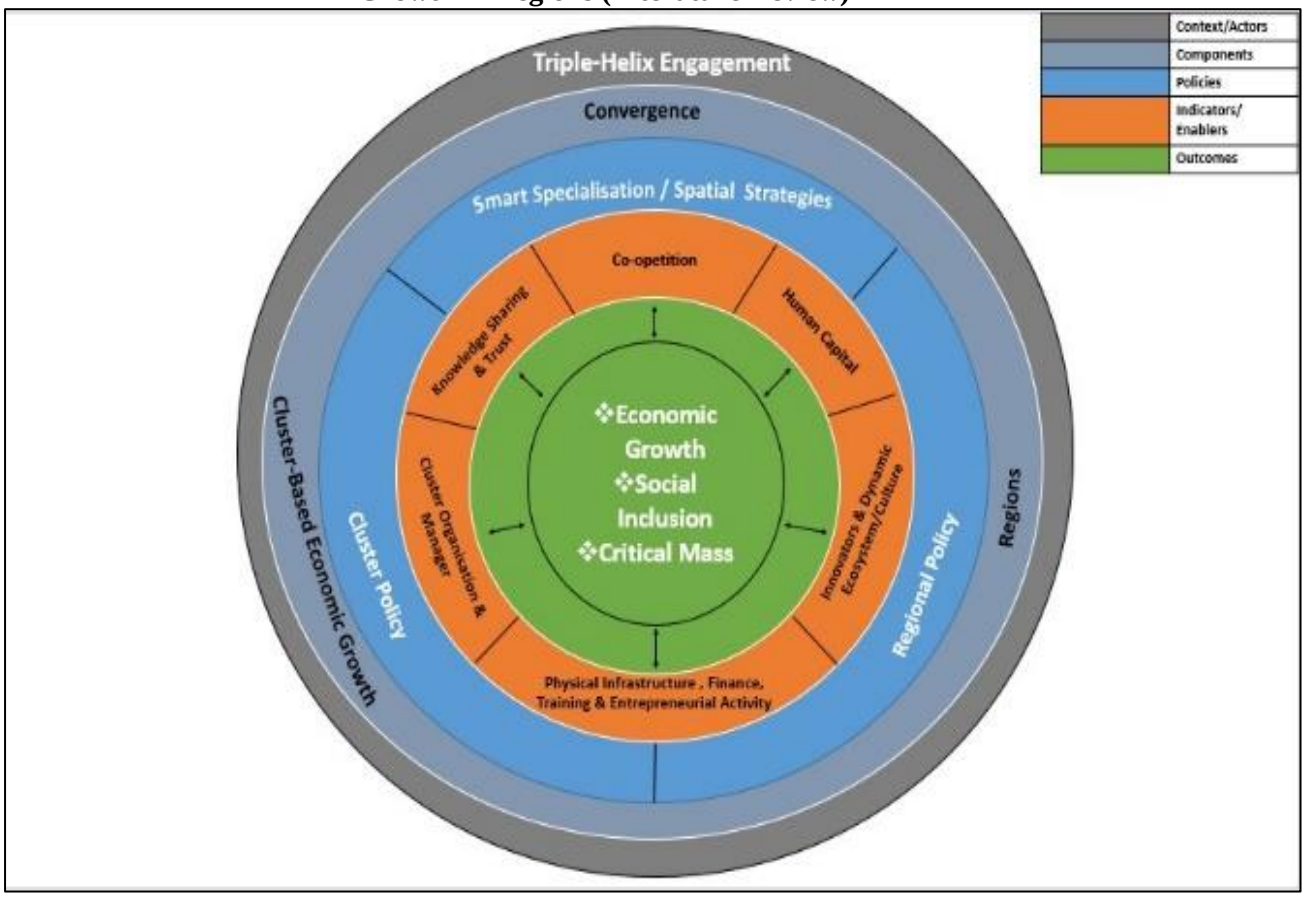
interaction, knowledge sharing, and collaboration, but all while moving towards equality (convergence). By bringing the key actors together, the cluster-based economic growth process can run more smoothly (Ketels et al., 2012). This chapter identified the facets which are pertinent to clusters and their development and as such, helped to comprehend the cluster literature and its factors to influence the development of the conceptual framework.

The analysis in Chapter Three examined the role of convergence and clusters in regions. Figure 3.13 in Section 3.11 highlighted the key factors of growth for regions which can help the reader to understand what facets are important to this research study. The term 'region' as posited by Abdullah et al. (2015) is the most pertinent for this research study. This is as it focuses on the resources available and the economic activities which stimulate the development of a region. For regions to capitalise on their unique strengths, the development of the entrepreneurial environment within can require factors, care, attention, and investment (both time and monetary). For convergence and business clusters to thrive, similar factors are required and as such, need to be included in an entrepreneurial regional environment (Burton, 2015; Lowe, 1993). These findings along with the literature surrounding this chapter help to support the development of Figure 4.10.

This chapter explored the various regions which form the contextualisation of this research study in conjunction with an expert Bootcamp. On review, the comparison of the four regions shows that regional policy, smart specialisation strategies and the need for cluster policy have been extremely important policies for regional development particularly in Asturias, Galicia, and Northern Ostrobothnia. Furthermore, the Shannon region in the Republic of Ireland has not implemented a specific smart specialisation strategy, as this policy approach has been national. The regions have cultural and economic resources, along with a 'useable past' which can be pressed into service with strong evidence of economic shocks and have influenced their

growth to date. Institutional arrangements and individuals' matter, with strong collaboration between the triple-helix systems as crucial to economic stability and enhanced development within these regions (Etzkowitz, 2002; Keating, 1999). The development of clusters has been successfully built around industrial sectors in these contexts (Byrne, 2016, Hobbs, 2010, Delgado et al., 2011; Porter, 2000). and there has been an emphasis on government initiatives and public funding mechanisms for regional development. Placing 'businesses', 'entrepreneurship' and 'capital investment' (Clusters of change, 2020; Provadis-hochschule.de, 2020) at the heart of both clusters and regions, so that industries come together to improve regional development (Dragomir, 2020; Rodríguez-Pose, 2000) is important.

Figure 4.10: Theoretical Framework: Convergence Influencing Cluster-Based Economic Growth in Regions (Literature Review)



Source: Adapted from Literature Review by Author

This chapter also aided the development of Figure 4.10, by providing empirical evidence on the imperative factors of cluster-based economic growth in regions and from industry experts

at the Bootcamp. On reflection of the preceding literature review chapters, the findings from these chapters enable the development of a theoretical framework. This framework will, in turn offer some valuable utility to future studies and is fully discussed in Chapter Seven as it is augmented through the discussion of the findings. This framework is designed to analyse the key factors at play which underpin the pivotal areas of this research study. This framework will be used in Chapter Six to act as a research guide and to ensure that the methodological approach taken is grounded in the literature.

Figures 1.4, 2.13 and 3.14 have highlighted the various mapping process frameworks in the previous chapters and have influenced and informed the development of Figure 4.10. Following this, the framework will be used for an analysis of the data through codes, categories, and ultimately the concepts which are used to interpret, discuss, and present the findings of this research study. Figure 4.10 above is an illustration of the theoretical framework constructed through the literature review. It has an outward-in emphasis that highlights the main context/actors, components, policies, enablers and outcomes which can influence various findings arising from the literature. Furthermore, Figure 4.10 has been adapted from Todeva's (2011) 'cluster mapping framework' (see Section 2.3) and Lowe's (1993) model of 'entrepreneurial activity and regional development/growth' (see Section 3.6.2). It can be suggested that this posits how convergence may influence cluster-based economic growth in regions. The answer based on the literature review findings on *'how can convergence influence cluster-based economic growth in regions'* is based on the existence of the right context, actors, components, policies, indicators, enablers, economic growth, social inclusion, and critical mass outcomes can be achieved. Convergence can influence cluster-based economic growth in regions if the right foundations (see Figure 4.10) are developed with a bottom-up growth, moving towards equality and an industry-driven approach being embraced.

4.9. Conclusion

Policies for regional development have undergone a major shift since the 1980s, under the influence of changed circumstances and new thinking regarding the nature of the problem. In the old paradigm, development is largely a matter of the right combination of factors of production to achieve efficiency. The last two decades have seen the 'rise of regional Europe' (Harvie, 1994) and there is a growing debate on the significance of regions and their place in the new global economy. Regions are not necessarily condemned by geography to either backwardness or progress. Nor on the other hand, is there a magic formula allowing regions to innovate and grow. Rather, there are objective economic strengths and weaknesses, but also social, cultural, and political factors that shape how the region responds.

The success of regional development strategies depends on a series of factors which are often difficult to understand. Geography, accessibility, economic and social structure, skills, institutions, politics and culture determine, to a greater or lesser extent, the success of development strategies. One of the consequences of an unbalanced strategy has been the progressive sheltering of a regional economy from market conditions. The establishment of clear and viable objectives from the start has contributed to the success of policies. Although the increasing regional debt looming in the horizon may jeopardise some sections – and most notably the financial incentives – of the regional development strategy. Concentrating exclusively in one or two policy areas and hoping that other development problems will wither away may yield little or no result. At worst, they may increase the dependency on transfers and an increasingly swollen public sector. To conclude phase four of this journey, this chapter has examined, *'regional contextualisation profiling'* through the examination of extensive literature, it has highlighted the economic development, business cluster and futuristic landscape of each to comprehend their current socio-economic status. On extensive

examination of the current literature related to the research question and the profiling of the regions involved, the next phase of this journey is the exploration of the methodology section.

Chapter Five

Research Methodology

5. Research Methodology

5.1 Introduction

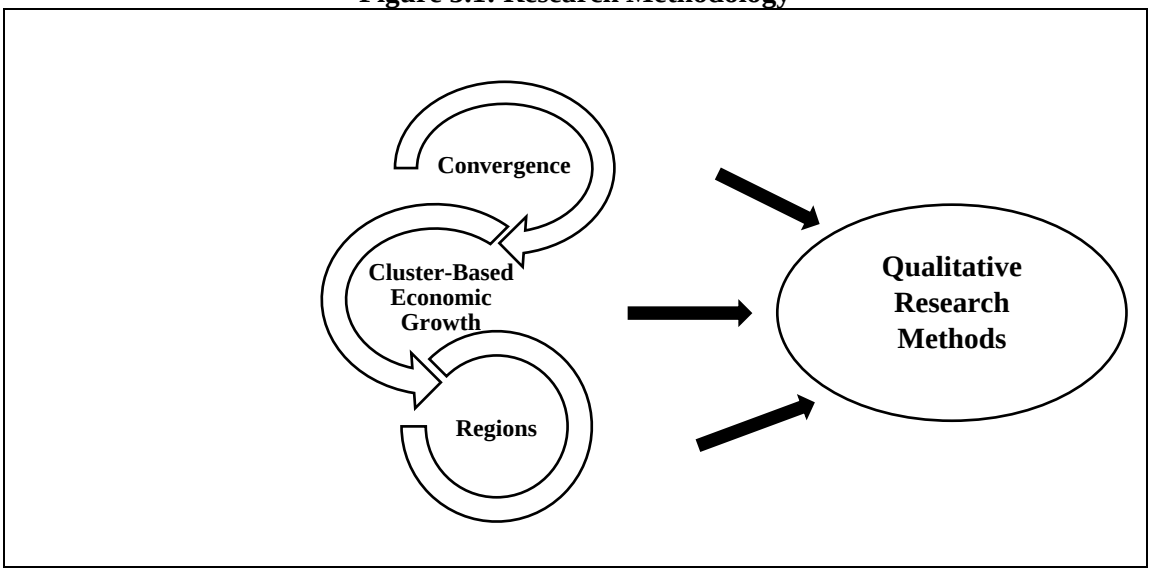
Like theories, methodologies are neither true or false, only more or less useful depending on the topic. The methodology in any research specifies how the research will be conducted and controlled. Jayaratna (1998) estimated that there are over 1000 brand-named methodologies in use globally. This chapter aims to explain the research methods used to satisfy the overall aim of this study. Using both primary and secondary research (is imperative in achieving the objective(s) set and produce useful recommendations in the end. The preceding chapters focused on the theoretical underpinning and key literature review areas. However, the purpose of this chapter is to outline the methodology used and the development of the methodological approach taken in the primary research element of this thesis. The methodology section can help to map out the specific methods for a research project.

Initially, a discussion of the various methodological approaches available to the researcher is presented with specific reference to the nature of positivism and naturalism. Following suggestions derived by Gill and Johnson (1991), these are established to inform the choice of methodology. The nature and context of the research problem and the extent of the available resources must be considered. In the consideration of the nature and context of the research problem, a comprehensive review of extant experiential research was undertaken to highlight previous methodologies and to identify gaps in this body of research. A research purpose statement is then derived from the research needs and a conceptual framework for the study is applied, giving rise to a series of hypotheses to be analysed.

The interpretive, qualitative approach to research is and their suitability for this work is debated (Bryman and Bell, 2015). This rationale is expanded upon and the more incremental aspects of the methodological decisions are addressed. The process of choosing a research approach is

then discussed regarding the development of qualitative (semi-structured interviews), research techniques. Methodologies best suited to fulfilling the identified research needs are outlined. The design of the actual research instrument arises from a detailed discussion of the qualitative elements of research and the nature of the data collected by attitudinal research. The sampling strategy employed is explained, justified and specified.

Figure 5.1: Research Methodology



Source: Adapted from Literature Review by Author

The implementation of the research instrument is described in detail, with specific reference given to interviews and sampling techniques. The research design and instrumentation are addressed with particular attention to the role of the researcher. The theoretical debate regarding the data collection strategy debates how appropriate the qualitative interviewing approach is for this study. The data analysis is proposed, with both the theoretical and software tools used to support this process outlined in detail. When choosing a research method there is no single method and that all methods have their strengths and weaknesses, and each are suitable in different circumstances. Bechhofer (1974) has stated that:

> *The research process is never a clear-cut sequence of steps or procedures following a predetermined, neat pattern, but a tangled interaction between the conceptual and empirical world, where the processes of deduction and induction occur at the same time.*

Due to the exploratory nature of this research, the study adopts a qualitative methodology based on the 'thematic analysis approach' (TA) devised by Braun and Clarke (2006). The flexibility involved in using TA in data analysis made it appropriate for a study like the present one as it examines theories and selects themes based on an empirical data set. *"The 'keyness' of a theme is not necessarily dependent on quantifiable measures - but in terms of whether it captures something important in relation to the overall research question*" (Braun and Clarke 2006). The controls for the research evaluation, transferability and quality are discussed to ensure the standing and value of this work.

Table 5.1: Chapter Structure

Chapter Approach
Introduction to Chapter
Defining Research
Methodological Approach – Qualitative Methods
Research Philosophy
Ontology | Positivism | Naturalism
Research Question | Sampling Strategy
Case Study Design
Researcher's Role | Research Ethics
Data Collection | Data Analysis
Conclusion
Source: Adapted from Literature Review by Author

This chapter analyses convergence and cluster research, examining the various methods and techniques used to identify, measure, and analyse clusters. The consensus is that cluster studies usually employ a variety of quantitative and qualitative tools, from measures of specialisation (location quotients), input-output techniques, expert opinions and interviews. In addition, more recently, network analysis. This chapter explores the key distinction between the levels and perspectives used in cluster analysis, to provide an outline of the diverse aims and contexts of

cluster studies. This provides an overview of the different types of cluster analysis techniques which are used in cluster analysis, incorporating both quantitative and qualitative methods.

Research methodology is a systematic investigation to find solutions to a problem (Burns, 2000). There are many possible ways to look at research methodology and the approach proposed by Saunders et al (2003) seems logical. They compared the research process to an onion by highlighting the layered approach to research (see Figure 5.12 in Section 5.15). Hussey and Hussay (1997) defined methodology as the overall approach of the research process starting from the theoretical underpinning to the collection and analysis of the data (Gill and Johnson 1991). According to Rajasekar, Philominathan and Chinnathambi (2013), the activity of research methods and research methodology must be examined when studying the area of research:

> ***Research methods*** *are the various procedures, schemes and algorithms used in research. All the methods used by a researcher during a research study are termed as research methods. They are essentially planned, scientific and value-neutral. They include theoretical procedures, experimental studies, numerical schemes, statistical approaches, etc. Research methods help us collect samples, data and find a solution to a problem. Particularly, scientific research methods call for explanations based on collected facts, measurements and observations and not on reasoning alone. They accept only those explanations which can be verified by experiments.*
>
> ***Research methodology*** *is a systematic way to solve a problem. It is a science of studying how research is to be carried out. Essentially, the procedures by which researchers go about their work of describing, explaining and predicting phenomena are called research methodology. It is also defined as the study of methods by which knowledge is gained. Its aim is to give the work plan of research.*

This research is exploratory as the resources on convergence and business cluster available are limited by lack of prior investigation. The literature review from the previous chapters has distilled the research priorities for this developing field. This chapter will discuss how this work will conceptualise how convergence influences cluster-based economic growth in regions

through an objective and data informative lens. In doing so, this work makes a novel contribution to economic geography, entrepreneurship, regional growth, and business cluster theory. The following chapters will discuss the findings of this work within the methodological framework presented below. It is important to note that other methods have been explored, but the qualitative approach has been identified (after conducting an extensive literature review), as the most effective for the purpose of this research study.

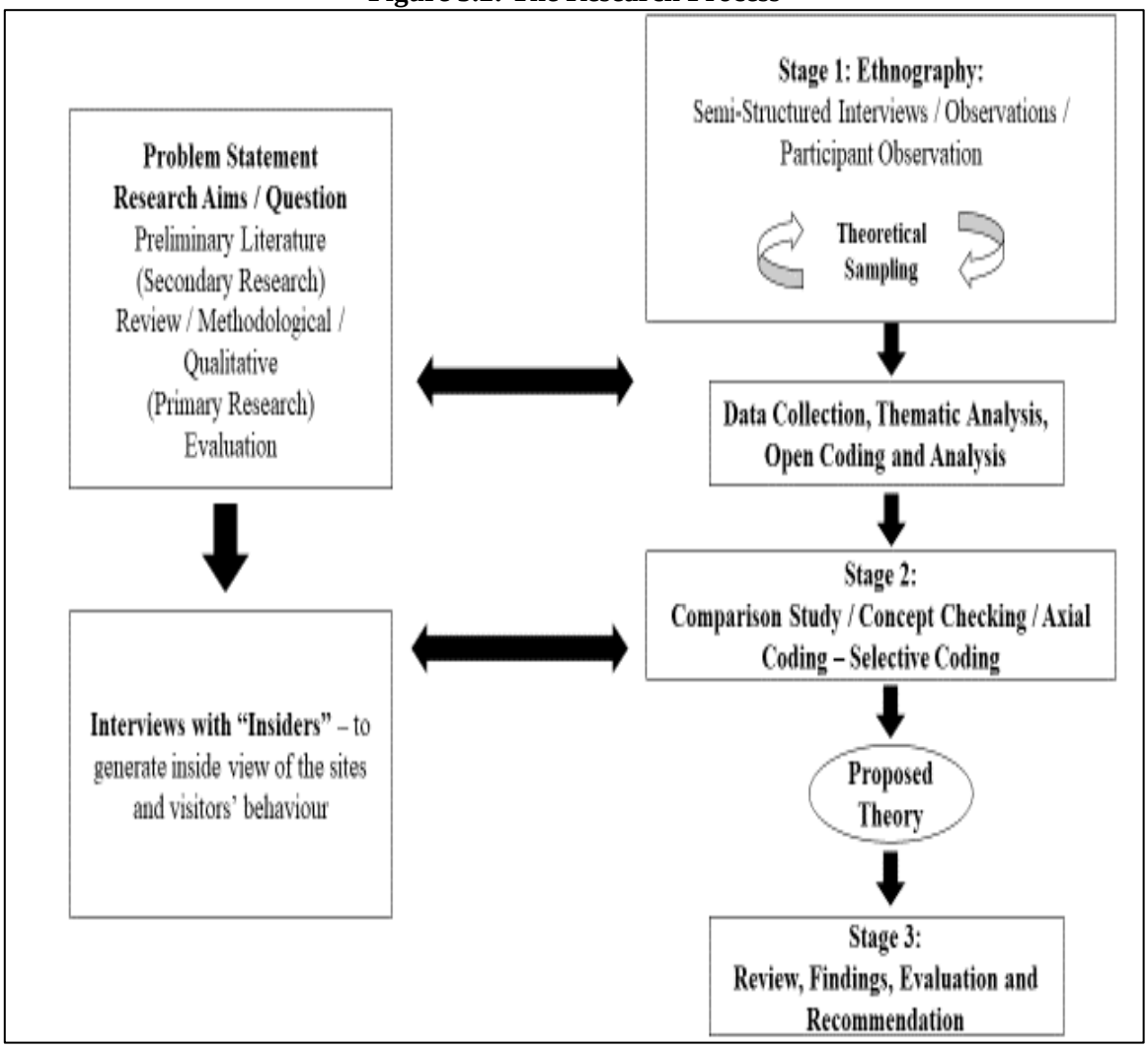
5.2 Defining Research (Objectivism vs Realism)

The consensus within various research studies surrounding methodology is that research is the study of existing or new ideas, materials, or theories. This is in order to try and either find that missing piece of the puzzle or expand upon it. Yin (2008) has supported this viewpoint emphasising that research is all around us, affecting everyday life. Creswell (2013) explained that research is, "*the process of making claims and then refining or abandoning some for other claims more strongly warranted. Most qualitative research, for example, starts with the test of a theory"*. Alternatively, Krishnaswami et al. (2010) have identified research as the search for facts and answers to questions and that it is known to be an art of methodical investigation. This is a critical facet in the process of discovering information surrounding the subjects in question.

Research is not just embedded within the areas of science and technology, but business, humanities, engineering, social care and it can help to improve the betterment of society and place an economy in a strong economic position. *"Research is a logical and systematic search for new and useful information on a particular topic. Whatever might be the subject, research has to be an active, diligent and systematic process of inquiry in order to discover, interpret or revise facts, events, behaviours and theories,"* (Rajasekar et al., 2013). It can be argued that

research can be defined as the areas to which new activities and unforeseen findings take place, for the betterment of that particular field of study. A different perspective may describe research as the activity which is practised 'when I don't know what I'm doing' (Rajasekar et al., 2013). For the purpose of this research study, the perspective on research by Krishnaswami et al. (2010) is relevant due to its endemic nature. Hemmington (1998) has developed a model that has outlined the process which is involved in research. This model has been adapted below in Figure 5.2 as supported by Cooper and Schindler (2003).

Figure 5.2: The Research Process



Source: Adapted from Hemmington (1998) and Cooper and Schindler (2003)

Research can be one of the most interesting features in academia as it can offer a degree of control and ownership over what you learn (Hemmington, 1998). One could suggest that it

provides the individual with the opportunity to confirm, clarify, pursue or even discover new facets of an area of interest. Additionally, Rajasekar et al. (2013) examined the rationale for research activity to take place:

- To discover new facts, and to verify and analyse important facts;
- To analyse an event, process, or phenomenon and identify the cause and effect relationship;
- To develop new scientific tools, concepts and theories to solve and understand scientific and non-scientific problems; and
- To find solutions to scientific, non-scientific and social issues that solve the problems occurring in our everyday life.

Neville (2007) argued differently and stated that research is, *"a process of enquiry and investigation; it is systematic, methodical and ethical; research can help solve practical problems and increase knowledge"*. Looking at the various research approaches, it can be said that qualitative (see Section 5.5.2) research techniques enable research practices to be applied to real-world situations. Qualitative research can be defined as gathering data based on observing what people do and say (Creswell, 2013). Research is a perpetual exercise, therefore leading to the exploration of different methodological approaches considering the cluster methodologies.

5.3 Methodological Approach - Cluster Methodology

Strauss and Corbett (1998) defined methodology as a, *"way of thinking about and studying social reality"*. The methodology is the way to study phenomena, while methods are the ways of gathering and analysing data. While philosophical orientation is the logic which underpins an approach to research (Corbin and Strauss, 2008). The specific methods which one might

utilise when researching business cluster theory have been mapped out within the existing body of literature. Initially, when discussing the various methodological approaches available to the researcher, there is normally a specific reference given to the nature of *positivism* (see Section 5.6.2) and *naturalism* (see Section 5.6.3). Gill and Johnson (1991) have established that these two areas inform the choice of methodology in the research when considering the nature and context of the research problem, and the extent of available resources. In the consideration of the nature and context of the research problem, a comprehensive methodological review of extant experiential research must be undertaken. This highlights previous methodologies and identifies gaps in this body of research. A research purpose statement is then derived from the research needs and a conceptual framework for the study is applied, giving rise to a series of hypotheses to be assessed.

Table 5.2: Cluster Methodology

Top-down and Bottom-up Methods in Cluster Analysis

Characteristic	Top-down	Bottom-up
Research Question	How Much?	How?
Approach	Quantitative	Qualitative
Principal Data	Secondary Data	Primary Data
Methodology	Statistical Modeling	Case Studies
Industrial Proximity	Classification System	Descriptive
Scope	Nationwide, Multi-Industry	Local, Single-Cluster
Dominant Logic	Deductive	Inductive
Measures	Employment, Patents, Wages, Output, Sales	Relationships, Institutions
Findings	Broadly Applicable	Narrowly Limited

Source: (Cortright, 2006)

Cortright (2006) developed a table which has illustrated cluster methodology (see Table 5.2). This table has highlighted the 'top-down' and 'bottom-up' methods in cluster analysis and the

characteristics needed (see Section 1.4 in Chapter One). According to Rocha (2004), there is a need for further research on the cluster area, regarding how to best define them, and measure them, using qualitative techniques. The identification of both the unit and level of analysis, and control for cluster type, stages, and strength in disseminating the impact of clusters on the enterprise landscape, entrepreneurship development, and the association between the three (clusters, enterprise landscape and entrepreneurship development) are key areas that require additional exploration. Equally, Rosenfeld (1997) claimed that to overcome the drawbacks of each methodology, there is a common accord in the literature that to identify clusters, it is essential to conduct a qualitative analysis. Rocha (2004) has stated that traditional quantitative measures are insufficient in ascertaining important facets which are present in some clusters such as *"social infrastructure, entrepreneurial energy, shared vision, and level of collaboration."* Therefore, are incapable of differentiating simple industry attentiveness from operative and functioning clusters (Rosenfeld, 1997).

The Clunet Cluster Policy Guidelines Report (PRO-INNO Europe, 2008) has proposed something different. It posited that the cluster methodology should encompass: Cluster definitions; cluster policy fact sheets; policy mapping; and policy guidelines. This report has not examined the qualitative perspective but deems quantitative analysis as the most relevant methodological approach to clusters. Another methodology that could potentially be adopted is that of Ketels and Protsiv (2013) and a European Commission (2013) report which have discussed the Location Quotient (LQ) methodology as a fundamental methodological approach when examining the area of business clusters (Sternberg and Litzenberger, 2004). Delgado et al. (2010, 2011) have also expressed an interest in this type of approach. They suggested that the process of identifying robust clusters is based on such a methodology. The levels and perspectives of cluster analysis will naturally be explored next.

5.4. Levels and Perspectives of Cluster Analysis

Many scholars have argued that cluster analysis can take place at various levels of regional disparity: (1) Micro; (2) Meso; and (3) Macro (Roelandt and den Hertog, 1999; Hoen, 2002). Based on the three levels at which cluster analysis is applied. This reflects the different aims of the various study types. Even the differing perspectives of the cluster concept. Therefore, certain cluster analysis techniques and methodologies are more pertinent at each different scope (Byrne, 2016).

(1) Micro-level Analysis

The micro-level analysis strand of cluster research tends to examine a single cluster or group, of related firms through exploring the individual firms. It tends to focus on understanding why firms co-locate with other firms and investigate how they may co-operate, share specialised inputs or services, their common markets or technologies (Morrison, 2008). The micro-level analysis is used to understand firm networks to: Analyse a network of suppliers around a large enterprise or Multi National Corporation (MNC) (Markusen, 1996); to comprehend innovation linkages in a network (Morrison, 2008; Giuliani, 2013); or to support the ties between the actors (SMEs, MNCs, universities, industry associations etc.) (Roelandt et al., 1998).

Micro analyses predominantly use primary data gathered from interviews and questionnaires which offer a rich dataset. They provide a face-to-face opportunity directly with actors within the region, and what is being experienced by firms (Mazzarol et al., 2005). Imperative social and inter-personal factors of clustering are identified more easily (McGrath, 2008). Micro-level analysis suffers from problems of external validity (see Section 5.6.4) as the findings may not be demonstrative of all regions. Additionally, studies may be instigated by specific regional interests or policy concerns, where a region is aware of their leading industries yet wish to understand how it and the firms within a sector operate. However, the definitions of clusters

and methods used to define them may be based on political concerns or pre-determined policy options rather than established theoretical models (Bergman and Feser, 1999). A danger of policy implications from micro analysis is that they may be focused at a firm level which entails specific firm supports and these may disturb the market mechanism in an economy (Hoen, 2002).

(2) Meso-level Analysis

Some cluster studies concentrate on the meso-level, which typically applies at the regional level. This is above the level of the firm, but below examining an entire nation across all industries. It may examine the linkages between various industry sectors to define clusters or the linkages of value chains within a region, such as using input-output analysis (Bergman and Feser, 1999). Typically, the study aims to assess some industries or sectors in a region and does not begin with predetermined clusters (Bergman and Feser, 1999). Meso-level analysis often combines both quantitative analysis of regional indicators, for example, employment and industry concentrations. This is achieved with in-depth qualitative approaches to clusters of interest.

The aim of a meso-level study may be to act as a starting point for strategic advice on the competitiveness of an individual cluster by identifying key knowledge issues, designing, and upgrading strategies and determining how to turn negative competitive dynamics into strategic cooperation, and differentiation-based competition (Roelandt et al., 1998). The majority of Porter-type cluster studies are carried out at the meso-level of analysis. For instance, Denmark (Dreijer et al., 1997), Finland (Vuori, 1997; Rouvinen, 1996), the Netherlands (Roelandt et al., 1998), Sweden (Stenberg and Strandell, 1997) and the United States (Held, 1996; Porter, 1997; Sweeney and Feser, 1997; Feser and Bergman, 2000).

(3) Macro-level Analysis

A national (USA) or even supra-national (EU) level focus on industry groups is known as a macro-level analysis. Typically, industry sectors across the economy are assessed as a whole to identify: the national clusters; in what regions do they exist; and to compare clusters across and within regions (US Cluster Mapping, 2015). A macro-level analysis can contribute to higher-level economic and innovation policy (Roelandt et al., 1998). In contrast to micro- and meso-levels, macro-analysis takes a more holistic view of a region or nation by investigating clustering across several industries. It employs secondary source statistical data such as regional indicators, for instance, standard industry classification codes (NAICS, ISIC, NACE) which are used as a benchmark for comparison of employment or industry concentrations.

Table 5.3: The Level of Cluster Analysis

Level of analysis	Cluster Concept	Aims
Micro (Local industry, cluster or firm level)	Examines a group of related firms, and their connections, in a locality.	Initiating or supporting specific firm-level initiatives and supports.
Meso (Regional level)	Examines the specialisation and the inter- and intra-industry linkages of a group of industries for a region.	Developing strategy for a region's clusters.
Macro (National or Supranational level)	Examines specialisation patterns at a national or supra-national level. Linkages between industry groups across the economy as a whole.	Identifies the cluster categories of a nation, for national and regional industrial and innovation policy-making.

Source: Byrne (2016)

With the use of secondary data and more widely accepted methodologies, the findings of meso- and macro-level analysis appear to be more reliable than those of micro cluster analysis. However, meso- and macro-level analysis have more replicability across regions. Clusters are unique and can be extremely diverse due to historical, geographic and economic factors. Standard methodologies measuring economic indicators do not explain how a cluster forms,

how a cluster operates and what can we predict for its future growth and scope. Table 5.3 has delineated the various levels of analysis for reflection when examining clusters and their focus. Therefore, various levels of analysis can be used when targeting different research objectives. Such as deciding on which geographic scale is most appropriate for a study, or whether it is the linkages in a network of firms or between industry sectors which are of most interest. The goal may be to better understand a specific pre-determined cluster or does the study seek to define clusters in a nation or region.

Caution should be taken to each approach as the level of analysis affects the possible outcomes of the study. The level of analysis is a useful model as it enables the researcher to evaluate what the aims of a study are, the cluster concepts employed and the advantages and disadvantages of the study. Both meso- and macro-levels of cluster analysis are pertinent for the purpose of this research study with a particular emphasis on the influence on regions.

5.5. Primary Research

Primary research can be quantitative or qualitative research (Creswell, 1994, 2013) and for this research study, a qualitative approach was used. Fidel (2008) suggested that this methodology approach of *"qualitative methods"* is perfect for studying social and behavioural research such as how convergence can influence cluster-based economic growth in regions, the act of moving towards equality (Sale and Brazil, 2004). The adoption of qualitative research (Saunders et al., 2015, 2016; Bryman, 2009: Wallace and Pernett, 2011; Tashakkor and Teddlie, 1998; Molina-Azorin, 2012) is incorporated as the aim is to augment the development of this research. Furthermore, using this approach provides a more meaningful and holistic perspective on the salience of the convergence and business cluster model, in influencing regional economic growth. After conducting an extensive literature review with a specific attention on the methodologies that have been adopted which are underpinning convergence, business cluster

sphere and regional economic growth areas, it can be suggested that in-depth semi-structured interviews (Creswell, 2003) will be used as the most effective research methods strategy to support this study. It can be anticipated that this will provide the most objective responses and findings to support this area of research, the presence of convergence and business cluster emergence (Porter, 2000: Ketels, 2003).

5.5.1. Quantitative

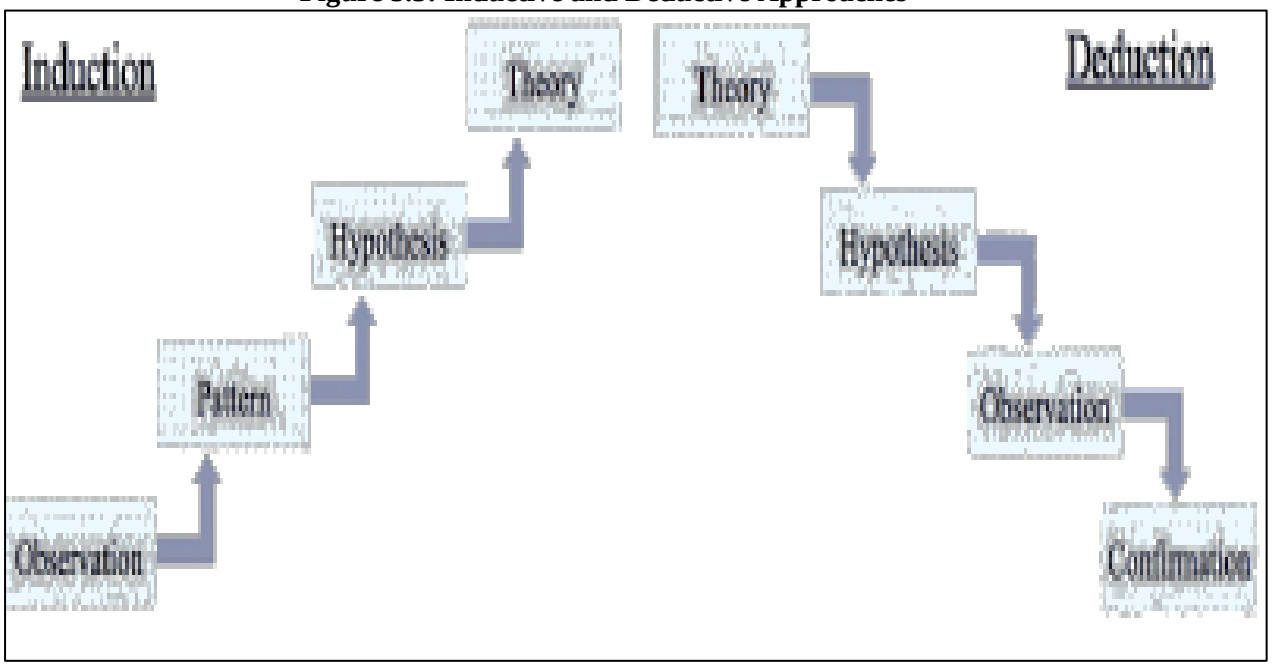
As outlined in Section 5.3 and throughout this chapter, quantitative, top-down cluster techniques identify and measure existing concentrations. These are often based on geographical concentration and industrial specialisation indices (van Egeraat et al., 2015) or input-output tables. A collection of geographical industrial concentration measures is commonly used in cluster studies as a starting point to identify specialisations of industry, or are utilised in combination with other methods, for example, to assess inter-industry or inter-firm linkages. Van Egeraat et al. (2015) described geographical industrial concentrations as, *"the extent to which employment in a particular industry is concentrated in a small number of localities or regions,"* and that input-output analysis examines the linkages between firms and subsequently industries. This in order to identify the presence of clusters in both regional and national economies.

5.5.2. Qualitative

After an extensive review of the current literature, numerous quantitative and top-down approaches to cluster analysis exist and perhaps a greater variety of qualitative and bottom-up studies have been developed in recent years. One could suggest that qualitative studies are less likely to abide by a set formula as they aim to address and answer specific questions concerning

a certain region or cluster. Qualitative research is often exploratory (Glaser and Strauss, 1967; Crabtree and Miller, 1999; Patton, 2002) and aims to generate new insights using inductive (theory development), rather than deductive (theory testing) approaches which have a quantitative focus. Trochim and Donnelly (2008) stated that inductive is known as the 'bottom-up approach' (see Section 1.4), whereas deductive is referred to as the 'top-down approach' (see Figure 5.3 below).

Figure 5.3: Inductive and Deductive Approaches



Source: Ragab and Arisha (2017)

This section has explored the techniques which can are described as pertinent for this research study and the methods which have been frequently applied to cluster studies. Other techniques such as focus groups could have been explored, but using the inductive semi-structured interview approach is arguably the most relevant for this research study based on the examination of the current literature. The techniques and methods are typically selected to align with the context and research question (see Section 5.7) of this research study.

5.5.3. Interviews

Micro-level studies (discussed above) tend to incorporate methodologies which are labour intensive such as face-to-face interviews and focus groups. As such, these techniques often enable the collection of a better level of 'rich' information at the cluster or firm level (Mazzarol et al., 2005). Face-to-face interviews are more reliable than questionnaires, as the interviewer is present and can ensure that the questions are understood. Furthermore, they allow the interviewer to clarify the research project to the respondent in person and give the interviewer the chance to explain ambiguous answers. There is also an opportunity to ask follow-up questions, which can provide additional information regarding the sector through participant experiences of particular connections (McNamara, 1999). Interviews can either be one-on-one or in a group, for example, a focus group. One-on-one interviews permit confidentiality and privacy for the respondent:

> *If you want to know how people understand their world and their life, why not talk to them? In an interview conversation, the researcher listens to what people themselves tell about their lived world, hears them express their views and opinions in their own words, learns about their views on their work situation and family life, their dreams and hopes. The qualitative research interview attempts to understand the world from the subjects' points of view, to unfold the meaning of peoples' experiences, to uncover their lived world prior to scientific explanations (Kvale, 1996).*

McNamara (1999) suggested that trust can be built amongst the interviewer and interviewee. This is an important factor when gathering information regarding firm connections which may be vital to the firm's operations. As outlined in Section 1.4, when assessing convergence, an important factor which influences the degree to which the actors co-operate with one another is *trust*. Trust is an important factor in a cluster as it binds firms, who may compete otherwise, together (Paniccia, 1998). Face-to-face interaction may reduce the likelihood in refusal to answer. The interviewee can be more open and one-on-one interviews allow them to elaborate

on particular topics or issues. Focus groups are often used when it is more appropriate to obtain information from a group rather than individuals This may be due to limited resources, or the topic being examined may benefit from collective discussion, sharing of opinions, and circumstances. The Delphi method can also serve as a reliable consensus of a group of experts (Holsapple and Joshi, 2002). Greater insights may be developed from the group dynamic.

Interviews can also be expensive and time consuming to conduct, due to the time needed to visit each respondent and go through the interview with them. Like questionnaires, interviews can be at risk of bias from poorly created questions or response bias, such as the: (a) Halo bias - which Cooper and Schindler (2003) defined as when a person agrees with someone because they consider the person to be intelligent; or (b) Prestige bias - when a respondent answers a question in a way which makes them feel better (Cooper and Schindler, 2003). Additionally, data collected from interviews may take longer to analyse, especially if the interviews must be transcribed and analysed. Critics of qualitative techniques cite that they are less reliable than quantitative techniques which use secondary data and statistical based information (Byrne, 2016).

An interview is "*a purposeful discussion between two or more people*," and a reliable method to gain research data (Kahn and Cannell, 1957). As a research tool, which originated in psychology and psychiatry, it is described as one of the most commonly used methods in qualitative research (Bryman, 2006). Easterby-Smith et al. (2002) argued that interviews are common among both researchers and respondents as they allow face-to-face interaction. This offers a holistic understanding of the research topics. Bryman (2012) stated that interviews are categorised by their level of formality beginning from structured interviews to unstructured ones (Bryman, 2012). **Structured interviews** use a set of identical questions which are asked in a predetermined order to all respondents and may offer the interviewee a fixed range of

answers. They are homogenous to questionnaires and are used to gather mostly quantitative data from respondents. Conversely, **unstructured interviews** are comparable to informal discussions and do not have standardised questions, but only a list of topics which are covered. The interviewers may modify the questions between interviews and allow respondents to express themselves freely concerning the topic under study (Healey and Rawlinson, 1994). **Semi-structured interviews** lie between both ends of the paradigm as they have a predetermined set of questions nonetheless, they permit a high degree of flexibility to ask new questions, remove existing ones, and let new ideas transpire during the discussion. Furthermore, the arrangement of questions may also differ subject to the flow of the discussion (Greener, 2008).

Table 5.4: Types of Narrative Analysis

Type	*Description*
Thematic Analysis	Emphasis is on the content of a text, "what" is said more than "how" it is said. Identifies themes of meaning.
Discourse / Structural Analysis	Emphasis shifts to the way a story is told. Focuses on language used, frequency of the words, their relationships, and structures.
Interactional Analysis	Emphasis is on the dialogic process between teller and listener. Considers pauses, interruptions, topic chaining and other aspects of conversation.
Performative Analysis	Envisages dialogue as a performance which addresses an audience through language and gesture, "doing" rather than only "telling."

Source: Ragab and Arisha (2017)

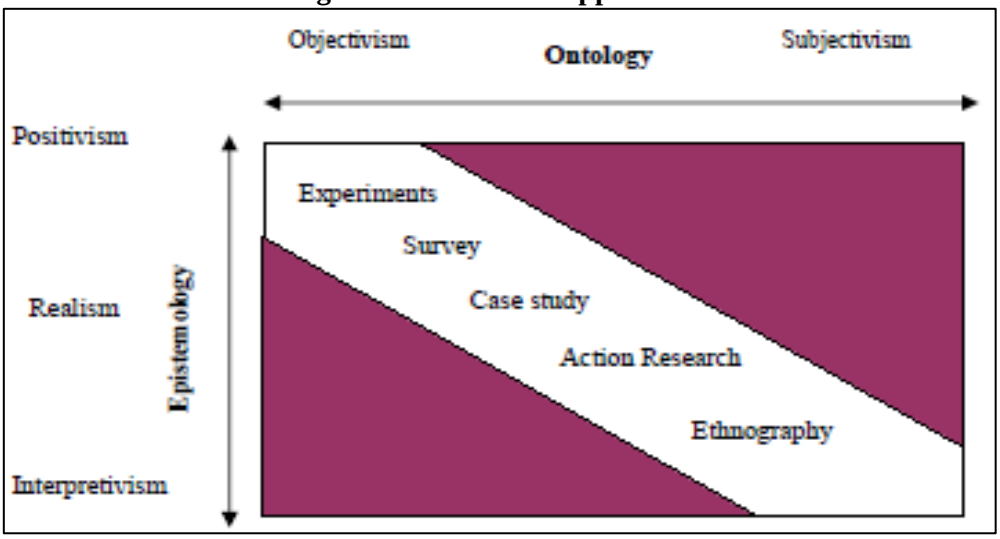
The researcher can undertake interviews with a small sample of respondents. Additionally, interviews are susceptible to response bias in the sense that interviewees may distinguish

certain responses to be more necessary than their actual views or can be swayed by the interviewer's opinion (Healey and Rawlinson, 1994). Once interviews are transcribed, numerous qualitative techniques are used to analyse the textual transcripts of interview data and these primarily concentrate on *"identifying, analysing, and reporting patterns within the text* (Braun and Clarke, 2006)". Ragab and Arisha (2017) argued a four-fold typology of narrative analysis (see Table 5.4) (Riessman, 2005)**.** Conversely, Rosenfeld (1997) argued that to overcome the shortcomings of each methodology, there is a common accord in the literature that when examining the area of clusters, it is crucial to conduct a qualitative analysis. As outlined in Section 5.3, Rocha (2004) suggested that traditional quantitative measures are unsatisfactory in establishing important facets that are present in some clusters such as, *"social infrastructure, entrepreneurial energy, shared vision, and level of collaboration."* Therefore, are incapable of differentiating a simple industry attentiveness from operative and functioning clusters. This implies the need for a qualitative application. After an extensive examination of quantitative and qualitative techniques, the chosen methods are now explored.

5.6. Research Philosophy

A pivotal point of the research process comprises determining its philosophical nature using a research paradigm (Kuhn, 1962). Kuhn defined a paradigm as, "*a set of linked assumptions about the world which is shared by the community of scientists and provides a conceptual framework for the organised study of the world".* Furthermore, one could suggest that the research paradigm is salient as it forms the methodological approach used to explore the research question (see Figure 5.4). There are two important schools of thought which influence current paradigms in scholarly research: (1) The scientific; and (2) The humanistic, each providing opposing ontological and epistemological views (Amaratunga et al., 2002).

Figure 5.4: Research Approaches



Source: Sexton (2003)

Ontology (see Section 5.6.1) is a division of philosophy which examines the nature of reality and the essence of its existence (Burrell and Morgan, 1979). There are two main ontological perspectives: Objective and subjective. *Objectivism* sees reality as a 'concrete structure' which exists 'out there' external to humans and believes the world 'predates individuals' and will carry on existing as a tangible entity irrespective of the actions of humans (Holden and Lynch, 2004). Holden and Lynch further recommended that this is the predominant view in the study of natural sciences, and when applied to social sciences, an objective standpoint is that social phenomena exist external to social actors.

Subjectivism conversely, proposes that reality is 'created by individuals' and that the world is a mere projection of the human mind (Morgan and Smircich, 1980). Smircich (1983) stated that while 'objectivistism' believe in a single reality, 'subjectivistism' believe in multiple realities which co-exist. In the subjectivist view, social phenomena are considered as a contextual outcome of the actions and perceptions of social actors which are in a continual process of revision through the social interaction of such actors (Smircich, 1983).

Table 5.5: Research Philosophy Assumptions

Epistemology (The how?).	General set of assumptions about how we acquire and accept knowledge about the world.
Ontology (The what?).	Assumptions that we make about the nature of reality.
Pragmatism (what works?).	Focuses on the practical outcome of the research and rejects the "forced selection" between research paradigms.

Source: Adapted from Literature Review by Author

Epistemology (see Section 5.6.1) is the study of knowledge and how it is attained. It presents a comparable two-fold argument between *positivism* (see Section 5.6.2) and *interpretivism* (see Section 5.6.3) - also referred to as *phenomenology* (Becker and Niehaves, 2007). Positivism embraces a scientific stance to research and aims to cultivate generalised findings from experimentation and structured observations of reality (Hussey and Hussey, 1997). When this approach is applied in the context of social science, the positivist paradigm accepts that the researcher objectively gathers data while remaining external to the research process and independent of the subject of research, similar to the way a physical scientist would investigate physics or chemistry (Remenyi et al., 1998). The outcomes of positivist research are replicable factual generalisations about social phenomena. Alternatively, to this interpretivist argue:

> *Interpretivists argue that, unlike natural phenomena, social phenomena are unique because they are created by individuals in certain contexts and are too complex to be reduced to generalised rules and formulae (Crotty, 1998; Rowlands, 2005). Adopting a contrary stance to positivism, the phenomenological paradigm aims to study social phenomena from within their own context and considers that there is an interactive relationship between the researcher and the research subjects. Interpretive research stresses the role of human beings as social actors where a researcher obtains knowledge by entering the social world of research subjects to understand the phenomena being studied from their point of view in a subjective and empathetic manner. (Holden and Lynch, 2004).*

The results of interpretive research offer *an understanding* to the social phenomenon under examination. This paradigm can be classified as the most pertinent for the purpose of this study. The positivist approach, however, is also important. Crotty (1998) posited that there is a *convergence* between ontology and epistemology which can make them challenging to separate from a conceptual perspective in the discussion of research methodology. Crotty recommended they both must be considered together as, *"to talk of the construction of meaning is to talk about the construction of meaningful reality"*. The view of reality (ontology) should not be separated from the way of knowing about reality (epistemology). To put this into perspective, an objectivist who *believes in a single, tangible reality is likely to seek knowledge about the world in a scientific and positivist manner, and vice versa* (Crotty, 1998). These paradigms have been further explored in Table 5.6 in order to provide some illustration of their meaning.

Table 5.6: Research Paradigms

Paradigm	**Scientific**	**Humanistic**
Ontology	Objectivism	Subjectivism
Epistemology	Positivism	Interpretivism (Phenomenology)
Views	• The world is tangible and predates individuals • Singular reality • The researcher is external to and independent of the phenomena being researched • Research attempts to reduce phenomena to context-free generalisations	• The world is socially-constructed, created by the minds of individuals • Multiple realities • The researcher is part of and interacts with phenomena being researched • Research attempts to provide a contextually bounded understanding of the phenomena

Source: Ragab and Arisha (2017)

Pragmatism is a research philosophy which concentrates on the practical outcome of the research and disregards the 'forced selection' between research paradigms (Tashakkori and Teddlie, 1998). Furthermore, the pragmatic paradigm is constructed on using "*what works*" and maintains that it is possible to embrace more than a single philosophy within the same

research study to reach its research objectives.The pragmatism approach may enable the application of philosophical or methodological approach which is suitable. Tashakkori and Teddlie (1998) maintained that pragmatism is a, "*study in the different ways in which you deem appropriate and use the results in ways that can bring about positive consequences within your value system"*. They suggested that pragmatism is a widely adopted research philosophy.

When conducting research, in order to understand any social phenomena, there is an array of methods for gathering and analysing data (McGrath, 2008). The choice of a research methodology will, naturally, affect the outcome of the research, thereby rendering the initial choice as important (Richardson, 1999). This 'dilemma of choice' facing social science researchers in the sphere of business has been outlined many times by many authors (for example, Tiernan, 1995; Richardson, 1999, Hill and McGowan, 1999; Fleming, 1999). The dilemma inevitably revolves around the basic dichotomy of an ontology, positivist or naturalist methodology. As Tiernan (1995) has stated that:

> *The crux of the philosophical dilemma facing the social scientist is centered on the tensions and conflicts associated with the prominence of research methods modeled on the physical sciences, while at the same time [appreciating] the need to individualise and contextualise social research. These conflicting demands have produces two fundamental choices in research methodology referred to as positivism and naturalism, which represent two directly opposing philosophies about human nature and our ability to understand it.*

It becomes clear, therefore that a need to examine and understand these 'fundamental choices' (see subsequent sections), in research methods is a required starting point when considering a methodological framework for this research.

5.6.1. Ontology

Ontological concerns are those which address the nature of social beings and reality (Hudson and Ozane, 1988). The positivist approach to research seeks to explain the single reality of

deterministic and reactive social beings in a study unconstrained by time and context (Tiernan, 1995; Gill and Johnson, 1991). Interpretivists bind their study to time and context and seek multiple meanings by understanding motives, meanings, and reasons. Positivists assume there is only one real world which is external to actors, while interpretivists believe in the social construction of multiple realities by actors engaged in the world they are building. According to Gruber (1993, pp.2-5), ontology is, *"a specification of a conceptualisation. It refers to the subject of existence. It is also often confused with epistemology, which is about knowledge and knowing. An ontology is a systematic account of Existence. Ontology is the study of being or existence and forms the basic subject matter of metaphysics"*. Hudson and Ozanne (1988) noted that the researcher must choose the processes through which knowledge is acquired and understand the beliefs and rules underlying positivism which is related to quantitative methods, while interpretivism and naturalism are related to qualitative methods. They compared the positivist and interpretivist paradigms and explored the meaning of knowledge from each philosophical vantage point. Each understanding of knowledge is based on different assumptions about the world and holds different beliefs about what is meant by reality, social beings, and knowledge. The inclusion of a juxtaposition of the two approaches in this section seeks to clarify the philosophy and try to identify the findings within the field of business cluster convergence and regional economic growth. Epistemological issues are concerned with knowledge and what is knowable (McGowan, 1999). There are different paths to knowledge, whose benefits are often hotly debated, but ultimately it seems both are valid. These various aspects of research are addressed in this section to offer the philosophical orientation.

The presentation of a substantial amount of extant literature in the preceding 'literature review' chapters suggests that a qualitative methodological approach is the most appropriate to the primary research element of this thesis. To support the paradigmatic viewpoint, it can be helpful to examine the work of some 'impartial' research design specialists who have written

on the merits and applications of qualitative approaches. Creswell (1994, 2013) and Cooper (1984) have stated that a literature review is typically advanced as a basis for comparison and is used deductively as a framework for the development of research hypotheses. One could propose that Creswell (1994, 2013) and Cooper (1984) are essentially stating that the design and extent of the 'pre-study' literature review should be taken as an indication of the authors underlying 'ontological assumption'. Such objectives can lead to the application of deductive methodologies which seek to:

> *Convey how the project will extend, fill a void in or replicate this literature. As a result the literature… will be more in-depth than the review in a qualitative study.* (Creswell, 1994).

Firestone (1987) explained that an ontological assumption is concerned with how one views the *nature of reality.* This will significantly affect how the literature review is conducted and used when it comes to its application in primary research. Furthermore, Firestone (1987) suggested that **qualitative** methodologies are used by researchers with an essentially 'subjectivist view of reality.' This to avoid the limitation of the discussion by operating within the constraints of past studies or literature. The 'logic of one's design' in such a case is inductive. This is an approach that Glaser (1978) described as collecting data in the field first, then analysing it, and generating theory from the findings. In such methodological approaches, extensive literature reviews are generally not presented before the research (Creswell, 1994 and 2013).

A **quantitative** (methodological approach, by comparison, can be identified as the ontological assumption of an 'objective reality' where an existing 'model, theory or body of literature exists that begs for an assessment or exploration' (Firestone, 1987). This work takes both a positivist and naturalist or interpretivist, approach as it is assumed that participants experience many

different realities. Furthermore, a strong position of subjectivity is adopted as this allows the understanding of the lived experience of participants the entrepreneurs, managers, firms, organisations and business cluster types, involved. Sternad et al. (2016) developed a purposeful meaning approach which can be applied here.

5.6.2. Positivism

The positivist approach has its basis in the natural and physical sciences. Researchers ascribing to this approach can perceive knowledge as an objective reality which can be explained by causal theories using quantitative analysis (Gill and Johnson, 1991). The core operational goals of the positivist researcher are, therefore to seek to break social phenomena into quantifiable variables that can be studied independently, through causal analysis, hypothesis exploration, developing theories and laws that predict future observations in the study group (Tiernan, 1995; Gill and Johnson, 1991). As Creswell (1994) and Cooper (1984) both suggested, the central methods used by the positivist researcher are logical. Tiernan (1995) outlined that the deductive approach starts with the development of conceptual and theoretical structures a process that Cooper (1984) aligns with the theoretical review process. This then moves to the operationalisation of these concepts into measures that allow for analysing.

The process ends with the analysis of the underlying theories and concepts through experiential observation. Gill and Johnson (1991) stated that the results of such a reasonable approach can take the form of theory fabrication or the creation of an unfalsified theory. Devices are available to the positivist researcher which revolve around questionnaires and surveys. These devices are suitable for satisfying the deductive approach to justifying theories and hypotheses as they allow the researcher and subject to remain separate. This concept is central to the issues of the replication and reliability of results (Cooper, 1984).

5.6.3. Naturalism

Gill and Johnson (1991) have described naturalism (similar to interpretivism), in terms of a rejection of positivism and a departure from the application of scientific methodological approaches to research in the social sciences. The ontological perspective of the naturalist researcher is at the other end of the ontological continuum to the positivist, viewing human action as resulting from the actor's subjectivity (Yin, 1989). Tiernan (1995) highlighted the key difference between positivism and naturalism succinctly stating that:

> *Subjectivity is seen as the intervening variable in any causal relationship between stimuli, external social reality, and subsequent human behavior.*

The basis for naturalism comes from the disciplines of anthropology and sociology, which seeks to examine the internal logic of human action by developing an understanding for the frames of reference out of which that behaviour arises (Tiernan, 1995, Gill and Johnson, 1991, Creswell, 1994). Subsequently, the operationalisation of the naturalist philosophy of research involves the immersion of the researcher in the world of the subject. The distance advocated by the positivists between researcher and subject, which is necessary to the deductive approach, is replaced by close observation. This is to identify patterns of behaviour and the explanations for them. The researcher is embedded within the surroundings and is basing their research on the observations of what people do and say. This, of course, is the central theme of the inductive approach.

Induction begins with an observation of the empirical setting and then proceeds to construct theories about observed phenomena (Tiernan, 1995). Rather than the theory assessment of the positivist approach, the outcome of naturalism is a theory, which can then be explored. Whilst these two approaches are opposites, they do inform each other. Many qualitative, largely unstructured research devices, rooted in ethnography (this is the scientific description of

individuals and cultures concerning their customs, habits and mutual differences), and case study approaches are available to the naturalist researcher undertaking the process of induction (Hudson and Ozanne, 1988). Observation (participant and non-participant), interviewing and action-based research have, as do the positivist devices, implications for the reliability and validity of any research (Bryman and Bell, 2015). These are issues which are now discussed in the next section with a view to the choice of a methodological framework for this research.

5.6.4. Reliability and Validity

Positivist and naturalist research methods and devices have significantly different effects on final research findings in terms of the basic concepts of reliability and validity. Some definitions, taken from Tiernan (1995), Richardson (1999) and Gill and Johnson (1991) explain this further:

- **Reliability**: To be reliable, another researcher, using the same methods, subjects and under the same conditions should be able to replicate the results obtained by the original study.
- **Validity**: The research measures only what it is supposed to measure and is not subject to extraneous factors that will bias the findings in any direction.

Quantitative devices, such as postal surveys, allow a large amount of information to be generated from many subjects. If care is taken in the design and execution of the research instrument, these positivist devices generally exhibit high reliability and population validity. However, quantitative methods are generally weak in terms of ecological validity due to the inability of the methods to allow the subject to contextualise their responses (Tiernan, 1995). Objective and unbiased knowledge may result from a positivist research approach. As one might expect, the qualitative devices available to the naturalist researcher provide opposing

concerns regarding the issues of reliability and validity. Interview techniques and non-participant observation enjoy high levels of ecological validity due to the natural setting and context of the research (Gill and Johnson, 1991).

Participant observation and interventions such as action research, according to Richardson (1999) provide the benefit of allowing the solution to actual problems for the subjects as a result of the intervention. The problem with this is the effect of the inductive process on the reliability and population validity of the research. Due to the subjective nature of naturalist research, problems with repeatability, and therefore reliability, have been raised. Due to the resource implications of case study work, only a small number of cases can generally be considered. This naturally calls the population validity of qualitative research into question (Yin, 1989; Tiernan, 1995, Gill and Johnson, 1991, Oppenheim, 1996).

5.7. Research Question

The research question *'How Does Convergence Influence Cluster-Based Economic Growth in Regions?'* is designed to provide strategic focus, combine data collection, support analysis and interpret the findings in this work. Miles and Huberman (1994) highlighted the process of reviewing the literature, and the research question is prioritised for the advancement of the fields of cluster-based economic growth and regions through the convergence approach. *"It is impossible to embark upon research without some idea of what one is looking for and foolish not to make that quest explicit (Wolcott, 2009)".* Many iterations and redesigns throughout the early research phase were instigated due to this prioritisation as the methodological approach was refined. Even during the early phases of this research study, this work remained flexible so as not to blind the research or include any bias to any emergent data. The fundamental purpose of the research question highlighted above is to provide transparency regarding the main domain of this research study, thus enabling the fruition of the sample design.

5.8. Designing the Sample

Sampling is widespread in research as resource limitations frequently make it impractical for the researcher to gather data from the whole population (i.e., conduct a census) (Saunders et al., 2009). However, sampling does allow for a practicable and effective 'objective' substitutes and offer the for application of research projects within time and budget limits. Henry (1990) described sampling as the study of a small group of 'cases' which exemplify the larger population. This may offer greater accuracy of results compared to a census due to the limited number of cases within the sample. This allows for more time to be assigned to duties such as the design and assessment of the, "*data collection instrument, collection of rich data, and in-depth analysis of the collected data,"* (Henry, 1990).

Malhotra et al. (2004) posited that the sampling design process is typically delineated in the subsequent five steps:

(1) Define the population;
(2) Determine the sampling frame;
(3) Select the sampling technique;
(4) Determine the sample size; and
(5) Execute the sampling process.

Bryman (2012) stated that a population signifies the universe of units who share common characteristics from which a sample is chosen. One might contend that when exploring the context of data collection, the *population* would include individuals who embrace the evidence. Greener (2008) proposed that sampling techniques can be divided into two types: (1) *Probability sampling;* and (2) *Nonprobability sampling*. Probability sampling suggests that every individual in the population has an equal chance (or probability) of being randomly chosen to produce a sample which is statistically illustrative of the population. Conversely,

non-probability sampling techniques maintain that the selection of individuals from the population are not random and are determined by the researcher (Greener, 2008).

Table 5.7: Sampling Techniques

Techniques		*Description*
Probability	Simple Random	Selecting the sample randomly from the sampling frame using random numbers obtained from tables or generated by a computer.
	Systematic	Selecting the sample at regular intervals from the sampling frame.
	Stratified Random	Dividing the population into a number of groups based on certain attributes, then applying random sampling (simple or systematic) to each group.
	Cluster	Dividing the population into a number of groups (clusters) based on naturally occurring attributes, then applying random sampling to select clusters. Data is collected from every individual within selected clusters.
	Multi-stage	Uses a series of sampling frames by dividing the population into clusters then levels of sub-clusters, and selecting sub-clusters using random sampling.
Non-Probability	Quota	Using stratified sampling and selecting individuals from each group using predefined quotas for each group. Attempts to produce a sample that has the same variability as that which occurs naturally in the population.
	Purposive (Judgemental)	Using judgement to select particularly informative individuals will enable the researcher to meet research objectives.
	Snowball	Making contact with few individuals and asking them to nominate other individuals until the desired sample size is reached.
	Self-selection	Allowing individuals to express their desire to take part in the research process.
	Convenience (Haphazard)	Selecting individuals that are easiest to access at random until the desired sample size is reached.

Source: Ragab and Arisha (2017)

Probability sampling is commonly incorporated in quantitative studies, whereas non-probability sampling tends to be adopted in qualitative studies (Anderson, 2009). When the parameters of the sample are completed, a data collection instrument occurs within the sampling frame. The most widely used techniques are described in Table 5.7. Qualitative work focuses on small samples of people through a microscopic lens. Samples tend to be purposive to ensure the viability of cases, boundaries must be set and a frame must be in place which will support the study of the case in question (Miles and Huberman, 1994). A sample can be defined as a segment of the population selected for market research to represent the population as a

whole (Saunders et al., 2015, 2016). The approach to sampling in this work is non-probability, quota sampling where a prescribed number of participants are interviewed in each of several categories to formulate objective findings (Bryman and Bell, 2015). The Snowball approach was also used (see Table 5.7) which looks at contacting a few individuals and asking them to suggest other individuals until the anticipated sample size is reached. The sample in this work consists of female and male triple-helix participants (see Table 5.8 below), all of whom match the criteria indicated by Etzkowitz (2002) (i.e., academics, industry players and government stakeholders) (Etzkowitz and Zhou, 2017, see Table 2.5 in Chapter Two).

Table 5.8: Demographic Profile of Participant's

Regions & Bootcamp	No. of participants	Gender	Triple-Helix Participants
Shannon	6	1 female/5 males	Academic – 2 participants Government stakeholder - 2 participants Industry Player – 2 participants
Asturias	5	1 female/4 males	Academic – 2 participants Government stakeholder - 1 participant Industry Player – 2 participants
Galicia	7	4 females/3 males	Academic – 3 participants Government stakeholder - 2 participants Industry Player – 2 participants
Northern Ostrobothnia	6	2 females/4 males	Academic – 2 participants Government stakeholder - 2 participants Industry Player – 2 participants
EU Cluster Bootcamp (TheCAP)	6	3 females/3 males	Academic – 0 participants Government stakeholder - 1 participant Industry Player – 5 participants

Source: Drawn by Author from Data

This sample profile facilitates cross-comparison, which will contribute to the depth and richness of the analysis. To support this table, Table 6.2 in Section 6.2 has been developed which goes through the profile of the participants in more detail. Miles and Huberman (1994:

p. 34) recommended that a qualitative researcher should, *"go to the meatiest, most study-relevant sources,"* and the sample selection for the present study followed this advice. Miles and Huberman (1994) proposed that setting research questions and a projects conceptual framework are helpful in the preliminary bounding of parameters for a sample. Such parameters, as these authors have argued, should identify settings, actors, events and processes. For the purpose of this research, the sample size and characteristics were developed to achieve the research objectives coherently and to offer thorough depth through triangulation of data sources and scope through a mixture in the sample.

5.9. Case Study Design

The question of when a case study approach should be utilised has been analysed by Yin (2003) and Creswell (2013). They stated that this approach should be considered when:

> *(A) The focus of the study is to answer "how" and "why" questions; (B) you cannot manipulate the behaviour of those involved in the study; (C) you want to cover contextual conditions because you believe they are relevant to the phenomenon under study; or (D) the boundaries are not clear between the phenomenon and context.* (Baxter and Rideout, 2006).

This qualitative practice can enable the exploration of a phenomenon within its environment using various data sources. Robert Stake (1995) has stated an issue is explored through multiple lenses instead of one allowing for greater facets of the phenomenon to be understood. Similarities can be drawn between both Stake (1995) and Yin (2003) as they have based their approach to case study design on a constructivist paradigm. This paradigm is grounded on the idea that truth is relative and is much based on one's standpoint. Miller and Crabtree (1999) argued that the constructivist dilemma, *"recognizes the importance of the subjective human creation of meaning but doesn't reject outright some notion of objectivity".* Conversely, Searle (1995) discussed that the social development of reality is imperative as is the close

collaboration between the researcher and the participant. This enables the participants to tell their stories. Views on reality and specific insights to important issues are explored through these stories which can allow a better comprehension of the participant actions (Lather, 1992; Robottom and Hart, 1993).

According to Robson (1993; 2002):*"[A] case study is a strategy for doing research which involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence"*. Hussey and Hussey, (1997), stated that *"case studies are an extensive examination of a phenomenon of interest in which the importance of the context is critical. There are many types of case studies such as: descriptive case study, illustrative case study, experimental case study and explanatory case study".* Yin (2003; 2009) suggested that case studies enhance various research purposes such as aiding descriptive accounts, theory building (inductive), and theory testing (deductive). When the goal is based on theory building, case studies commonly adopt an exploratory and inductive approach which entails partial prior theoretical knowledge. It endeavours to create theory from close observation of the phenomenon within its environment (Eisenhardt, 1989). Løkke and Sørensen (2014) proposed that when the number of theories to be examined is relatively small, multiple case studies and case comparisons would be an effective approach to undertake, in order to explore the validity of those theories in different environments.

Miles and Huberman (1994) have a different perspective and case study design with their focus being on what the case is and what is the unit of analysis. They claimed that the case is the unit of analysis with the focus being on whether to analyse 'the individual', 'a program', 'the process' or 'the difference between an organisation'. For the purpose of this study, all elements can be categorised as being pertinent with 'the process' and 'the difference between an organisation being the main. Answering extensive questions can be quite a concern for research

as described by Yin (2003). Thus, certain boundaries must be put in place inclusive of: (a) Time and place; (b) Time and activity; and (c) By definition and context (Stake, 1995; Creswell, 2003).

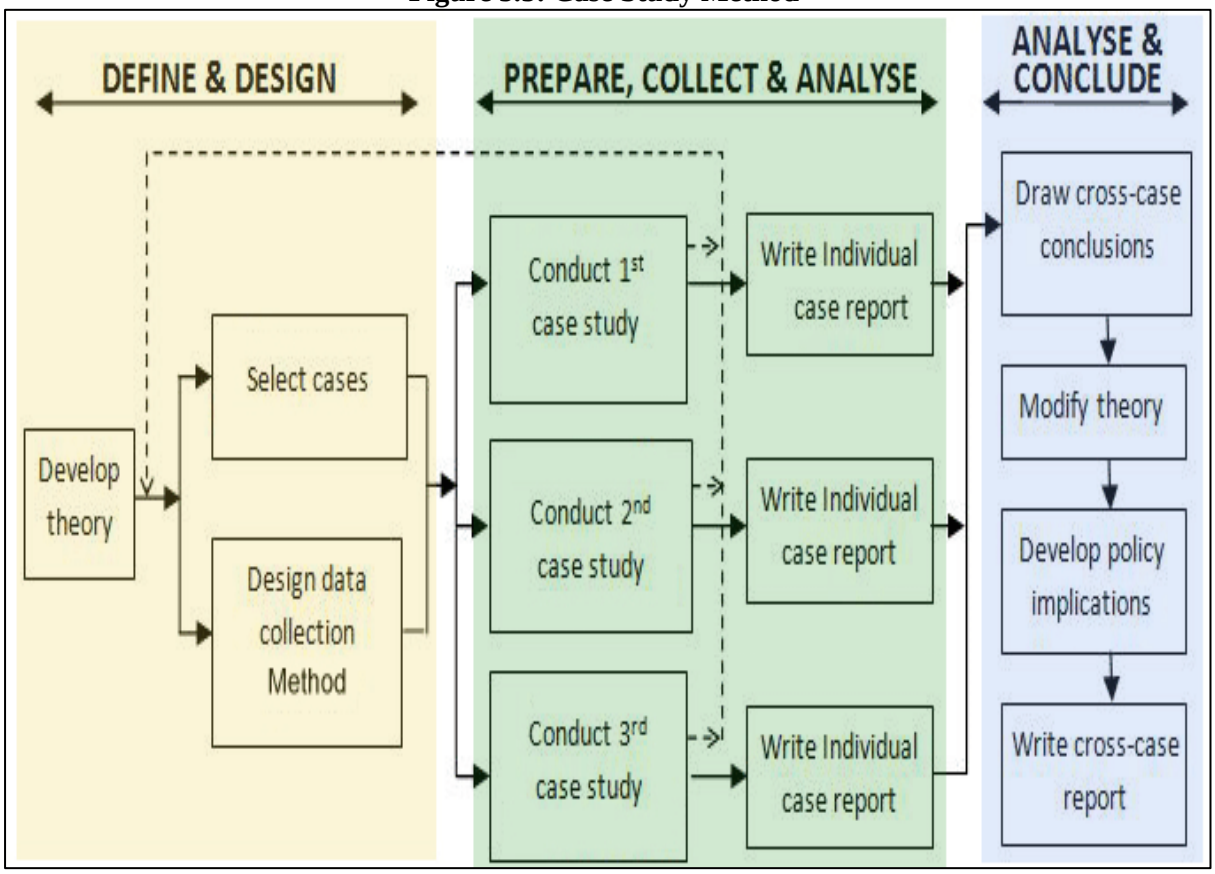
Once the research question and boundaries have been developed the specific type of case study must be conducted. The questions such as are you looking to describe a case, explore a case or conduct comparisons between cases can then be initiated (Stake, 1995). Explanatory, exploratory, descriptive categories or multiple-case studies can be used when designing a case study (Yin, 2003). Campbell and Ahrens (1998) defined the multiple-case study approach as one that:

> *Enables the researcher to explore differences within and between cases. The goal is to replicate findings across cases. Because comparisons will be drawn, it is imperative that the cases are chosen carefully so that the researcher can predict similar results across cases, or predict contrasting results based on a theory. (Yin, 2003).*

Multiple-case studies can be regarded as a more effective approach when comparing issues or contexts, especially when trying to make it applicable internationally (Yin, 2003). Scheib (2003) used the term 'collective' as another meaning for multiple. Furthermore, when a study comprises of more than a single case then a multiple approach is required. Such a tactic can permit the researcher in exploring within and across settings. Therefore, various cases can be examined to comprehend comparisons and differences between the cases at hand. Whilst multiple-case studies can be advantageous, this selection has some limits which Stake (1995) has emphasised with time and expense being the main limitations. Both Stake and Yin argued that issues and propositions which help the flow of the case study are important. Miles and Huberman (1994) have differing opinions in that a conceptual framework must arise. They stated that this will help to identify who will and will not be included in the study, what relationships must be present, and the constructs which allow the case study to develop.

The examination of a single situation or individual is not confined to what case study research is as this approach has the potential to deal with simple or complex paradigms. 'How' and 'why' type questions can be utilised, whilst also exploring how a phenomenon can be influenced by its environment, which can be pertinent for the purpose of this research study (Yin, 2003). Furthermore, Yin (2009) has developed a case study method framework which has been included in Figure 5.5 below to illustrate how the case study design process formulates. This model acts as an effective benchmark for one to fully comprehend how to develop an operative case study analysis.

Figure 5.5: Case Study Method



Source: Yin (2009)

As argued by Byrne (2016), one reason for qualitative research is to study a case when it is of special interest and to gain a better understanding of the context. Conversely, Baxter and Jack (2008), in their study of the qualitative case study methodology, stated that, *"a case study is*

an excellent opportunity to gain tremendous insight into a case. It enables the researcher to gather data from a variety of sources and to converge the data to illuminate the case". Perhaps the most common approach for examining clusters are specific case studies of clusters or regions. These have been some of the most influential and comprehensively cited cluster analyses in the USA (such as Porter, 1990; 2003; Saxenian, 1994; Bacheller, 2000; Rosenfeld, 2000; Waits, 2002) and Europe (Sölvell et al., 2003; Ketels, 2006). Qualitative case studies are an in-depth analysis, typically of a single cluster or region and some case studies may involve research into a series of similar clusters in different regions (Sölvell et al., 2003). The cluster case study model is noted for its versatility as it uses a number of techniques and methods in gathering information.

When undertaking a cluster case study, it can be significant to base the design of the study in cluster theory: *"Reliance on theoretical concepts to guide the design and data collection for case studies remains one of the most important strategies for completing successful case studies"* (Yin, 2003). Many qualitative approaches aim to identify the components of the cluster such as the firms, industries, suppliers, customers, trade associations, research institutes, *inter alia*. Allen and Potiowsky (2008) provided a typical case study approach whereby they relied upon, *"a combination of surveys and interviews targeted at 'key informants' to develop an understanding of the industry cluster".* These key stakeholders are asked about regional economic characteristics; the methodology usually aims to validate hypothetical or assumed strengths or weaknesses of the area under study (OECD, 2006). A renowned qualitative cluster study is Saxenian's (1994) study of Silicon Valley and Route 128 (see Section 2.5). It epitomised the ability of qualitative approaches to be in-depth: *"The empirical material accumulated by observing the two regional economies. The core of the argument is built from more than 160 in-depth interviews with entrepreneurs, industry leaders, corporate executives,*

and representatives of local business associations, governmental organisations, and universities in Silicon Valley and Route 128," (Saxenian, 1994).

Qualitative approaches are particularly beneficial to micro- and meso-level studies (see Section 5.4) of specific regions or clusters. Regions and firms can be dynamic in terms of knowledge and innovation led growth. Statistical data for a region may lag behind the immediate trends and be unavailable for the application of quantitative techniques or may not be available at a regional level. Detecting the current situation and new trends requires knowledge and observations from actors directly involved in the changes (OECD, 2006). Arguably, qualitative techniques also allow much needed flexibility and in an interview situation, follow-up questions on a particularly relevant topic or theme which may be unknown beforehand and be uncovered during the study can be asked (Hobbs, 2010).

As part of this research study, case studies are a key element to gain a deeper understanding of the research area (see Chapter Four). Wenger (2004) suggested using case studies for regional studies. He stated that case studies can be used to demonstrate the value created by regions, take the pulse of a region, evaluate the need for renewal, disseminate the stories of actors, encourage their development, understand what it takes, and learn from both successes and failures. Depending on the extent of the case study, the following sources of data were adopted. The data was then turned into a case where the development of a story of particular stakeholders (triple-helix) within four regions (see Sections 4.2-4.6). Custer experts at the first-ever EU Cluster Acceleration Bootcamp in Frankfurt (Germany) were also interviewed to find out their origin to date, describe their structures, activities, leadership and organisational context to fully comprehend 'how convergence influences cluster-based economic growth in regions'. Undertaking the preliminary research activity within the Shannon region (acting as a pilot study), arguably enabled the researcher to progress examination and effectively understand any

difficulties that may be encountered, and to try to alleviate them. During the International Cluster Conference in Limerick, Ireland in 2015, the Commercial Director of Shannon Airport was referred to as being a key economic driver of the Shannon Region (Edmond, 2015). This pilot study acted as a preliminary research activity with the Commercial Director of Shannon Airport and helped to inform what participants should be incorporated from the Shannon Region, provided key literature studies and helped to shape the structure of the thematic sheet in Appendix G.

Many concerns must be carefully examined when undertaking such qualitative techniques. A key drawback of the expert opinion and case study approach is that, *"it is rarely done systematically enough that findings can be generalised,"* (Bergman and Feser, 1999). A criticism of case studies is that the cluster being examined may not be representative of similar clusters in other regions or other clusters in the same region. Therefore, the theoretical contribution of this research study may not apply to all regions based on the resources available. One could argue that the results of the research should not be used to make generalisations or assumptions. Therefore, case studies aim to describe a particular cluster in detail and to develop theory and recommendations from that example. Therefore, for the purpose of this research study, many cases will be explored to understand: (a) Explore whether there is a presence of convergence; and (b) The influence of convergence on cluster-based economic growth in regions. The examples which have been incorporated are an EU Cluster Acceleration Bootcamp (Frankfurt), an Irish region, a recent winner of the European Entrepreneurial Region (EER) awards 2019 and regions' with a strong cluster tradition (*Case comparison* – Shannon region in the Republic of Ireland, The Principality of Asturias in Spain, The Galician region in Spain and Northern Ostrobothnia in Finland) (Cor.europa.eu., 2019) (see Sections 4.2-4.6).

The selection process for these cases has been based on a recent international EER award recognition, strong cluster tradition, and economic growth transition (see Figure 4.1). Furthermore, the Free Trade Zone 1947 in Galicia and the ICT cluster in Northern Ostrobothnia have similarities and differences to explore. It is important to alleviate bias as much as possible, but as Sternad et al. (2016) argued, some degree of bias will always form part of a research study (see Section 5.6.1). It is easy for researchers to overestimate the applicability of cluster case studies to other regions or other clusters within the same region. They should refrain from applying the results of a narrow study, at a particular point in time, more widely (Cortright, 2006). Another danger is that research may begin with predetermined ideas of the most important regional sectors, actors, and relationships which can lead to bias (Bergman and Feser, 1999). There is also a tendency to overemphasise the accuracy of strongly held opinions among key stakeholders in the study.

Researchers must be cognisant there are a variety of potential biases influencing each expert's view, along with each expert's limited experience within the broader economy. Furthermore, Bergman and Feser (1999) proposed that collecting expert opinion data can yield rich contextual information about the region's economy. However, many others (e.g. Stimson et al., 2002) believed that interviews, focus groups and questionnaires are labour intensive. Therefore, they are expensive unless a modified faster version is adopted. Qualitative techniques can gather rich data from sources directly involved in the cluster and it can uncover information which is not revealed in quantitative techniques. On review of the current literature and the cases in question, there is a consensus that qualitative techniques have their limitations relating to 'biases', 'replicability', 'validity' and 'practicality' and that the researcher's role must be effectively understood.

5.10. The Researcher's Role

In the positivist paradigm, the researcher is non-existent and unrelated to the research. Through qualitative case studies, meaning is sought with the researcher playing a central role in the instrumentation of the methodology. Throughout the data analysis, the researcher seeks value and understanding, and the researcher is a tool used to draw purposefully from the participant information which is relevant to the study. Consequently, the researcher builds the data with the participants in the study.

> *Our backgrounds and past experiences provide the mental capacity to respond to and receive messages contained in the data – all the while keeping in mind that our findings are a product of data plus what the researcher brings to the analysis* (Corbin and Strauss (2008).

The researcher was born in Ennis, Co. Clare, where he spent his early life, before moving to Co. Limerick in 2008 at a time when the economic crises was most prominent and clusters were a relatively untouched space in Ireland (Hobbs, 2010). Moving to Limerick in 2008 was the beginning of a degree in Marketing and Management, which gave the researcher a new understanding of the enterprise landscape at large and its influence. On completion of the degree in Marketing and Management at Limerick Institute of Technology in 2012, the researcher went on to complete an Employment-Based Masters by Research Degree and thesis in *'Examining the Impact of the National Franchise Centre in Limerick City'* where his knowledge of clusters, entrepreneurship, franchising and regions was further broadened. The degree was with Limerick Institute of Technology in conjunction with the Limerick Chamber of Commerce where the researcher was also working in the National Franchise Centre Incubator on a full-time basis. Further, the researcher currently works at Cork Institute of Technology as a Senior Researcher with the V-LINC R&I cluster analysis and regional innovation group working closely with national and international clusters and their development providing training and consultancy services. Additionally, EU projects focusing

on the examination of clusters such as Interreg Atlantic Area, Interreg Europe and Horizon 2020 form part of this employment. This enhanced the interest in clusters, entrepreneurship, economic growth and regions. This interest created an avenue to explore how the convergence approach influences cluster-based economic growth in regions that has been relatively less explored in the current literature. In addition, Corbin and Strauss (2008) described objectivity in qualitative research as 'a myth' and indicated that sensitivity is the opposite of the objectivity sought in more positivist paradigms. These scholars have described how the experience of our realities helps to understand other ethical issues and realities.

5.11. Ethical Considerations

Creswell (2013) proposed that interviewers need to understand how their research will add to the general knowledge and the human situation. How stressful the interview may be for the participant, if participants have any control over how they are interpreted and what the concerns the participant may have. Kvale (2007) determined these issues which can be described as honest explorations and distinguished the increasing significance of the researcher being sensitised to such matters. Consequently, this section will debate the ethical concerns of research and shape how this work has adopted a high ethical standard. Creswell (2013) indicated that the strongest modern-day ethical concerns include: (1) Personal disclosure; (2) Authenticity; and (3) Credibility and recommended numerous factors which should be reflected upon in data analysis and interpretation. Encompassing Creswell's study, the privacy of the participants must be safeguarded. Complete transparency regarding the ownership rights to the data produced must be achieved. The identity of the participants has been safeguarded and transparency was ensured through the gathering of signed research consent forms. In the data analysis and presentation of findings, biased language was avoided, in order to ensure that findings are not falsified to suit objectives. Alternatively, to anticipate the consequences of

publication and release the details of the research design to allow for examination. This research abides by ethical principles and procedures which have been considered, *"to protect, develop trust, and build relationships with participants,"* (Creswell, 2013). In addition to this, informed consent, research transcripts, accompanying audio files, and contact summary forms are available on request from the researcher.

5.12. Measuring and Collecting Data

As part of the measurement and data collection phase of this research study, as outlined in Section 5.5.3, semi-structured interviews have been selected as the qualitative technique. Neergaard (2005) suggested the interview is a series of questions from the interviewer and a series of answers from a participant. It is further described that structured interviews tend to be positivist, whereas the interpretivist paradigm supports the semi-structured approach. For the purpose of this research study, the semi-structured interview was considered a suitable data generation tool as it aids the profound examination of social and personal topics, enabling an understanding of the complex social and economic issues. Corbin and Strauss (2008) argued that, *"it is impossible to know prior to the investigation what salient problems or what relevant concepts will be derived from this set of data".* This research adopted a qualitative interviewing approach due to the exploratory nature of the study and for the usefulness of data generation. Rubin and Rubin (2005) posited that qualitative interviewing is much like the use of night vision goggles to enable one to see what is not usually visible at night:

> *Learning about the world through qualitative interviews has extended our intellectual and emotional reach, and by turns, roused and satisfied our intellectual curiosity. Further, they understand this to be responsive in nature based on three factors: both researcher and research participant are human beings, the goal is depth of understanding rather than breadth, and that the design remains flexible throughout the data generation process* (Rubin and Rubin, 2005).

Additionally, Kvale (1996) argued that the interview, as a research technique can be explained as a discussion with structure and purpose. It normally goes beyond an exchange of views and becomes a careful process of questioning and listening to gain knowledge. The purpose of this research is to understand how convergence influences cluster-based economic growth in regions, thus gaining knowledge from semi-structured interviews can enhance the purpose of this research study and real data.

5.13. Data Analysis

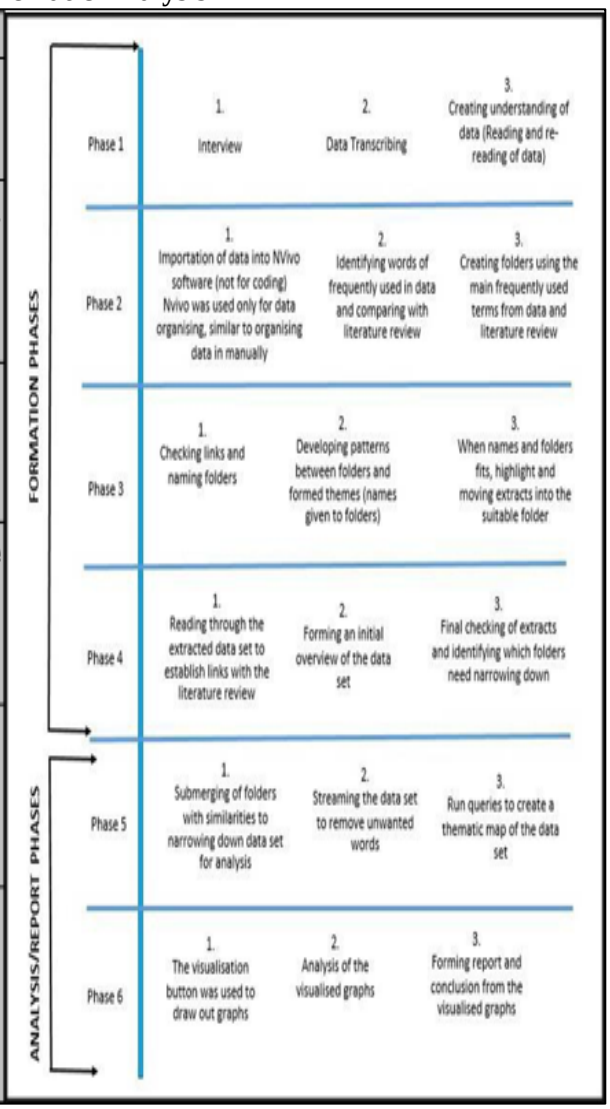
As indicated above in Section 5.1, this study adopts a thematic analysis (TA) approach to data analysis, following the six-phase (see Table 5.9) scheme devised by Braun and Clark (2006). Using TA allows for the identification of patterns or themes within the data set (Braun and Clarke, 2006). TA is mostly regarded as a method rather than a methodology and is not tied to any epistemological or theoretical perspective (Braun and Clarke 2006; Braun and Clarke, 2013). The flexibility of this method makes it adaptable for qualitative data collection, while facilitating an interpretation of the data in the context of the research question. TA also enables elements to be chosen, to be compared and contrasted, as well as articulating the grounds for comparison and explaining the flow of the argument (Braun and Clarke, 2006). TA may be defined as, *"a method for identifying, analysing, and reporting patterns (themes) within data,"* (Boyatzis, 1998; Braun and Clark, 2006). In the present study, the use of TA enables the organisation of the data into a rich, manageable process of analysis, with sufficient flexibility, in order to adapt to other epistemologies whenever necessary.

Qualitative analytic methods can be divided roughly into two major types. The first type aims at identifying any constraints on an epistemological position, such as using conversation analysis and interpretative phenomenological analysis (Braun and Clark, 2006). The second type addresses factors which are essentially independent of theory and epistemology but are

accessible through a cross range of theoretical and epistemological approaches. TA, framed as a method under the realist paradigm, which is compatible with both essentialist and constructionist paradigms, is usually classified within the second type of qualitative analysis (Aronson, 1994; Roulston, 2001).

Table 5.9: Six Phases of Thematic Analysis

Phase	Description of the process
1. Familiarisation with data:	Transcribing data (if necessary), reading and re-reading the data, noting down initial ideas.
2. Generating initial codes:	Coding interesting features of the data in a systematic fashion across the entire data set, collating data relevant to each code.
3. Searching for themes:	Collating codes into potential themes, gathering all data relevant to each potential theme.
4. Reviewing themes:	Checking if the themes work in relation to the coded extracts (Level 1) and the entire data set (Level 2), generating a thematic 'map' of the analysis.
5. Defining and naming themes:	Ongoing analysis to refine the specifics of each theme and the overall story the analysis tells, generating clear definitions and names for each theme.
6. The report:	The final opportunity for analysis. Selection of vivid, compelling extract examples, final analysis of selected extracts, relating back of the analysis to the research question and literature, producing a scholarly report of the analysis.



Source: Adapted from Braun and Clark (2006)

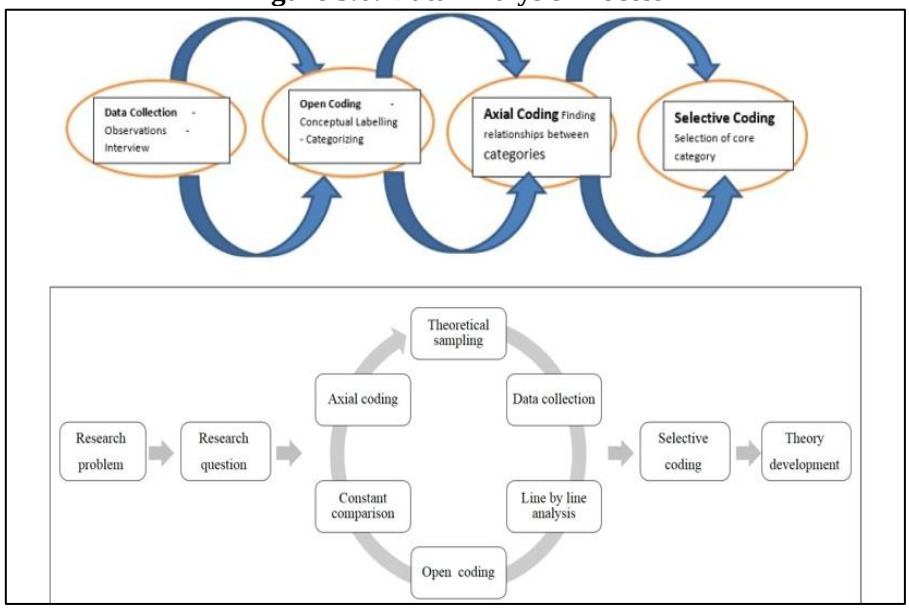
For any research to reach its objective, the identification of an appropriate means of data collection is obligatory (Sarantakos, 1994). Generally, it can be said that a variety of methods are considered to form the basis to the research, but a key question which is prominent in the planning process and concerned with the category of data is desired for the assigned research.

Data analysis is a process of exploration to find out what it is, how it works, how it can break apart a substance into mechanisms to detect properties and dimensions for the purpose of analysis (Corbin and Strauss, 2008). Consequently, an interpretation of the participant's words and actions, assigning meaning to data generated and deducing the multiple meanings of experience are created. Denzin (1998) recommended that interpretation is a transformation which illuminates and refines and that meaning can be shifted from data.

5.13.1 Working with the Data

This research study adopted an interpretative qualitative research approach (see Figure 5.12), directed by the six phases of thematic analysis suggested by Braun and Clarke (2006). Additionally, looking at the works of Choi, Choi and O'Donnell (2018) and Cho and Lee (2014) works (see Figure 5.6 below), it can be said that this research study went through the process of data collection, open-coding, axial-coding and theory development. Consequently, Braun and Clarke's six phases assisted with issues such as reducing ambiguity and enhancing clarity regarding what needed to be completed.

Figure 5.6: Data Analysis Process



Source: Adapted from Choi, Choi and O'Donnell (2018) and Cho and Lee (2014)

Phase 1 was becoming familiar with the data, with the collected data being transcribed, read and re-read for better understanding and transparency before being imported into NVivo. Phase 2 of generating initial codes (open coding) involved the coding of interesting features of the data systematically across the entire data set and the organising of data pertinent to each code. The phase allowed for the creation of novel nodes from the data collated during the semi-structured interview process. These nodes will serve as a guide for the next phases and act as important participant contributions for this research study. In Phase 3, searching for themes (developing categories) was embarked upon where the data collated was organised into potential themes, gathering all data pertinent to each potential theme in a separate container or node. Phases 4 and 5 were amalgamated together where themes were reviewed (coding on) and defined and named (data reduction – consolidation). For data clarification purposes, Phase 4 was segmented into two levels: on level 1, the themes formed in Phase 3 were analysed against the coded extracts; on level 2, the complete data set was used to generate a thematic 'map' of the data analysed in level 1. Further, Phase 5 involved additional analysis to improve the specifics of each theme and explain the overall story that the analysis was telling, generating clear definitions and names for each theme. Phase 6 involved creating the report (analysis and write up) and allowed for a concluding opportunity for analysis of selected extracts and referrals back to the research question and literature, resulting in a scholarly report.

5.13.2 Data Analysis: Stage 1 – Open Coding

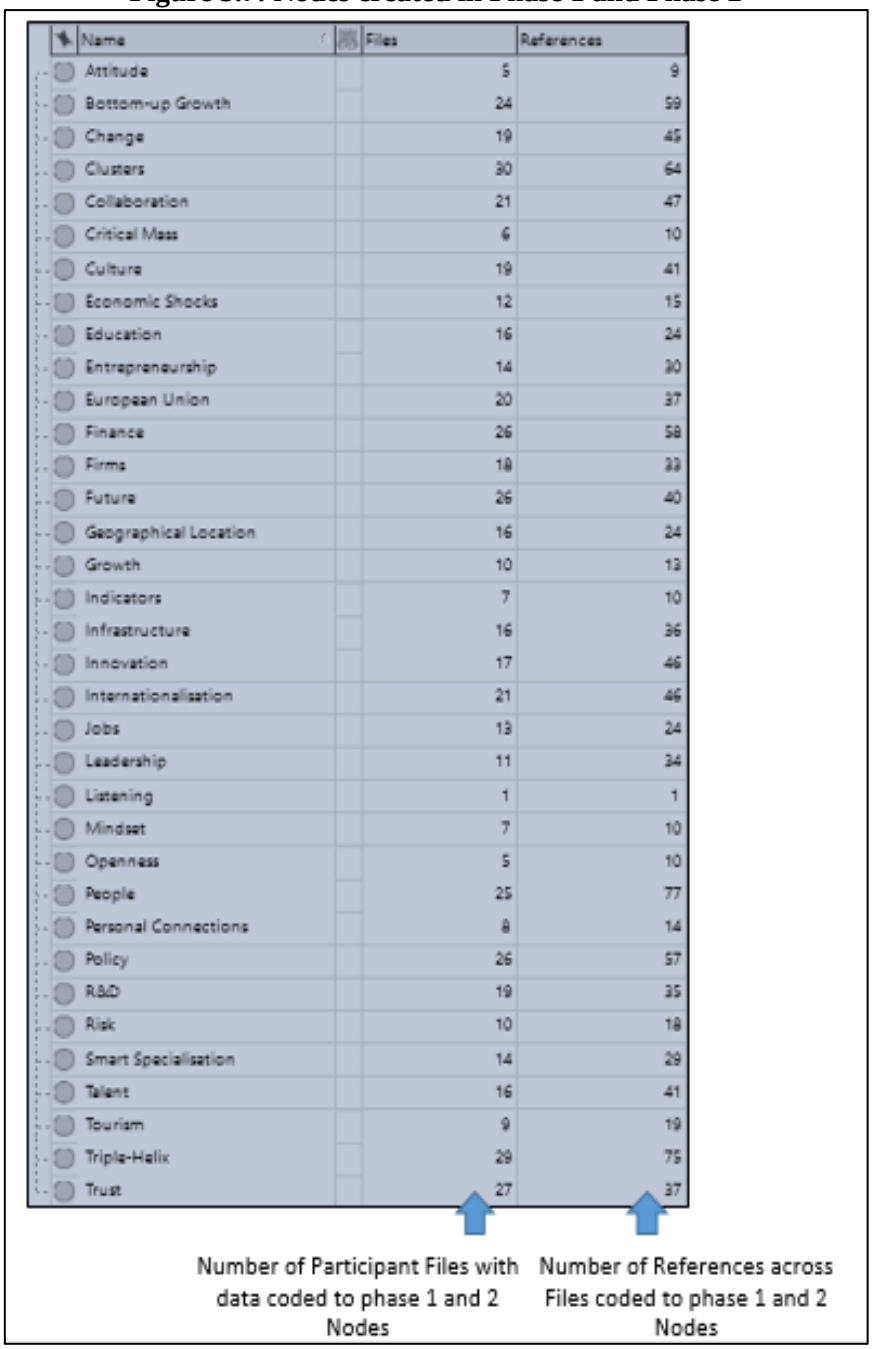
After the review of Braun and Clarke's six steps, the initial discussion focused on the data analysis delivery and coding process. The analysis was carried out in two stages with: (1) The initial first stage using open coding; and (2) Axial coding was then adopted. Choi, Choi and O'Donnell (2018) posited that open coding is the process of labelling concepts in conjunction with defining and developing categories based on their properties and dimensions. Open coding

allowed for initial categories to be developed from the data collated which helped to provide direction for this research study in terms of what nodes and categories were most prevalent based on participant responses (Bryman and Bell, 2015). This process was completed by reading and re-reading the data to compare and contrast facets identified in the literature review and to explore whether these were also present in the collected data. Moreover, during this stage, this research study was able to ask questions of the data, define themes, systematically specify states and infer possible relations within the data. Figure 5.7 below highlights the various codes derived from the data collected and the numbers of the files and references were encompassed. The *'files'* signify the number of participants that have mentioned the particular node (words of significance) and the *'references'* signify the number of times that the participants discussed the node. For instance, the node 'Attitude' was identified as being important by 5 participants (files) and of those 5 participants, they discussed attitude 9 times (references).

On examination of Figure 5.7, it can be seen that Policy, People, Internationalisation, Future, Finance, European Union, Collaboration, Clusters and Bottom-up Growth can be regarded as the nodes that have received the most responses from participants (files) and references. Following this, the important nodes can all be viewed in Figure 5.7. Using elements with several references from the literature review (see Section 3.4 and 4.8), folders with names such as 'context-actors', 'components', 'policy', 'enablers', 'outcomes' were created. Sub-folders were created also for the other elements highlighted in the literature review (e.g. 'Triple-Helix', 'Convergence', 'Cluster', 'Regions', 'Smart Specialisation Strategies', 'Trust', 'Sharing Knowledge', 'Innovation', 'Ecosystem', 'Culture', 'Infrastructure', 'Finance', 'Entrepreneurship', 'Education') and others that evolved from the data collated (see Figure 5.9). Working through the data collated from the 30 participants for this study, extracts from the data were moved into the created folders to form data sets to be used for final analysis. For

instance, when a participant spoke about triple-helix, that element of the data set was highlighted and moved into the ‘context-actors’ folder

Figure 5.7: Nodes created in Phase 1 and Phase 2

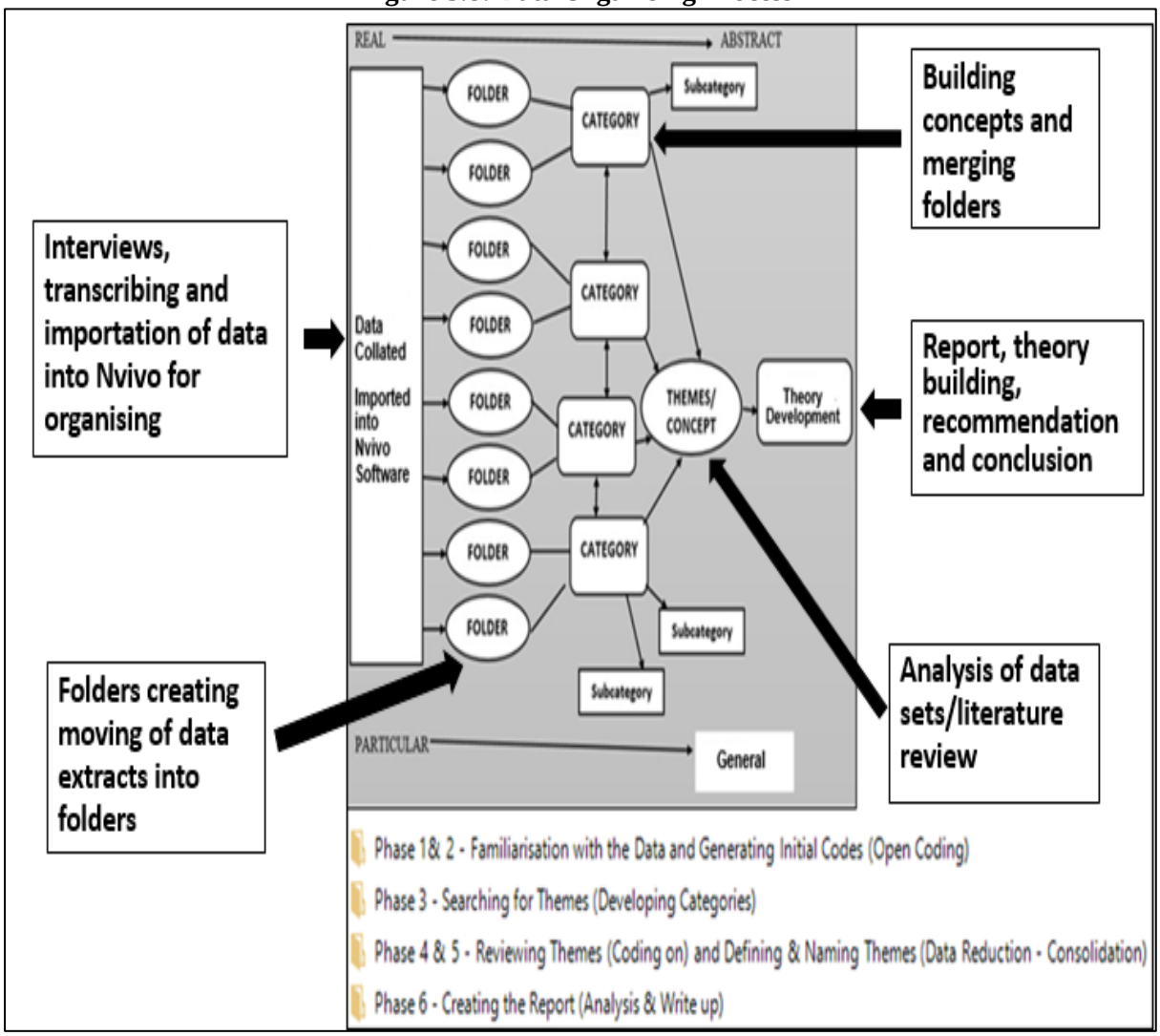


Source: Drawn by Author from Data

It is important to recognise that there may be some instances that the data set may also fit into another folder with a similar or related meaning, resulting in the data set being coded into both

folders. The practice of coding, reading and deciding the most effective way to organise the data for this research study was a gradual and intricate process. To support this statement, Marshall and Rossman (2011) suggested that the analysis of data is a somewhat messy, ambiguous, time-consuming, creative and fascinating process (Cho and Lee, 2014; Bryman and Bell, 2015). One might propose that the coding practice adopted in this research study agrees with the Marshall and Rossman perspective. Open-coding data organisation within this research study has been graphically represented in Figure 5.8 below to clarify how the data collected was structured. For instance, when an interviewee spoke about trust, the comments were coded under the enabler main folder into the 'trust folder'.

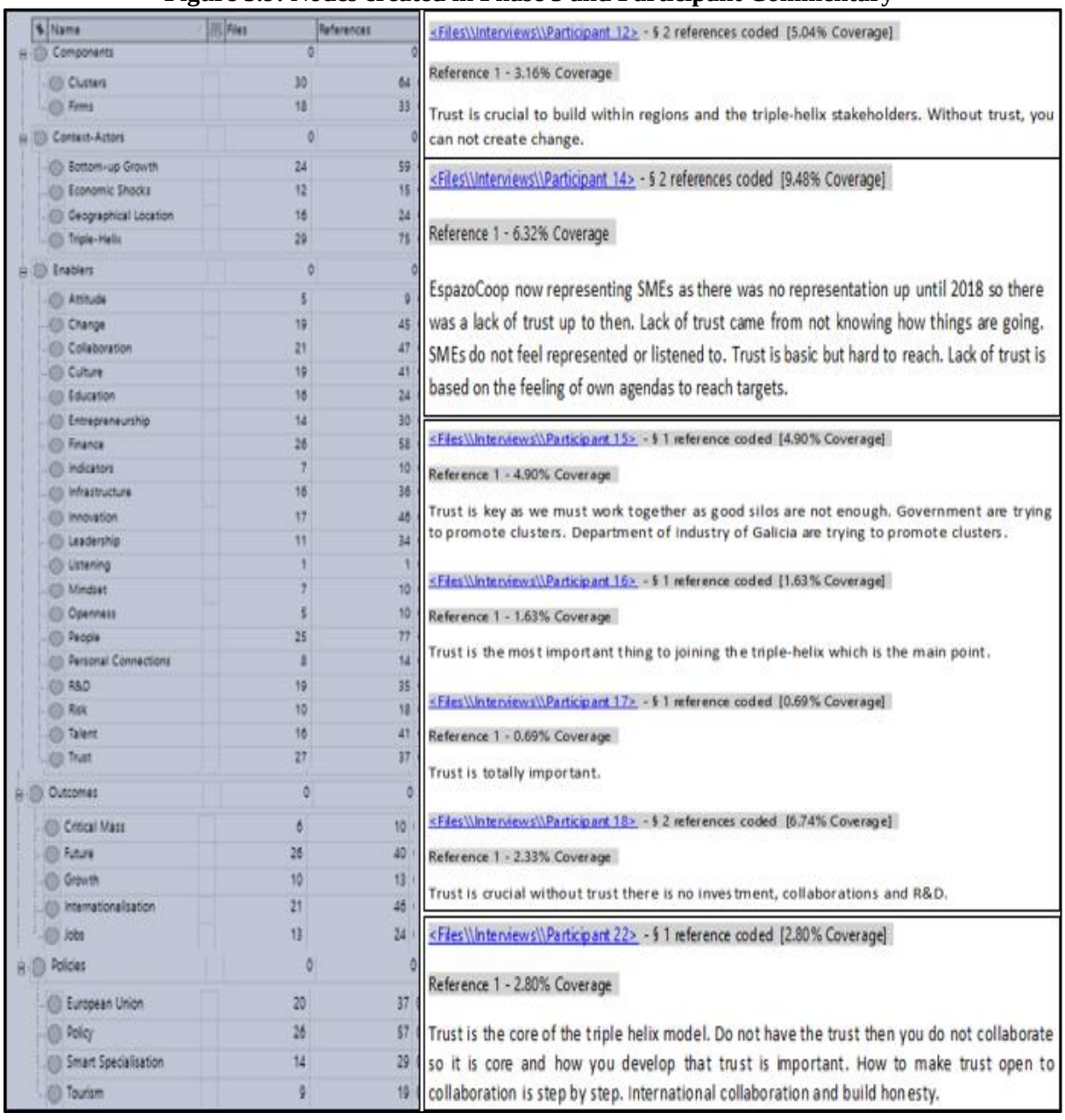
Figure 5.8: Data Organising Process



Source: Drawn by Author from Data

The following comments taken from the semi-structured interviews with Participant 12, 14, 15, 16, 17, 18 and 22 are just a few of the 27 files with 37 references that highlight this process in action in Figure 5.9 below. This data organisation process in NVivo was incorporated for all 30 participant interviews and at the end, there were differences in participants' responses to the 5 main thematic folders (context-actors, components, policy, enablers and outcomes) identified in the literature review.

Figure 5.9: Nodes created in Phase 3 and Participant Commentary



Source: Drawn by Author from Data

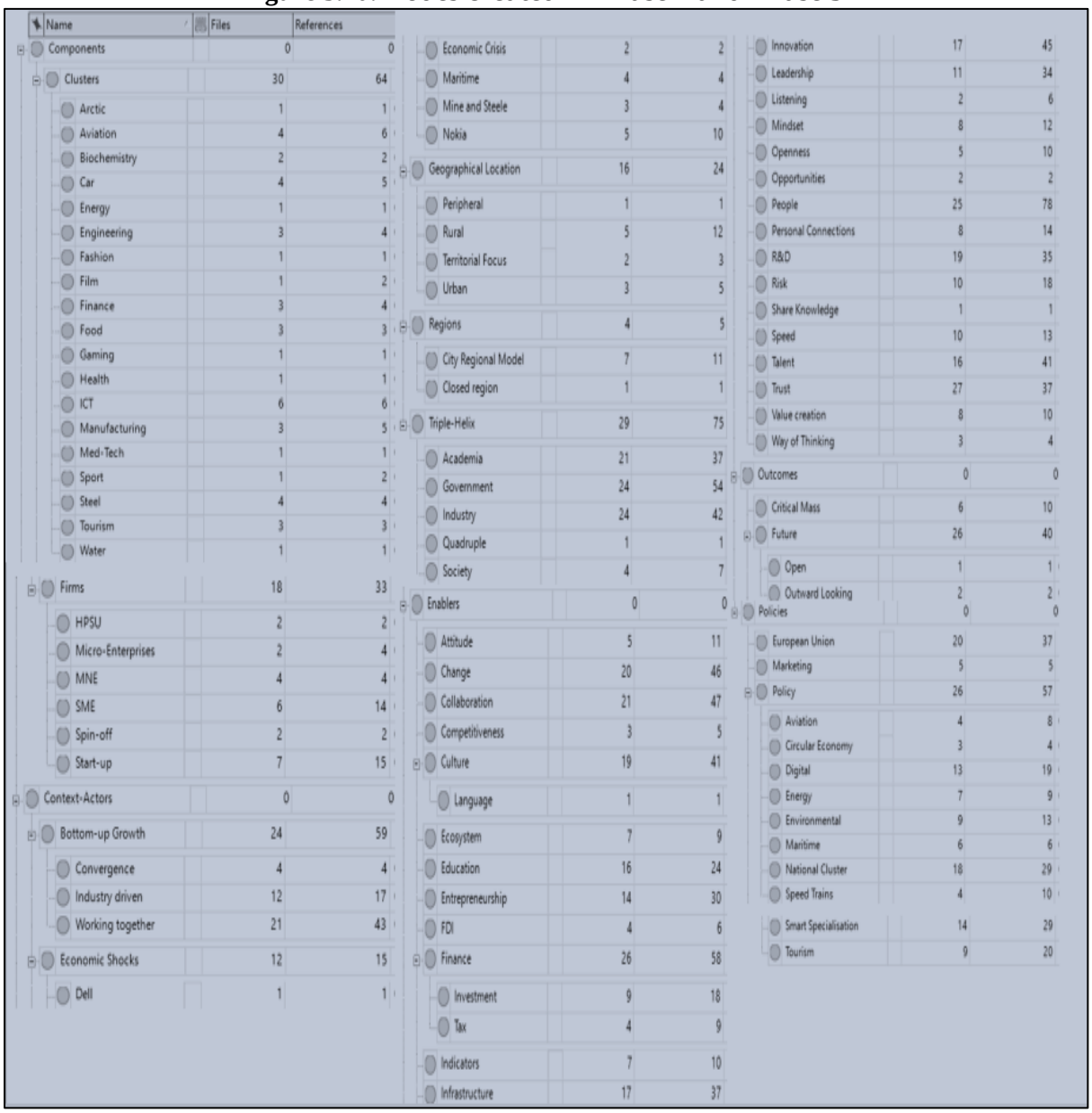
Some of the issues mentioned in the coded data presented a greater degree of connectivity and commonality to the themes which arose from the literature review and others to a lesser extent. As shown in Figure 5.9, Trust was an important node that was mentioned by some of the participants which has also been acknowledged as a key factor of convergence in Section 1.3. During this stage, it became apparent that these issues needed to be redefined to enable an effective organisation and collective data analysis. Consequently, this naturally led to the use of axial coding to combine and group the issues under broad thematic headings, thus helping to simplify the data set for analysis (Choi, Choi and O'Donnell, 2018; Cho and Lee, 2014).

5.13.3 Data Analysis: Stage 2 - Axial Coding

The second stage integrated axial coding. Strauss and Corbin (1990, 1998) found that axial coding groups and segments core themes during qualitative data analysis and is the process of relating codes (categories and concepts) to one another with the basic framework of generic relationships understood. Furthermore, this type of coding method involves assembling data in new ways to develop connections between categories produced by the open coding process. As a result, this simplified the data collated into broader categories. Figure 5.10 shows the initial data nodes identified in the course of the two-stage coding process giving an indication of the various folders and categories that stemmed from the participant interviews.

Sub-categories which form part of the literature review thematic areas of interest headings were grouped to ensure an organised and collective data analysis process. As such, sub-categories such as 'clusters' and 'firms' were merged into the components folder and 'bottom-up growth', 'economic shocks', 'geographical location', 'regions' and 'triple-helix' under the context-actors folder. This process was conducted using Braun and Clarke's (2006) six-phase TA approach.

Figure 5.10: Nodes created in Phase 4 and Phase 5

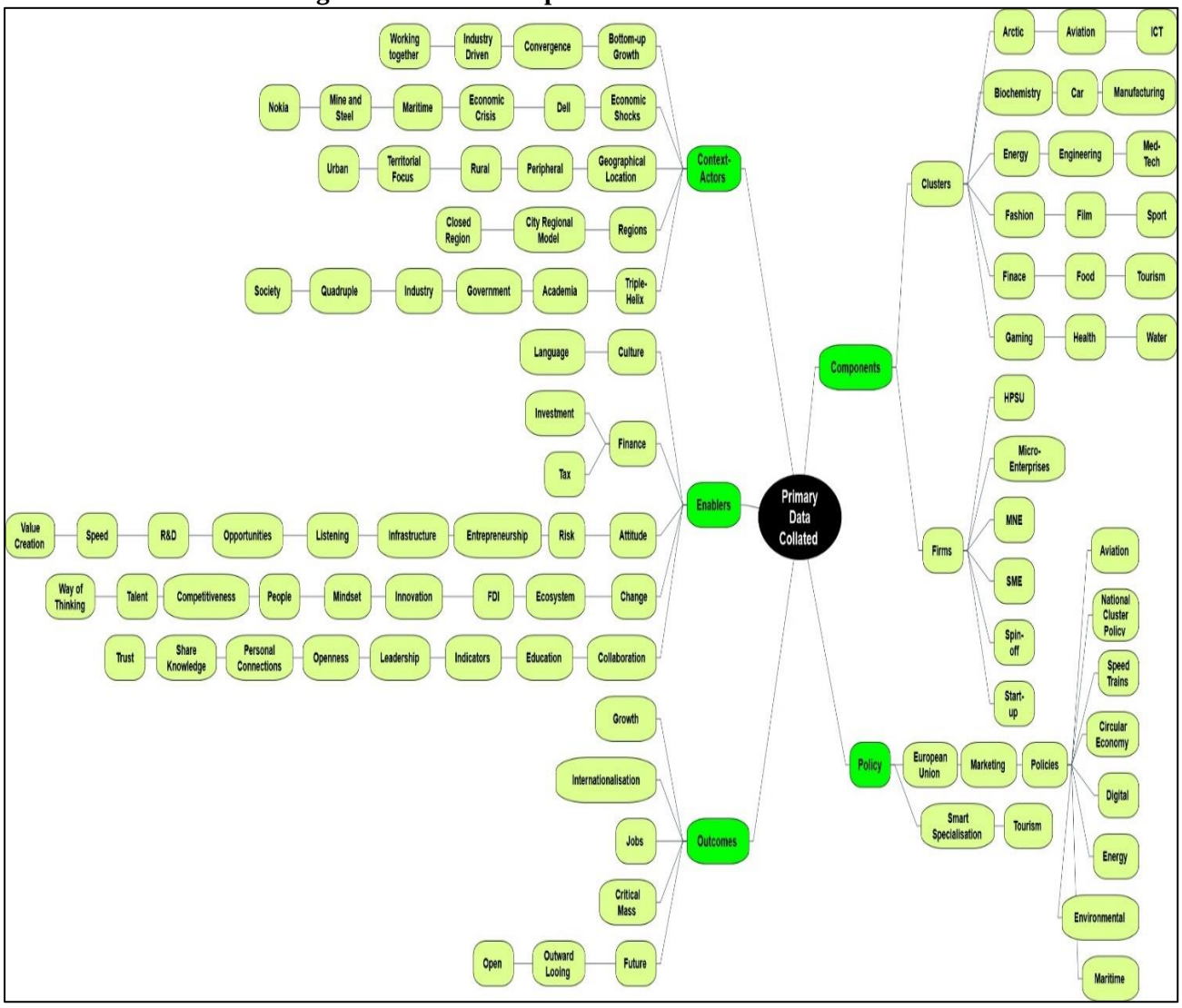


Name	Files	References
Components	0	0
Clusters	30	64
Arctic	1	1
Aviation	4	6
Biochemistry	2	2
Car	4	5
Energy	1	1
Engineering	3	4
Fashion	1	1
Film	1	2
Finance	3	4
Food	3	3
Gaming	1	1
Health	1	1
ICT	6	6
Manufacturing	3	5
Med-Tech	1	1
Sport	1	2
Steel	4	4
Tourism	3	3
Water	1	1
Firms	18	33
HPSU	2	2
Micro-Enterprises	2	4
MNE	4	4
SME	6	14
Spin-off	2	2
Start-up	7	15
Context-Actors	0	0
Bottom-up Growth	24	59
Convergence	4	4
Industry driven	12	17
Working together	21	43
Economic Shocks	12	15
Dell	1	1
Economic Crisis	2	2
Maritime	4	4
Mine and Steele	3	4
Nokia	5	10
Geographical Location	16	24
Peripheral	1	1
Rural	5	12
Territorial Focus	2	3
Urban	3	5
Regions	4	5
City Regional Model	7	11
Closed region	1	1
Triple-Helix	29	75
Academia	21	37
Government	24	54
Industry	24	42
Quadruple	1	1
Society	4	7
Enablers	0	0
Attitude	5	11
Change	20	46
Collaboration	21	47
Competitiveness	3	5
Culture	19	41
Language	1	1
Ecosystem	7	9
Education	16	24
Entrepreneurship	14	30
FDI	4	6
Finance	26	58
Investment	9	18
Tax	4	9
Indicators	7	10
Infrastructure	17	37
Innovation	17	45
Leadership	11	34
Listening	2	6
Mindset	8	12
Openness	5	10
Opportunities	2	2
People	25	78
Personal Connections	8	14
R&D	19	35
Risk	10	18
Share Knowledge	1	1
Speed	10	13
Talent	16	41
Trust	27	37
Value creation	8	10
Way of Thinking	3	4
Outcomes	0	0
Critical Mass	6	10
Future	26	40
Open	1	1
Outward Looking	2	2
Policies	0	0
European Union	20	37
Marketing	5	5
Policy	26	57
Aviation	4	8
Circular Economy	3	4
Digital	13	19
Energy	7	9
Environmental	9	13
Maritime	6	6
National Cluster	18	29
Speed Trains	4	10
Smart Specialisation	14	29
Tourism	9	20

Source: Drawn by Author from Data

There are 28 sub-categories that fall under the enabler's folder that have been identified as being key drivers of economic growth. 'Critical mass' and 'future' of being open and outward-looking fall under the outcomes folders and key 'European Union', 'marketing', '8 policy' areas, 'smart specialisation strategies' and 'tourism' fall under the policy folder. Some sub-categories have sub-categories of their own (bottom-up growth, economic shocks, geographical location, regions, triple-helix, culture, finance, future and policy) that highlight the importance of particular nodes to these areas.

Figure 5.11: Mind Map Summarised Themes



Source: Drawn by Author from Data

When considering all of these matters, whilst using the NVivo 'add to stop words list' frequency element, unwanted generic words have been excluded from the data set before running each query. To supplement this, Saldana (2016) described this process as real to abstract general meaning, and generic words are removed such as 'key' (Rogers, 2018; Wicks, 2017). Figure 5.11 above was developed which illustrates the most commonly recurring themes, exemplified using a 'Mind Map' model. Using the mind map creation function in the NVivo software tool, elements were created to graphically represent the nodes and the categories to

which they are strategically aligned. It can be said that this mapping process enables the reader to effectively identify the themes and nodes that have developed from the data collated.

5.14. Preparation for Data Analysis

For the purpose of this research study, the acquaintance with: (1) Voice recorder device (Sony ICD-PX240); (2) The process of transcription; and (3) NVivo 12 software were salient (Bryman and Bell, 2015). The three facets were the storage location for the data generated and recall of data for the purpose of analysis and each passed to the next smoothly. In addition, field notes have been incorporated in this work to record intuitive ideas, questions, or non-verbal cues that occurred during the interview. Field notes were used to explain the research to early modelling which may have arisen or to bias which may need reflection.

Furthermore, this preparation for management of the data allowed the organisation and recall for both coding and analysis. The data for analysis in this work was recorded using the voice memo application; this was then transmitted as an mp3 file to the researcher's Windows Media platform on a personal computer and was then transcribed by the researcher to aid intimacy with the data. This process was time-consuming, but advantageous to the overall data analysis process due to a robust knowledge of the data. In addition, interviews were transcribed using the Microsoft Word software application and upon completion, the word files were uploaded to Google Drive for safe storage and imported into the NVivo qualitative analysis software. The researcher was trained in using the NVivo software (thematic coding and data organisation analysis) and is skilled in the analysis of data using this data management software. For NVivo coding is accomplished through nodes (the route by which coding is undertaken).

Bryman and Bell (2015) argued that nodes are a collection of references about a specific theme, place, person or another area of interest. Bearing this software in mind, a code has been defined

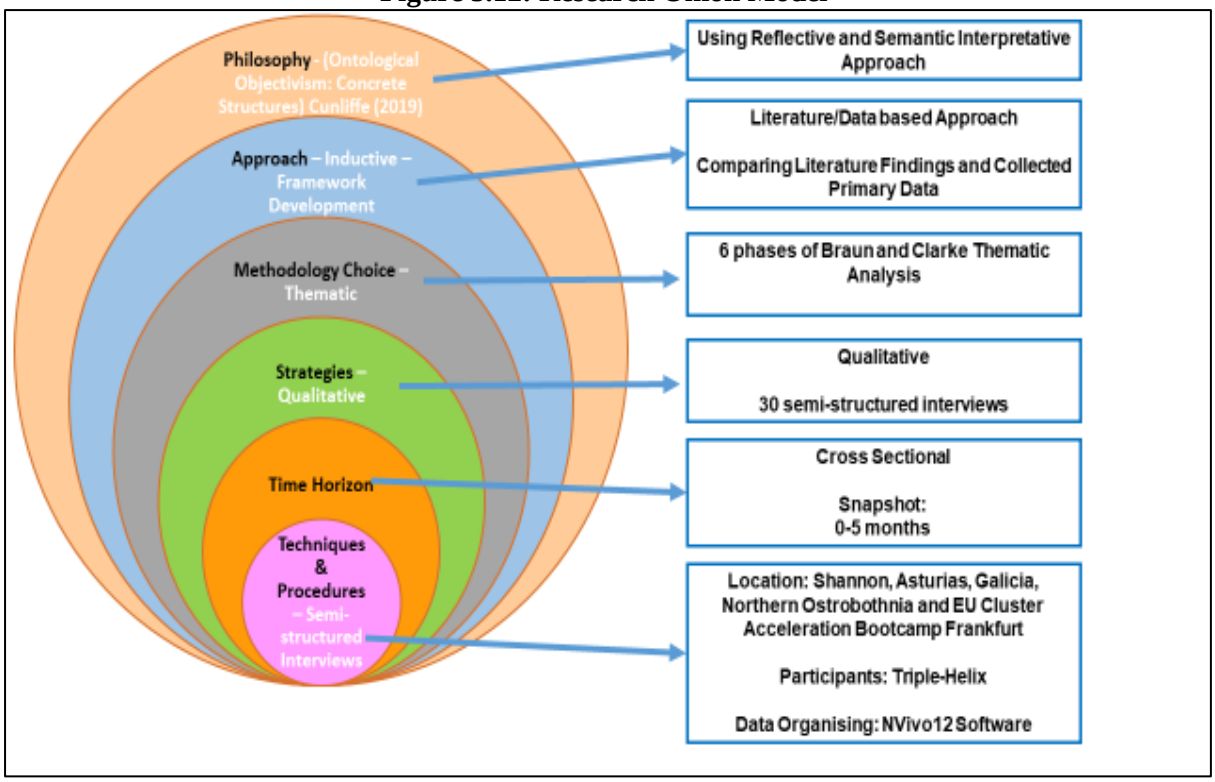
as a representation of a phenomenon (Corbin and Strauss, 1998), and is an important tool for the qualitative research interview. They further argued that, *"coding is analysis. To review a set of field notes, transcribed or synthesized, and to dissect them meaningfully, while keeping the relations between the parts intact, is the stuff of analysis,"* (Miles and Huberman, 1994). It has been proposed that when using NVivo 12 software that three steps are utilised in designing codes which could be incorporated to 'break in' to the text: (1) Identify what is interesting; (2) Ask why it is interesting; and (3) Understand why it is relevant to the research problem (Bazely, 2007).

5.15. Conclusion

The purpose of this Chapter was to outline the methodological approach to the present study. The most significant objective in following the chosen methodology was to ensure that the study would be coherent, and useful to the field to which it contributes (see Figure 5.12). On review of the methodology chapter, there are five main types of qualitative research, namely: (1) Exploratory; (2) Phenomenology; (3) Ethnography; (4) Case Study; and (5) Grounded Theory (Bryman and Bell, 2015). Phenomenology, the initial key strategy to qualitative research is descriptive with the study of how individuals experience a phenomenon. Conversely, ethnography is the discovery and description of the culture of a group of people, while the case study is an in-depth description and analysis of one (singular case) or more "cases" (Denzin, 1998). Lastly, the grounded theory approach is an inductive approach to develop theory. As outlined in Section 5.5.2, this research study is grounded on Trochim and Donnelly (2008) perspective of the inductive approach (theory building) which is known as the 'bottom-up approach' (see Section 1.4 in Chapter One), whereas deductive (theory testing) is referred to as the 'top-down approach'. Rocha (2004) argued that further research is required

surrounding the topic of clusters regarding how to best define them and measure them using qualitative techniques.

Figure 5.12: Research Onion Model



Source: Adapted from Saunders et al. (2016)

Furthermore, Rosenfeld (1997) maintained that to overcome the drawbacks of each methodology, there is a common accord in the literature that to identify clusters, it is essential to conduct a qualitative analysis. Moreover, Rocha (2004) stated that traditional quantitative measures are insufficient in ascertaining important facets which are present in some clusters such as, *"social infrastructure, entrepreneurial energy, shared vision, and level of collaboration".* They are therefore incapable of differentiating a simple industry attentiveness from operative and functioning clusters (Rosenfeld, 1997).

For the purposes of this study, 30 semi-structured interviews (see Section 5.5.3) have been collected (see Appendix M for sample of transcripts). They lie between both ends of the paradigm as they have a predetermined set of questions nonetheless, they permit a high degree

of flexibility to ask new questions or remove existing ones and let new ideas transpire during the discussion (Greener, 2008; Neergaard, 2005). McNamara (1999) suggested that trust can be built up amongst the interviewer and interviewee. This is an important factor gathering information about firm connections which may be vital to a firm's operations. This work takes a naturalist (interpretivist) approach as it is assumed that participants experience many different realities. Furthermore, a strong position of subjectivity is adopted as this is deemed essential by the researcher to understand the lived experience of participants (entrepreneurs, managers, firms, organisations and business cluster types) involved. Sternad et al. (2016) developed a purposeful meaning approach, which can be applied here as all research aims to create some sort of meaningful contribution.

The approach to sampling in this work is non-probability quota sampling where a prescribed number of participants are interviewed in each of several categories to formulate objective findings (Bryman and Bell, 2015). Moreover, the Snowball approach was used during the preliminary research activity (see Table 5.8) which looks at contacting a few individuals and asking them to suggest other individuals until the anticipated sample size is reached. When the goal of a research study is based on theory building, case studies commonly adopt an exploratory and inductive approach which entails partial prior theoretical knowledge to the creation of theory from close observation of the phenomenon within its environment (Eisenhardt, 1989). Løkke and Sørensen (2014) proposed that when the number of theories to be examined is relatively small, multiple case studies and case comparisons are an effective approach to undertake when exploring the validity of those theories in different environments.

Miles and Huberman (1994) have a different perspective and case study design with their focus being on what the case is and what is the unit of analysis. They claimed that the case is the unit of analysis with the focus on whether to analyse 'the individual', 'a program', 'the process' or

'the difference between an organisation'. Multiple-case studies can be regarded as a more effective approach when comparing issues or contexts, especially when trying to make it applicable internationally (Yin, 2003). As argued by Byrne (2016), one reason for qualitative research is to study a case when it is of special interest to gain a better understanding of the example. Many qualitative approaches aim to identify the components of the cluster (the firms, industries, suppliers, customers, trade associations, research institutes, *inter alia*). Allen and Potiowsky (2008) provide a typical case study approach whereby they relied upon, *"a combination of surveys and interviews targeted at 'key informants' to develop an understanding of the industry cluster".* A renowned qualitative cluster study is Saxenian's (1994) study of Silicon Valley and Route 128 (see Section 2.5). It epitomised the ability of qualitative approaches to be in-depth.

Qualitative techniques also allow much-needed flexibility and in an interview situation. A researcher can ask follow-up questions on a particularly relevant topic or theme which may be unknown beforehand and be uncovered during the study (Hobbs, 2010). Wenger (2004) suggested using case studies for regional studies. Bergman and Feser (1999) argued that a criticism of case studies is that the cluster being examined may not be representative of similar clusters in other regions or even clusters in the same region. The theoretical contribution of this research study must apply to all regions based on their resource availability. Therefore, case studies aim to describe a particular cluster in detail and to develop theory and recommendations from that example. Therefore, for the purpose of this research study cases are engaged to: (a) Explore whether there is a presence of convergence; and (b) the influence of convergence on cluster-based economic growth in regions. Stohr's (1986) work which has been cited in Callanan's (2000) study on Ireland's Shannon story, maintained that development and growth should be 'from below' rather than 'from above' (refer to Section 1.4), This supports the

viewpoint that the convergence approach does influence cluster-based economic growth in regions.

Chung and Tibben (2006) and Foghani et al. (2017) stated that when examining clusters and economic growth future research should adopt a qualitative approach encompassing interview techniques on selected SMEs and institutions that are within the cluster. This empirical evidence supports the selection of the qualitative research approach for this research study. On review of the current cluster methodological literature, there is a real lack of research on this topic. Castro et al. (2010, 2011) stated that 20–40 participants as part of a doctoral thesis would suffice and Ragin (1987) suggested that two-three people should be interviewed per case study. 30 triple-helix participants were included in total in support of by Castro et al. (2011). 8 participants from government, 9 from academia and 13 from industry formed the participant basis for the interviews. Acemoglu and Robinson (2014) argued that using the institutional approach works best in interview scenarios. Therefore, implying that people within positions of authority should form part of this work. Furthermore, the emergent nature of this method will support a much greater understanding of the unknown realities experienced in regions, the convergence space and the business cluster sphere. In addition, Fidel (2008) advised that this methodology approach of *"qualitative methods"* is perfect for studying social and behavioural research such as how convergence can influence cluster-based economic growth in regions (the act of moving towards equality) (Sale and Brazil, 2004).

This chapter has concentrated on accomplishing the requirements of the research objective and question. Firstly, the holistic research approach in the context of the research setting has been addressed. Secondly, the methods through which this strategy can be realised were examined. This chapter also detailed the methodological strategy this research study has adopted. Cortright (2006) argued that a qualitative cluster methodology should take place. This research

uses a qualitative method with semi-structured interviews to generate data. The main rationale behind the use of a qualitative methodology is the relatively under-researched and uncultivated literature surrounding cluster methodology. The resulting decision was that the exploratory nature of this study would be best served through the interpretivist paradigm as inductive (theory building) is a priority for the field (see Section 5.5.1).

The specifics of how data was generated, analysed and evaluated were conveyed in conversation with the relevant literature in Chapter One, Two, Three and Four. The following chapters will discuss the outcome of the data analysis and interpretation and make recommendations based on the findings of this work. Chapter Six and Chapter Seven discuss the key findings in this work, the research analysis and conclusion and recommendations whilst both chapters present the data based on an automatic exchange with the relevant literature. Chapter Seven will set out the recommendations following-on from the key findings from three actors: academia; industry; and government.

Chapter Six

Research Analysis

6. Research Analysis

6.1 Introduction

This work is titled ‘How Does Convergence Influence Cluster-Based Economic Growth in Regions?’. It examines the regions of Shannon in the Republic of Ireland, Asturias in Spain, Galicia in Spain, and Northern Ostrobothnia in Finland. The first EU Cluster Acceleration Bootcamp in Frankfurt (Germany) has also been included, but it is important to recognise that the Bootcamp is not a region and as such arguably, does not receive the same level of significance. There are two important aspects to this research problem which are: (a) Exploring whether there is a presence of convergence; and (b) The influence of convergence on cluster-based economic growth in regions. This research analysis chapter will try to bridge this gap. The discussion in this chapter will focus on the themes and trends which emerged from the literature review, the collected primary data, and the results gathered from processing the data using the NVivo software.

This work used a qualitative methodology comprised of semi-structured interviews involving five contexts and thirty individuals, collected through extensive travelling over five months. The generated data was primed and entered into NVivo. Subsequently, the data was analysed, coded, organised and repackaged into the themes and trends which emerged from the data set. From this analysis, an explanatory framework was constructed to answer the research question. The chapter also discusses the role of thematic analysis (TA) in comparing empirical findings from the literature and the collected primary data set to draw conclusions. As emphasised in Sections 5.13 and 5.14 in Chapter Five, Braun and Clarke’s (2006) six-step thematic analysis approach was incorporated into NVivo. The discussion in this chapter and Chapter Seven is grounded in the themes and trends which emerged from the research. The arguments presented traverse many levels of analysis as certain themes are developed based on the data, theory, and previous empirical research discussed in the literature review.

Table 6.1: Chapter Structure

Chapter Approach
Introduction to Chapter
Participants Profile
Data Sets by **Role**
Data Sets by **Region**
Data Sets by **Other Measures**
Other Areas of Interest
Answering the Primary Research Question
Conclusion
Source: Adapted from Literature Review by Author

This work invites the reader to enter the world of the research participant and facilitates this journey through a rich description of the realities faced around clusters nationally and internationally. The themes discussed in this chapter will enable theory building around the important areas of convergence, clusters, and regions. For the purposes of this research study, the NVivo software enabled the thematic analysis data sets to develop specific nodes (Bryman and Bell, 2015). The thematic analysis coding process of Braun and Clarke (2006) and NVivo facilitated the data organisation process of this research study and the subsequent collation of the data. The data has been organised using the six-step approach by illustrations of the files and references from the participants, along with the creation of important nodes which were derived from the data. Additionally, a ‘mind map’ along with ‘word cloud’ visuals and ‘chart case coding’ diagrams were created using NVivo to report, analyse, and write up the data analysis. These visuals can help the reader to examine and understand the main findings and nodes that have transpired from the semi-structured interview process. Lastly, this chapter will express the significance of the findings that have evolved from the participant responses to answer the primary research question.

6.2 Participants Profile

The participants in the research study have all come from the regions which have formed part of the contextualisation of this research study (see Chapter Four). Their relevant biographical information has been outlined in Table 6.2 below.

Table 6.2: Profile of the Participants

Participant No.	Name	Gender	Nationality	Country/Region	Institution name and location	Position	Type of Institution
1	Fergal	Male	Irish	Shannon	LIT, Limerick	Former VP Enterprise and Research	Academic
2	Pat	Male	Irish	Shannon	LCCC	CEO	Government
3	Brian	Male	Irish	Shannon	SIDC	Regional Director	Industry
4	Margaret	Female	Irish	Shannon	Foynes Flying Boat Museum	Managing Director	Industry
5	Niall	Male	Irish	Shannon	IDA, Limerick and Shannon Heritage	Regional Manager	Government
6	Vincent	Male	Irish	Shannon	LIT, Limerick	President and former CEO of Shannon Development	Academic
7	Pirkko (EU Cluster Acceleration Boot camp)	Female	Finnish	Northern Ostrobothnia	AIF Water Ecosystem, Oulu	Cluster Manager	Industry
8	Christian (EU Cluster Acceleration Boot camp)	Male	Norwegian	Norway	Engage Innovate	Cluster Expert and Author	Industry
9	Pieter (EU Cluster Acceleration Boot camp)	Male	Dutch	Netherlands	Wetsus	EU Liaison Officer	Government
10	Kristianne (EU Cluster Acceleration Boot camp)	Female	Norwegian	Norway	Norwegian Innovation Clusters	Policy Advisor	Industry
11	Johannes (EU Cluster Acceleration Boot camp)	Male	Finnish	Northern Ostrobothnia/Lapland	Arctic Smart Rural Community	Cluster Manager	Industry
12	Bianca (EU Cluster Acceleration Boot camp)	Female	Romanian	Valencia, Spain	AVAESEN (CleanTech)	CEO and Cluster Manager (Cluster Manger of the Year 2016-18)	Industry
13	Serxia	Female	Spanish	Galicia	University of A Coruña	Teacher	Academic
14	Patane	Female	Spanish	Galicia	Espazocoop	Trainer	Industry
15	Xosé	Male	Spanish	Galicia	Xunta de Galicia	Deputy Director	Government
16	Jose	Male	Spanish	Galicia	Technology Transfer Office	Manager	Academic
17	Rosa	Female	Spanish	Galicia	Vigo Free Trade Zone	Director	Government
18	Cristina	Female	Spanish	Galicia	University of Vigo	ECOBAS R&D Manager	Academic
19	Gitte	Female	Finnish	Northern Ostrobothnia	Council of Oulu	Project Manager	Government
20	Janne	Male	Finnish	Northern Ostrobothnia	Quieton Oy	Co-Founder	Industry
21	Pekka	Male	Finnish	Northern Ostrobothnia	University of Oulu	Head of Innovation Centre	Academic
22	Kristiina	Female	Finnish	Northern Ostrobothnia/Lapland	Council of Lapland	International Affairs	Government
23	Juho	Male	Finnish	Northern Ostrobothnia	Butterfly Ventures	CEO	Industry
24	Arto	Male	Finnish	Northern Ostrobothnia	University of Oulu	Vice President	Academic
25	Oscar	Male	Spanish	Galicia	Aclunaga	Cluster Manager	Industry
26	Fernando	Male	Spanish	Asturias	Oviedo University	Professor	Academic
27	Inigo	Male	Spanish	Asturias	IDONIAL Research Centre	Director	Academic
28	Paz	Female	Spanish	Asturias	IDEPA	Consultant	Government
29	Enrique	Male	Spanish	Asturias	ClusterTIC	Director	Industry
30	Jose	Male	Spanish	Asturias	MetaIndustry4	Cluster Manager	Industry

Source: Drawn by Author from Data

There were 30 participants interviewed in total and Acemoglu and Robinson's (2014) institutional approach was adopted which is considered to work best in interview scenarios. This implies that people within positions of authority should form part of this work. 6 participants were interviewed in the Shannon region in the Republic of Ireland, 5 in the Asturias region in Spain, 7 in the Galician region in Spain, 6 in the Northern Ostrobothnia region in Finland and 6 at the EU Cluster Acceleration Bootcamp. Table 6.2 above breaks down the participants by name, gender, nationality, region, institution name, employment position and the type of triple-helix actor to which they are affiliated. This table was generated to provide the reader with a clear understanding of the participant's profile.

From the data collection, the powerful meaning of words and their weighting in this research study have been illustrated in the various graphs below (see Figure 6.1-6.13). Shashkevich (2020) argued that words can help to better understand ourselves and why humans behave in a certain way. Robin (2017) suggested that words have a powerful part to play in society and that people can achieve positions of power because of the use of words:

> *Words have the power to harm or heal, create or destroy, bless or curse. We all know this, even if, for some reason, we tend to deny it out loud. To a very large extent, we are all who we are (or aren't) because of words. The words spoken by our leaders, are the words spoken by us. Few things, if any, in our world, can equal the power of words.*

He further proposed that words can form the very basis of thinking, belief and action, can change external reality, can be creative or destructive to some extent and can help to form or deform us as individuals and our works.

6.3 Data Sets by Role

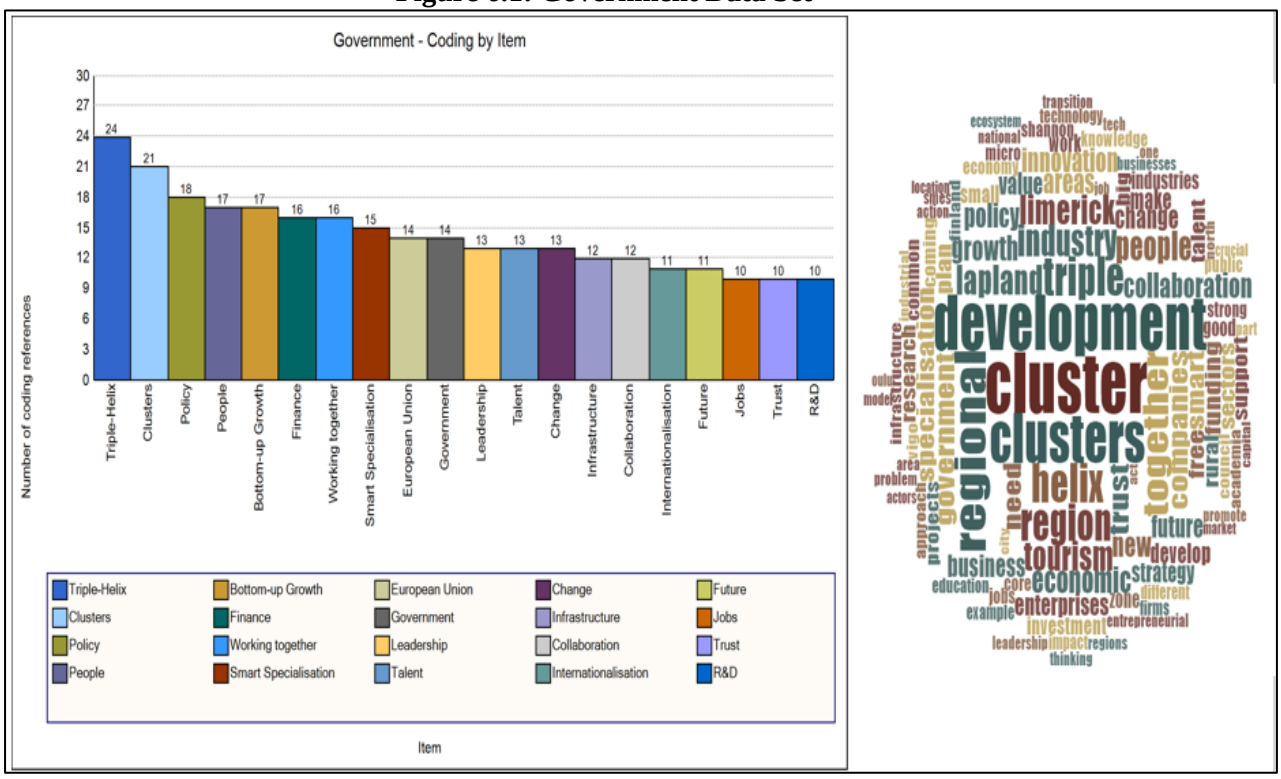
The data sets have been organised by role concerning the triple-helix framework developed by Etzkowitz (2002). The following sections highlight the data collated (see Appendix M) that

Government, Academia and Industry stakeholders have provided based on the semi-structured interview approach (Bryman and Bell, 2015). As discussed in Table 5.8, there were 8 participants from Government stakeholders, 9 from Academic institutions and 13 from Industry players.

6.3.1. Data Set on Government

Of the 8 Government participants, the 20 most relevant thematic nodes that evolved from the data collated is illustrated below in Figure 6.1. They have been identified as being the most important 'Governmental' categories for this research study. This process is adopted for all the following charts. These nodes have been exclusively initiated from the participant responses through the use of NVivo. As shown, the nodes have been categorised by the 'number of coding references' meaning the number of times that these themes were mentioned by the participants, thus emphasising their level of importance.

Figure 6.1: Government Data Set



Source: Drawn by Author from Data

This same process has been adopted for all the 'triple-helix' categories (Government, Academia and Industry). The analysis indicated (see Figure 6.1) that the 'triple-helix' node with 24 references was the most important 'Government' category by the participants, with clusters encompassing 21 references. The government data suggests that R&D was the least important node along with trust and jobs with only 10 references. Participant 15 stated that:

> *The tripe-helix is very important and is increasing every day a bit more and can not do anything without innovation. Need collaboration with academia and administration and good innovation. Many SMEs and micro enterprises in Galicia and big firms such as Citroen, Renault and Inditex and medium firms of up to 5 to 10 people. An ecosystem of innovation and micro firms needs more promotion. We have to improve the growth and wellness of enterprises and must internationalise and sell abroad more. The target is marked areas of working with the S3 plan. There needs to be a big effort in common goals and cross border S3. Coming together is key as all together should lead to improvements.*

Participant 9 suggested *"the triple-helix is vitally important as it led to the water alliance cluster and public funding helped to create the ecosystem and scale to where it is today"*. In support, Participant 22 argued *"the triple-helix knowledge alliance approach is crucial to foresee emerging industries and the smart specialisation strategy in Northern Ostrobothnia is based on the triple-helix triangle. Make triple-helix work in rural areas in practice"*.

Participant 22 discussed that the development of clusters are based on *"innovation and education and must promote business driven clusters. Must make a breeding ground for existing and new businesses with a cluster environment but policy is important"*. Interestingly, this may posit that whilst the triple-helix framework of government, academia and industry actors coming together is imperative, the enactment of the creation of jobs, the trust between the actors and the R&D process are not the most pivotal areas that need to be addressed or explored. However, Participant 15 posited that "*trust is key as we must work together as good silos are not enough and trust is the core of the triple-helix model"*.

Participant 28 believed that *"Triple-helix has the main role in this regional development and new instruments for triple-helix. Trust is not that important as it is more important to have a common goal and further commitment is needed"*. Participant 17 considered that *"high technology incubators are crucial to future growth and must put all the actors together more. Triple-helix, accelerators are an example of collaboration. ViaGalicia and ViaExterior work all together to develop the accerators"*. It can be said that without the development of jobs, trust between the different stakeholders and innovative R&D; economic growth will be difficult to achieve for any economy. From a cluster perspective, Participant 19 posited *"to continue the growth of clusters, start-ups are key and the coming together of industry sectors are important"* and Participant 28 agreed having stated that *"clusters to act as a tool for the implementation of smart specialisation strategy but must be very industry focused as some industries are declining"*.

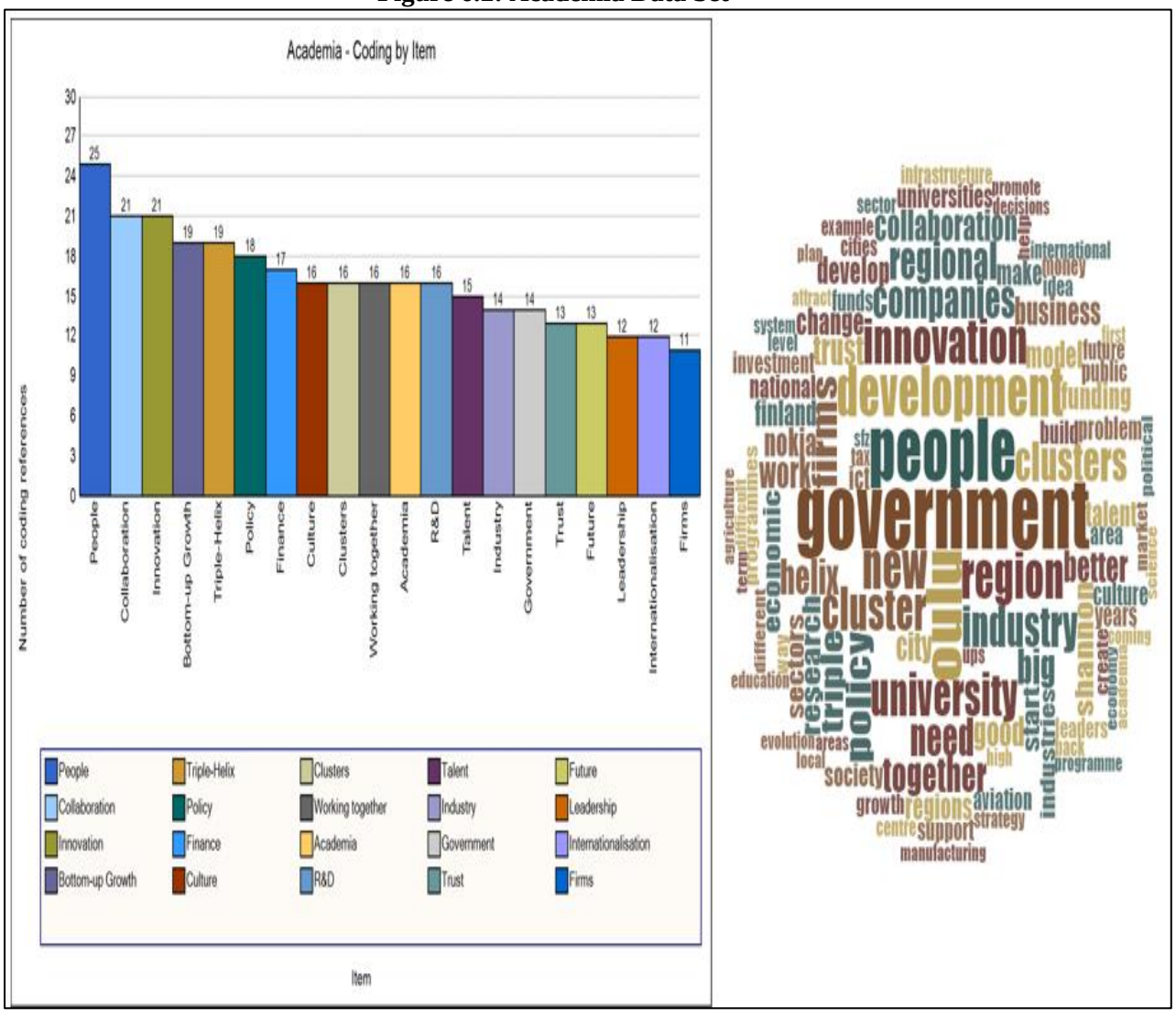
This data exemplifies what the participants believe are the important thematic nodes to focus on when relating to the 'Government' facet of convergence influencing cluster-based economic growth in regions. The Government stakeholders placed the 'triple-helix' node as the most referenced as the coming together of the three actors is salient to achieving economic growth in any context.

6.3.2. Data Set on Academia

As described in Section 6.3.1, the same strategy was adopted for these participants from Academia. Of the 9 Academic participants (see Figure 6.2) that took part in this research study, the analysis indicated that the 'people' node with 25 references was the most important 'Academic' category by the participants with collaboration and innovation incorporating 21 references.

From an academic context, it is interesting to note that people are the most important node because it could be suggested that people are the cornerstone and the drivers behind the enablement of the academic milieu. Firms received the lowest number of references which could propose that the development of new firms or scalability of existing businesses are not as important as getting the right people into the economy and fostering an environment of collaboration and innovation.

Figure 6.2: Academia Data Set



Source: Drawn by Author from Data

The exploration of how the academic community can help to attract and retain the right people could form an interesting future research activity. Participant 1 indicated that:

> *People and blue-sky thinking are needed with real practical change. The backing of yes, we can, frontier mentality, great people, ideas and a can do attitude are important. People who are visionaries need to be backed and working together with high levels of collaboration are crucial. Leaders emerge in crisis situations and people with long term plans and being part of the journey to the end. Maven type people are solution focussed and the idea before everything else for the greater good and must have skin in the game. People with a relationship with risk and uncertainty as there are too many bluffers. Bed blockers are blocking new ideas coming through in Ireland and not listening to straight forward thinkers. Listen and back people as things happen when people meet and leaders with a can do attitude make decisions. We must think big. Everybody working collaboratively and hardened innovation supporting inventions and backing fundamental research are needed.*

Participant 13 has discussed that *"there is a need to motivate people to develop their own firms and motivate collaboration. People must become decision makers and leaders"*. It has been described by Participant 18 that *"if you do not have better people or workers to make a better decision, this is bad for economic development. The number of international collaborations need to grow"*.

Participant 21 argued, *"people, the role of individuals and entrepreneurs are important. Experienced people with good networks and working together with a degree of risk. Must promote the region and attract people to live here in Oulu as there is a lack of skilled people in the ICT sector. Attracting talent from abroad is key"*. In addition, Participant 21 said that *"the innovation centre hires CEOs to work with start-ups to increase innovation and network collaborations"*. Participant 6 stated, *"people working together is key to regional development and cluster development"*. The *"collaboration with other entities and innovation of existing sectors to transform"* are important which Participant 16 has suggested.

Participant 24 thought that better strategic *"direction is required and the digitisation of industries"* are important. Participant 26 thinks that "*collaboration is a problem of demographic and that we must change institutions to collaborate more. Policies need to be more combined and collaborative but getting government to collaborate is difficult"*. Also,

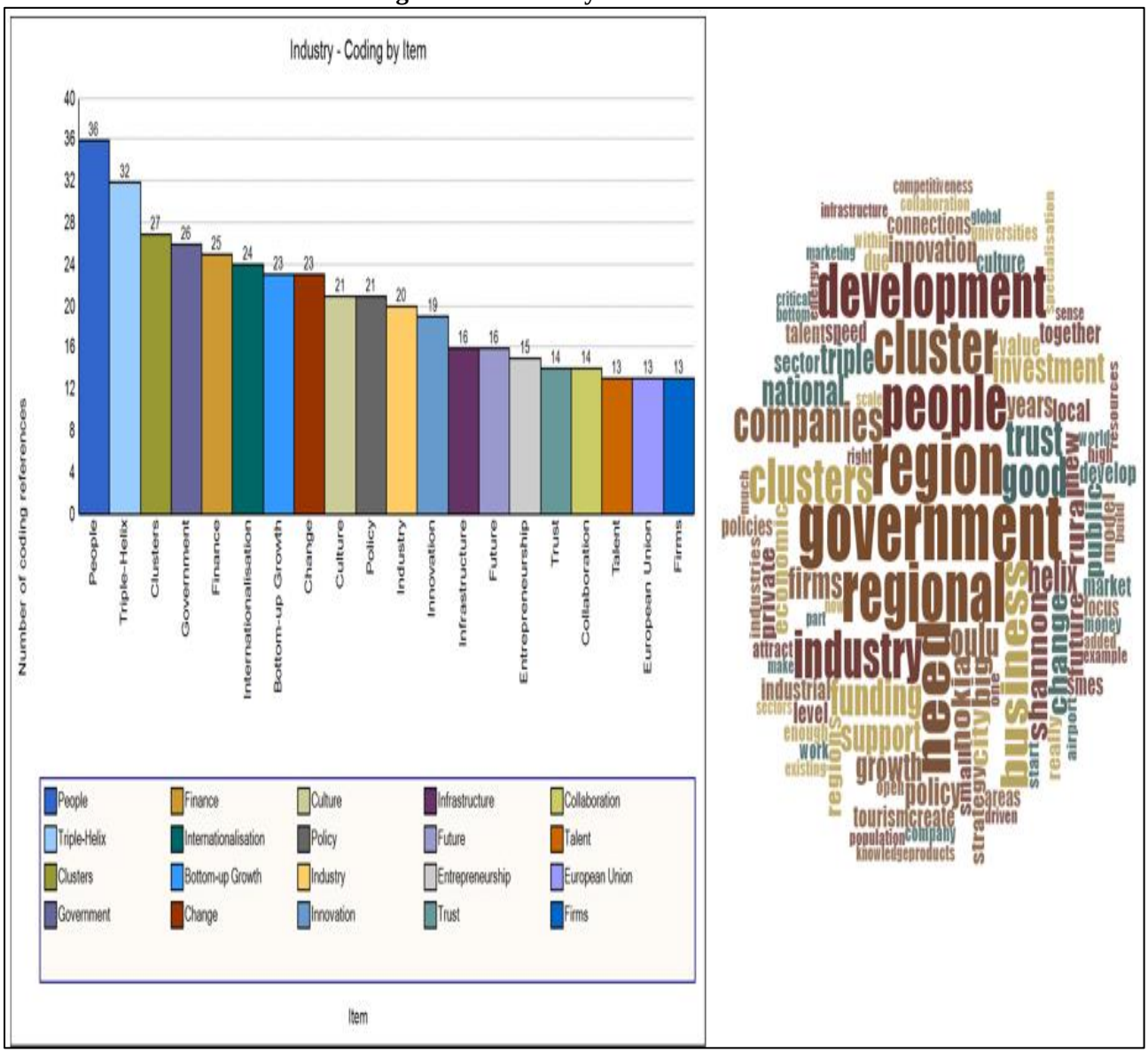
Participant 26 argued that *"policies are not focused and there is no real regional project. A city regional policy approach is key, a metropolitan area"*. Participant 27 concluded that the future is *"internationalisation and innovation influenced by worldwide issues. Follow innovation and launch new initiatives. Companies must evolve to IN4.0 and look inside and develop from inside"*. There needs to be a culture of innovation and collaboration and existing industries must be maintained.

It can be said that this entire course of action demonstrates what the participants believe are the important thematic nodes to focus on when relating to the 'Academic' facet of convergence influencing cluster-based economic growth in regions. It can be suggested that the academic participants emphasised that the 'people' node was the most important as the core catalyst for regional growth is, of course, great people. Having the right people can be vital to unlocking a region's potential, to attracting and retaining companies in the region and to achieve cluster-based economic growth in regions (Courtney, 2019; Horn, 2012).

6.3.3. Data Set on Industry

There were 13 industry participants out of the total (30) sample population (see Figure 6.3) that indicated that the 'people' node with 36 references was the most important 'Industry' category with triple-helix having 32 references and clusters with 27. Furthermore, talent, European Union and firms all received the lowest number of references with 13. Similarly, to the academic participants, people were placed at the forefront, whereas firms came in last. This may indicate that both industry and academic participants believe that the creation of new firms or enhancement of existing firms does not need the same level of attention as putting the right people in place to answer the research question. The questions of how to attract the right people or how to keep the right people could form part of future research activity. What is meant by people or the right people might also serve as areas for future research opportunities.

Figure 6.3: Industry Data Set



Source: Drawn by Author from Data

This line of work establishes what the participants believe are the essential thematic nodes to concentrate on when relating to the 'Industry' facet of convergence influencing cluster-based economic growth in regions. As identified through the analysis of the Academic participants, the Industry participants have also emphasised that 'people' are the most important area to focus on when answering this research question, but interestingly, firms received the lowest number of references. This could serve as an area that industry sectors need to promote more and try to attract and retain the right people to achieve regional growth. Industry participants

posited that the development of people, triple-helix and clusters are more prominent than the promotion of firms. It can be said that the right environment needs to be in place for the development of firms to occur. Participant 20 concluded that:

> *Finding the right people is important to achieve growth as people now have jobs but the tax money is not near the times of Nokia. Business Oulu is important but what people can do is amazing with linking with other people to achieve success. Having the right people and best talent to the region is important to improve companies to succeed with speed. Entrepreneurs are needed with a can do attitude.*

Participant 11 argued that *"young people are not returning and need to make it the local economy level"*. Participant 12 posited that *"investment and clear idea of growth with people building. Jobs, speed, scale and synergy with people. Good synergy with other people to create change"*. Participant 23 mentioned, "*people who have networks, personal connections and people living here and moving here are important to Northern Ostrobothnia"*. Even though the industry responses have highlighted that the triple-helix is the second most referenced node.

Participant 30 stated that *"the triple-helix has not been that important in Asturias as academia are not really involved in this situation of the region"*. The ClusterTIC Director, Participant 29 similarly argued that *"the triple-helix is not really happening and is not really understood"*. However, Participant 10 said that the *"triple-helix has been extremely important in helping firms become more innovative and work together and the future must be outward looking. Understand what an innovation ecosystem is and do more with less"*.

From a cluster perspective, Participant 11 maintained that *"clusters are a good model but need roles for each member for cooperating and must be proactive with common goals needed"*. Participant 12 claimed that a *"globalised regional innovation ecosystem is needed with clusters creating the interconnection"*. Participant 14 suggested that cluster development is important to *"foster trustful relationships between and within industries. SMEs must have a presence*

within clusters as they are not represented as usually, firms in clusters are big". Looking at the three charts in Figures 6.1-6.3, 'people', 'triple-helix', 'clusters', 'policy' and 'finance' can be regarded as the five-top number of nodes referenced. The government participants promote triple-helix engagement, whereas academia and industry believe that getting the right people is the most imperative area to answer the research question.

6.3.4. Comparison Analysis

The data sets by role, region (in Section 6.4.5) and other measures (in Section 6.5.6) have been compared. Accordingly, the following three tables (6.3-6.5) highlight in detail, the numerical references to each node(s) from the 'triple-helix' actors, each 'region and Bootcamp' and the 'literature review' thematic areas of interest.

To illustrate the nodes in terms of the level of importance for this research study, they have been disseminated into coloured categories. The yellow category colour represents 'low' ranging from 1-20 references associated to that node, green characterises 'medium' ranging from 21-40, blue signifies 'high' ranging from 41-60 and finally, red exemplifies 'very high' extending to 61-80.

After amalgamating Figures 6.1-6.3 into one table, it can be stipulated that the nodes of importance to this research study are apparent (see Table 6.3), ranging from low to very high in terms of the level of importance. An interesting insight was that only the government stakeholders found smart specialisation strategies to be important with 15 references. Jobs, Academia and Entrepreneurship all received low references, with only government participants placing any importance on jobs, industry highlighting entrepreneurship as salient, and academic participants were the only ones to place any significance towards academia itself.

Table 6.3: Triple-Helix Nodes

No.	Node	Government	Academia	Industry	Total
1	Triple-Helix	24	19	32	75
2	Industry	0	14	20	34
3	Government	14	14	26	54
4	Academia	0	16	0	16
5	Innovation	0	21	19	40
6	Internationalisation	11	12	24	47
7	Bottom-up Growth	17	19	23	59
8	Working Together	16	16	0	32
9	People	17	25	36	78
10	Change	13	0	23	36
11	Entrepreneurship	0	0	15	15
12	Talent	13	15	13	41
13	Collaboration	12	21	14	47
14	Leadership	13	12	0	25
15	Policy	18	18	21	57
16	Smart Specialisation Strategies	15	0	0	15
17	Jobs	10	0	0	10
18	Finance	16	17	25	58
19	Firms	0	11	13	24
20	Infrastructure	12	0	16	28
21	European Union	14	0	13	27
22	Clusters	21	16	27	64
23	Culture	0	16	21	37
24	Trust	10	13	14	37
25	R&D	10	16	0	26
26	Future	11	13	16	40

Level of Importance	
	1-20 = Low
	21-40 = Medium
	41-60 = High
	61-80 = Very High

Source: Drawn by Author from Data

These findings could suggest that there is a lack of convergence (moving towards equality and bottom-up approach to economic growth) in existence currently and that a more collaborative approach is required to improve these areas. People, triple-helix, and clusters received the most interest. Therefore, this data suggests that for convergence to influence cluster-based economic

growth in regions that these are the three most pivotal areas needed (as stated by the triple-helix actors), as suggested by Participant 2:

> *Knowledge and talent are needed in the cluster and there is a growing Sports Tech cluster in Limerick with Limerick City and County Council talking about the development of clusters. They are more networks really but good clusters come from networks. There is a natural sports cluster in the region with aviation, finance, med-tech and film other cluster sectors. A cluster project manager is needed, then investment and then the tripe-helix must come together. Marketing is key though and housing is a key issue. A cluster person in Enterprise Ireland and IDA are important with innovation and dynamism being key. Regional plans, direction, action and preparing for the jobs of the future are needed. We must co-locate, develop fast infrastructure, have a vision and need bodies/people.*

The literature posited that entrepreneurship and jobs are key to regional growth in Section 3.6 in Chapter Three, but the data analysis suggests otherwise (European Committee of the Regions, 2019; Cor.europa.eu., 2019; RIS3, 2019; Sidc.ie, 2017; Cluster TIC, 2019; Xunta de Galicia, 2015). The subsequent charts illustrate the contextualisation areas that make up this research study.

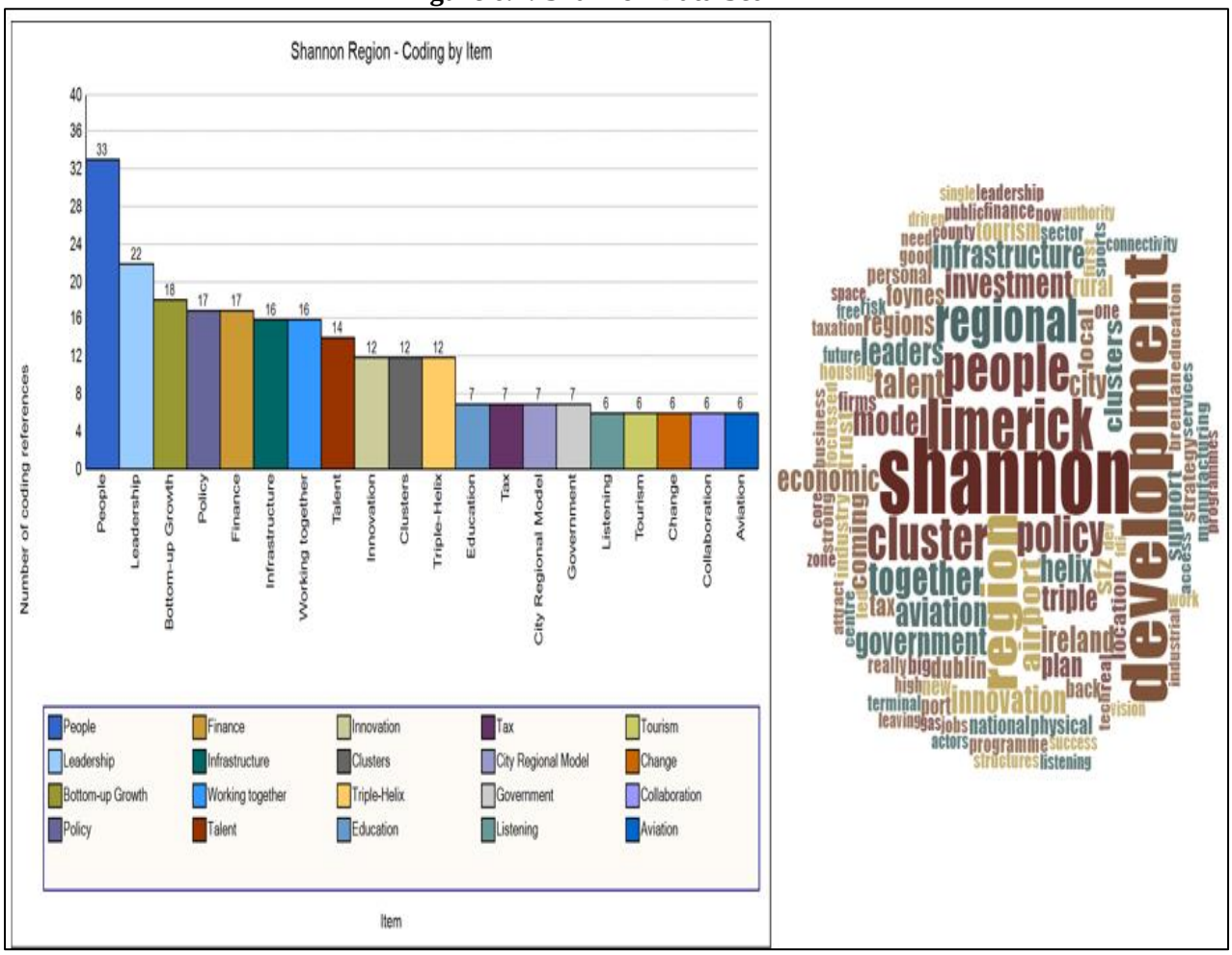
6.4. Data Sets by Region

The data sets have been organised by region concerning the four regions that have been extensively examined in Chapter Four and the following sections have highlighted the data (see Appendix M) that the Shannon region in the Republic of Ireland, Asturias region in Spain, Galician region in Spain and Northern Ostrobothnia region in Finland, have been provided based on the semi-structured interview approach (Bryman and Bell, 2015). In support, the first-ever EU Cluster Acceleration Bootcamp was examined to provide an expert guide on clusters and the research question. As previously mentioned in Table 5.8 in Section 5.8, there were 6 participants from the Shannon region, 5 participants from the Asturias region, 7 from Galicia, 6 from Northern Ostrobothnia, and 6 from the Cluster Acceleration Bootcamp.

6.4.1. Data Set on Shannon Region

The Shannon region in Ireland is now explored which had 6 participants (see Figure 6.4) with the nodes once more being categorised by the 'number of coding references'. Of the 6 Shannon region participants that took part in this research study, the analysis indicated that the 'people' node with 33 references was the most important, with leadership encompassing 22. Having the right people in place and the correct leadership is, undoubtedly, critical for the participants of the Shannon region with regards to achieving cluster-based economic growth. Participant 3 considered that *"people like Ed Walsh and Paul Quigley are key to regional development in Shannon and personal connections are important. Skilled people and linkages are effective and there must the conditions for new leaders to emerge".*

Figure 6.4: Shannon Data Set



Source: Drawn by Author from Data

In addition, Participant 3 mentioned that *"clusters are logical that provide added value to the market and do not need to be physical anymore. A cluster strategy is needed with clustering techniques and support services as national and regional policy needs renewal"*. Participant 4 agreed and thought *"personal connections such as Brendan O'Regan and Tony Ryan have been major influencers of the development of the Shannon region. Visionaries and risk takers such as JP McManus, Donal Slattery and Pat Keating are key to bottom-up growth"*. Furthermore, Participant 4 posited that *"trust and faith have been lost in the Shannon Group"* and there is not a great hope for the future of the region. *"Port needs to be a key economic driver into the future of the Shannon region. Cluster development and airport needs to attract investment"*. Idle industrial parks must be used, but the Shannon region has lost key people and risk takers are needed again. Participant 5 has claimed that:

> *Individual led collaboration within the region with people who did not choose to be leaders but spoke up and not looking for recognition has been important to the success of the Shannon region. Leaders like Barry O'Sullivan and Pascal Meehan are great examples. Trust and personal connections are important. Attracting and upskilling talent are needed as it is a smaller world, more globalised. Brendan O'Regan was a key instigator for Shannon and put Shannon Development on the map. Brave choices are needed and strong relationships maintained.*

Listening, tourism, change, collaboration and aviation all received the lowest number of references with 6. As the participants were all triple-helix stakeholders within the region, arguably they all have an important role to play to influence economic growth. Considering this, they have placed people as the most important area to focus on when trying to answer how convergence can influence cluster-based economic growth. This would suggest that the Shannon region needs to get the right people in or upskill the existing demographic to achieve some success going forward.

Critical strategies and policies that encompass how to attract, upskill and retain the right people to improve the profile of the region could be a solution to embrace. Participant 1 suggested that

"great people with ideas, leadership and a can-do attitude are needed and wrap yourself around leaders. Cluster development died but doing it now again as clusters continue to emerge but need policy". Participant 2 stated that "*people are key"* and Participant 6 indicated that "*people working together is key and Brendan O'Regan was the greatest innovator with a personal connection with Paul Quigley and relationships with the ministerial government were very important"*. On reflection, the data suggests that the participants from the Shannon region believe people to be the most important area to work on and that to answer the research question for the purposes of this research study, the right people are needed.

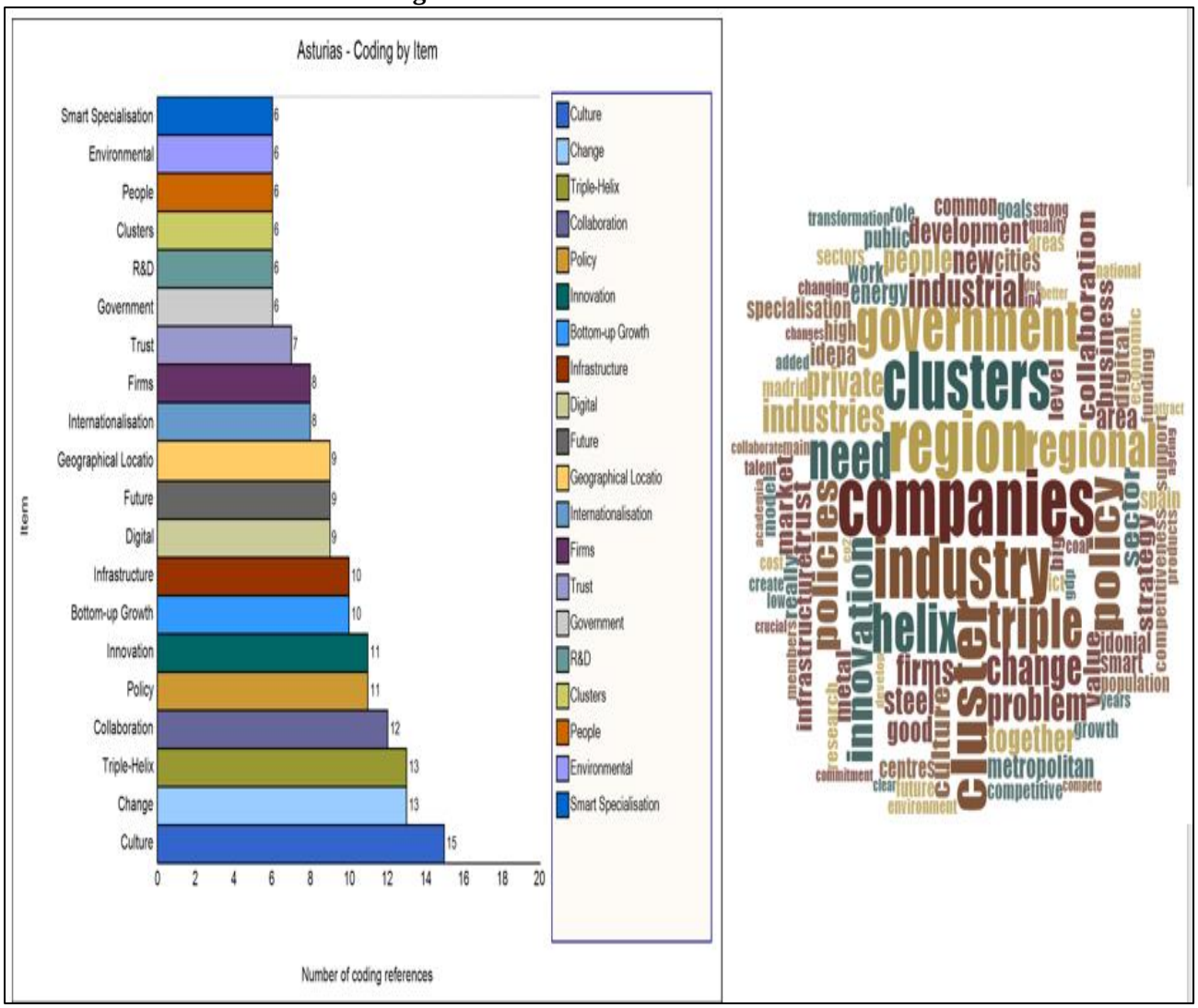
6.4.2. Data Set on Asturias

After exploring the Shannon data, 5 participants were interviewed as part of the Asturias region, Spain (see Figure 6.5) and of those, the analysis indicated that the 'culture' node with 15 references as the most important 'Asturias' category by the participants with change and triple-helix having 13 references. The preceding region focused on people being the most important areas to address, whereas the Asturias participants suggest that people are the least important category with only 4 references.

This is interesting as the Asturias participants would favour the improvement and promotion of their culture over the attraction and retainment of people to their region. It can be said that perhaps they believe that they have the right people in place but that the culture needs to be changed to achieve success or growth. Participant 26 suggested that from a policy perspective, *"cultural activities need to be integrated with music and theatre. Triple-helix is not working very well as companies do not use the results and research from universities. Short terms goals are more important to firms and collaborations are not very strong. Firms do not want to trust academia"*. Participant 27 highlighted that *"cultural change, culture of innovation and*

collaboration are required and must maintain existing industries with 22% of the industries of Spain in Asturias".

Figure 6.5: Asturias Data Set



Source: Drawn by Author from Data

Participant 28 indicated, *"cultural change is needed in Asturias and new investments for triple-helix. The triple-helix has the main role in this regional development and needs to be reshaped to change roles"*. Participant 29 considered that *"Asturias must support R&D policies and investment in the region in the next 5 years and abandonment of the rural economy needs improving. Smart specialisation strategies for Asturias only works with EU support"*. This participant also suggested that *"business corporation and business firms are not really*

cooperating the last decade, generational and cultural change. Clusters are modifying culture behaviour". Interestingly, Participant 30 claimed that the:

> *Government situation has been bad with 4 elections in 5 years so instability for firms. Regional government are a weak government. Research is so far from the needs of business in the region. Firms feel no one is helping them. Principality of Asturias and regional government need to lead the actions. Number of cluster organisations are decreasing at the national level every year as 100 to 83 labelled membered clusters in Spain. In Asturias 6 clusters labelled in 2018, now only 3. Lack of funding and instability of politics and lack of strong government funding and policies to support clusters are an issue. Firms do not understand the role of clusters. The case of MetaIndustry4 was born from private initiatives and helped by government through projects. Private companies have developed this bottom-up cluster. Stakeholders must work together and a clear strategy is needed for all stakeholders to keep our competitiveness and market share. Must redefine products and services and more added value is needed.*

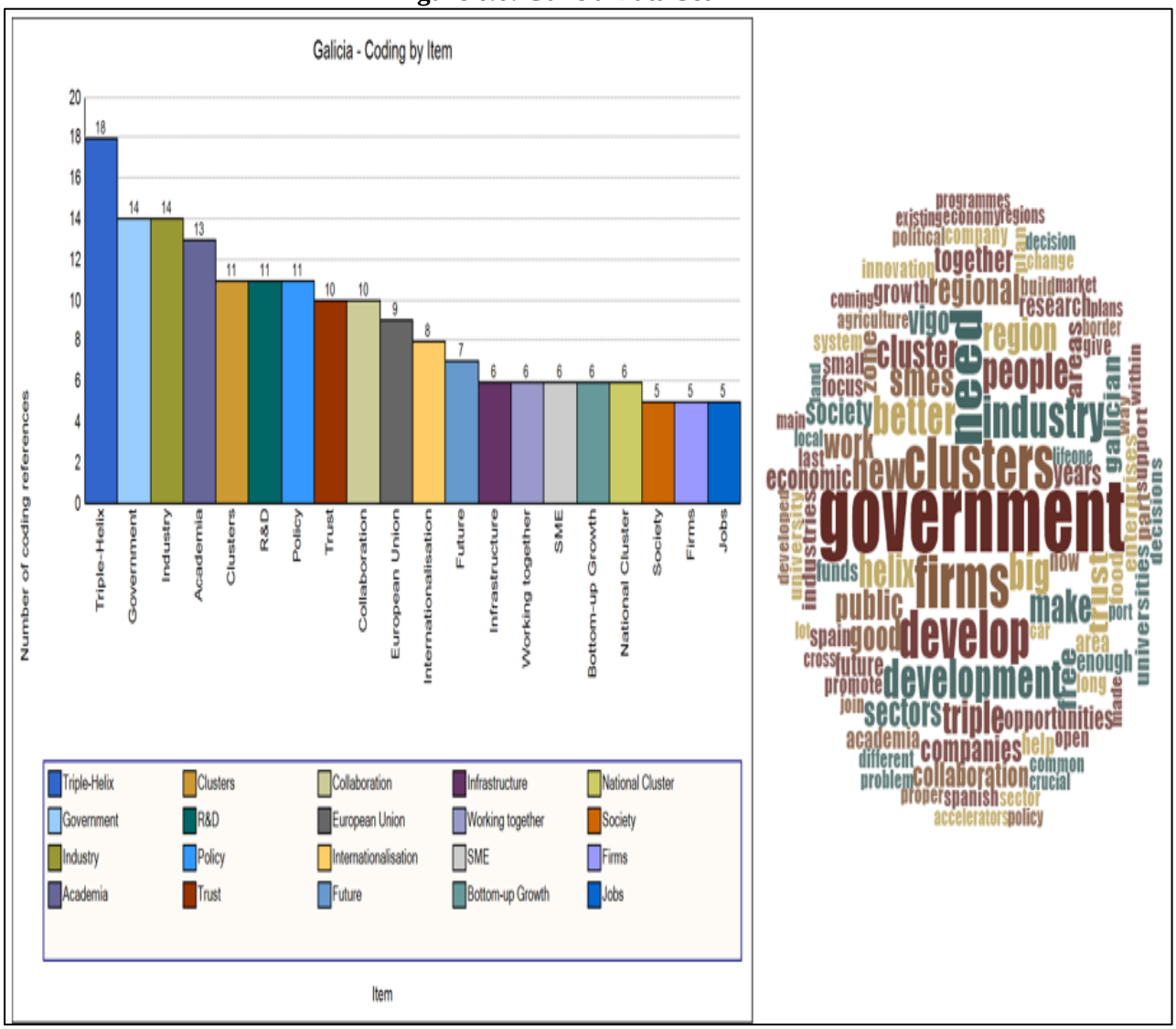
It can be suggested that this trajectory of work establishes what the participants believe are the necessary thematic nodes (mainly, culture) to pay attention to when concerning the 'Asturias' facet of convergence influencing cluster-based economic growth in regions. When comparing the Shannon region and the region of Asturias, it can be said that policy is the highest shared number of references between both regions. The data suggests that the participants from the Asturias region believe culture (see Section 3.6 and 4.3.1) is the most important area to focus on. Culture may be regarded as an interesting insight into the Asturias way of thinking regarding economic growth and regional development and that it is somewhat of a differing opinion. To answer the research question for the purposes of this research study, the right culture is required (Keane, 2012; Mitchell and Wall, 1989; Spilling, 1987, 1991; Hofstede, 1980).

6.4.3. Data Set on Galicia

The Galician region of Spain had 7 participants (see Figure 6.6) with the nodes yet again being categorised by the 'number of coding references'. Of the 7 Galician region participants that

engaged in this research study, the analysis showed that the ‘triple-helix’ node with 18 references as the most important ‘Galician’ category by the participants with government and industry having 14 each and academia receiving 13.

Figure 6.6: Galicia Data Set



Source: Drawn by Author from Data

The data for the Galician participants posits an important emphasis on the coming together and collaboration of the triple-helix actors before anything else. Therefore, one might suggest that the Galician economy is reliant on the triple-helix model. By contrast, society, firms and jobs received the lowest number of references (5). This may indicate that the creation of jobs and the development of firms do not come before the triple-helix milieu in Galicia. To compare

Galicia with the preceding regions, one might say that that the triple-helix (Etzkowitz, 2002; Etzkowitz and Zhou, 2017) context is the most important facet for the region of Galicia and is the node with the highest shared number of references between the regions. The Galician participants have highlighted the importance of the 'triple-helix' context. Participant 13 argued that:

> *A good triple-helix is crucial to Galicia. We need to develop a system that helps industries to grow and be better. Based on good governance, public administration should be solid, transparent, well informed and open. Industry and society need to be updated and need a strong academic system and voice for society and industry. Academia should be at the base of democracy. Decisions can be made at school as students should be responsible, kind, fair and trustful with their peers for the rest of their lives. This can help the regional government of Galicia in the long term. A strategic plan is needed for long term economic development with citizen contribution. Involve people in the whole process of strategic plans and really need democracy as a way to build the base for a convergence approach.*

Participant 15 believed that *"the triple-helix is very important and is increasing every day a bit more, as you can not do anything without innovation and need collaboration with academia and administration. Must internationalise and sell abroad"*. Participant 16 has indicated that:

> *The triple-helix environment in Galicia is very important as it is the one and only way for universities to reach impact on market and society. University of Santiago de Compostela was traditionally focussed on education and a low percentage of research but has changed with more focus on education, research and technology transfer to society. Must join clusters that are working in the same area and develop clusters based on value and output. Academia must collaborate more with industry. It is difficult to improve regional economic growth if working in an isolated way. The challenge of clusters is that they must join forces.*

Participant 17 argued that *"the triple-helix is an example of collaboration with ViaGalicia and ViaExerior all working together to develop accelerators"*, with Participant 18 positing that *"the triple-helix is the most important thing and the University of Vigo are working on this"*. Furthermore, Participant 18 said that Galicia is a closed region with its own language, but it is

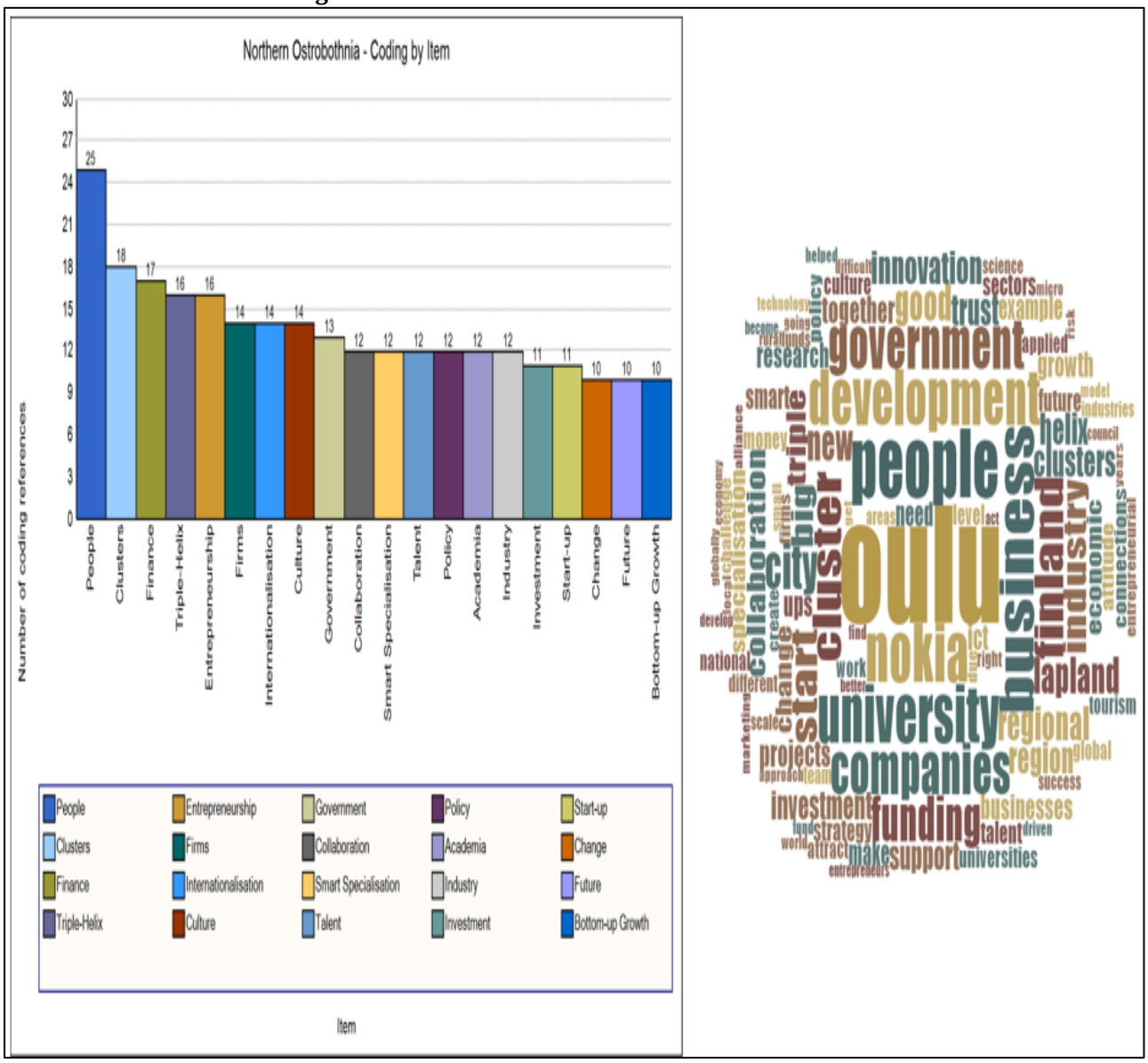
getting more international with a huge effort to become more connected. Several clusters have been created in recent years such as the CEAGA car cluster and *"clusters need to get stronger, better projects to collaborate more internationally and compete and become competitive. Cluster development is based on government decision to fund"*. This would indicate that a more bottom-up industry driven convergence approach to cluster-based economic growth could be a welcome solution to cluster development in Galicia, as it has primarily been based on the top-down governmental approach. Arguably, this practice shows what the participants believe are the essential thematic nodes (mainly, triple-helix) to study and focus on when concerning the 'Galician' facet of convergence influencing cluster-based economic growth in regions.

6.4.4. Data Set on Northern Ostrobothnia

The final region explored was Northern Ostrobothnia of Finland that encompassed 6 participants (see Figure 6.7) and the analysis revealed that the 'people' node with 25 references as the most important 'Northern Ostrobothnia' category by the participants similarly to the Shannon region in Ireland. As the region is geographically positioned on the peripheral of the EU, this might be the main factor as to why people are the most important node to address for this region.

Attracting and retaining people might prove difficult due to where the region is located, its cold climate and standard of living and with the heavy loss of the Nokia manufacturing base. 'Out of times of crisis, comes Opportunity' (Moynihan, 2018) and with the strategic focus of policies on putting people first, this could prove a significant step to achieving economic growth for the region. Change, future and bottom-up growth all received the lowest number of references with 10 which indicates that their level of importance are outweighed by the promotion and attraction of people, cluster development (18 references) and finance (17 references).

Figure 6.7: Northern Ostrobothnia Data Set



Source: Drawn by Author from Data

The triple-helix node can again be regarded as the node with the highest shared number of references between the regions when adding the Northern Ostrobothnia region into the mix. Moreover, the data suggests that the participants from the Northern Ostrobothnia region would agree with the Shannon region participants that people are the most important area to focus on and that the right people are needed to answer the research question. Without people, cluster-based economic growth in Northern Ostrobothnia could prove difficult to achieve and

attracting and retaining talent, specifically in the ICT area and in rural geographical areas is proving challenging. Participant 19 maintained that:

> *People are important and how to keep the people that have the knowledge and skills in these areas are key. Urban growth is happening but rural areas are declining and how do we keep people there. There is a real lack of people in ICT and we are missing professionals with the right skills for industry. The funding systems of clusters is not there and finance support is needed. People in academia and government are encouraging to create links with companies. Continue the growth of cluster development and the spirits to be developed further. Start-ups are key and the start-up of new sectors. Strong research and finding solutions to problems have been key.*

Participant 20 suggested that *"people and the right team are key as high skills are needed but investment, attracting companies and finance are key"*. Conversely, Participant 21 concluded that *"financing is not an issue as investors are looking and as the region got the most investment per capita based on comparison figures with the EU average. Individuals and experienced people are key to the growth of the region"*. This participant further stated that *"people and the role of entrepreneurs cannot be overlooked as experienced people who take risks and have good networks, work together and trust each other are going to help you win"*. Cluster development has been mainly industry driven by industry players working together and joining together. A bottom-up approach is a more effective approach in Northern Ostrobothnia. The *"promotion and attraction of the region and to get people to live there"* must form part of the future, as there is the *"tendency to live in the current situation and not prepare for the future"*; development is steady, but not fast enough as discussed by Participant 22.

Participant 23 posited *"people from the region are afraid of emigrants from developing regions and why would people want to come here. Local government and universities must make it more attractive for people to come here"*. There has been a lack of start-up formation in the region as more big companies are coming in so more investment and finance for start-ups are needed. However, talent competition and attracting people have been a major challenge and

the need to attract more foreign talent is required. *"People are being sucked into the big cities like Helsinki and people are leaving which is a key factor. People are moving out so attracting talent and outside labour is needed"*. Participant 24 identified that *"rural areas and geographical location of the region can be an issue for economic growth"*. One might determine that this entire process depicts what the participants believe are the main thematic nodes (mainly, people) to develop further when concerning the 'Northern Ostrobothnia' aspect of convergence influencing cluster-based economic growth in regions.

6.4.5. Comparison Analysis

Continuing the same process as conducted in Section 6.3.4 and looking at Table 6.4, the data suggests that 'people', 'triple-helix' and 'clusters' were again the nodes that received the most references. The smart specialisation strategies have been indicated as being the medium level of importance arising from the data sets on the 'regions and Bootcamp' and 'literature review' thematic areas, which differs from the triple-helix table in Table 6.3. Asturias participants referred to them 6 times, Northern Ostrobothnia participants 12 times and the EU Cluster Acceleration Bootcamp participants 6 times also. One could argue that this is a unique finding as it goes against what the literature stated about smart specialisation strategies (see Section 3.9 and Chapter Four) when compared with the data collated.

The literature identified smart specialisation strategies as being very important (Hobbs et al., 2018; Xunta de Galicia, 2015; Eastnorth.fi, 2019). In Sections 4.3.1, 4.4.1 and 4.5 in Chapter Four, the smart specialisation strategies were highlighted as important to the regions of Asturias, Galicia and Northern Ostrobothnia, but the analysis in Table 6.4 suggested a medium level of importance. The triple-helix framework and its level of engagement has been highlighted throughout this research study as being vital (see Table 2.5 in Chapter Two) and Downes (2019) has agreed in Chapter Four (O'Reilly, 2019; O'Regan, 2019).

Table 6.4: Regions and Bootcamp Nodes

No.	Node	Asturias	Shannon	Galicia	Northern Ostrobothnia	EU Cluster Acceleration Boot camp	Total
1	Triple-Helix	13	12	18	16	11	70
2	Industry	0	0	14	12	0	26
3	Government	6	7	14	13	11	51
4	Academia	0	0	13	12	0	25
5	Innovation	11	12	0	0	0	23
6	Internationalisation	8	0	8	14	9	39
7	Bottom-up Growth	10	18	6	10	13	57
8	Working Together	0	16	6	0	7	29
9	People	6	33	0	25	10	74
10	Change	13	6	0	10	11	40
11	Entrepreneurship	0	0	0	16	0	16
12	Talent	0	14	0	12	6	32
13	Geographical Location	9	0	0	0	0	9
14	Collaboration	12	6	10	12	0	40
15	Leadership	0	22	0	0	7	29
16	Policy	11	17	11	12	0	51
17	Smart Specialisation Strategies	6	0	0	12	6	24
18	Jobs	0	0	5	0	0	5
19	Finance	0	17	0	17	13	47
20	Firms	8	0	5	14	0	27
21	Investment	0	0	0	11	0	11
22	SME	0	0	6	0	0	6
23	Infrastructure	10	16	6	0	0	32
24	European Union	0	0	9	0	11	20
25	Clusters	6	12	11	18	14	61
26	Environmental	6	0	0	0	0	6
27	Education	0	7	0	0	0	7
28	Tourism	0	6	0	0	0	6
29	Aviation	0	6	0	0	0	6
30	Culture	15	0	0	14	0	29
31	Digital	9	0	0	0	0	9
32	Listening	0	6	0	0	0	6
33	Tax	0	7	0	0	0	7
34	Trust	7	0	10	0	7	24
35	R&D	6	0	11	0	0	17
36	Future	9	0	7	10	7	33
37	National Cluster Policy	0	0	6	0	0	6
38	Industry-Driven	0	0	0	0	6	6
39	Speed	0	0	0	0	7	7
40	Critical Mass	0	0	0	0	6	6
41	Start-up	0	0	0	11	0	11
42	City Regional Model	0	7	0	0	0	7
43	Rural	0	0	0	0	7	7
44	Society	0	0	5	0	0	5

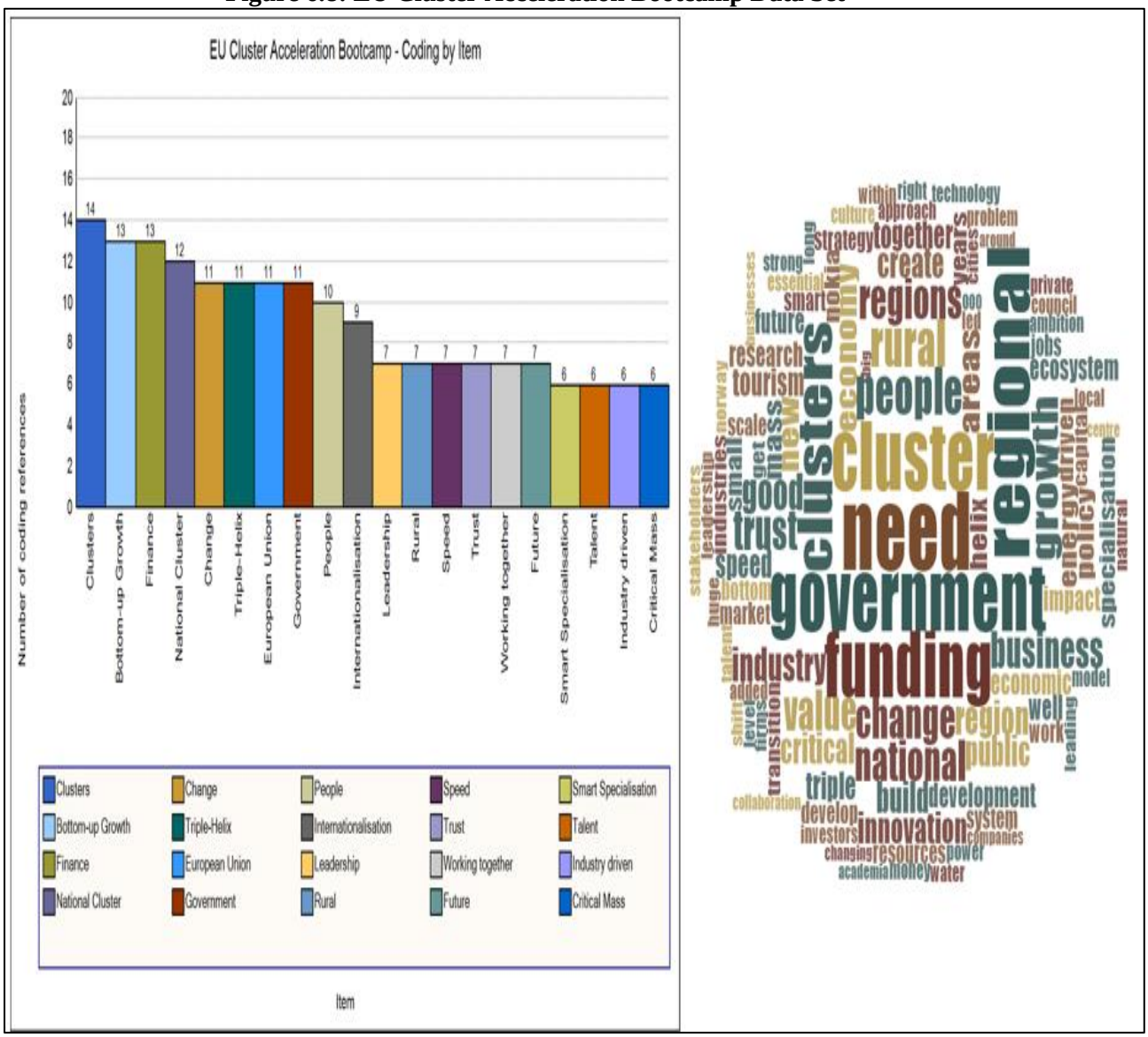
Level of Importance	
	1-20 = Low
	21-40 = Medium
	41-60 = High
	61-80 = Very High

Source: Drawn by Author from Data

As highlighted in Table 6.3, entrepreneurship and jobs were again posited as being of low importance in Table 6.4 by the regions and Bootcamp participants, whereas people, triple-helix

and clusters were again suggested as being the most important. The data suggests that the participants involved in Table 6.4 believe that these three areas are imperative and need to be in place to answer the research question. The last context examined was the EU Cluster Acceleration Bootcamp in Frankfurt (Germany) where 6 participants were studied (see Figure 6.8 below) and the analysis suggested that the 'clusters' node with 14 references was the most important 'Bootcamp' category by the participants. As it was a Bootcamp on clusters, it could be posited that clusters were naturally going to receive the most references, but the significance in terms of their development should not be overlooked.

Figure 6.8: EU Cluster Acceleration Bootcamp Data Set



Source: Drawn by Author from Data

Participant 11 stated that *"we must develop things right now and clusters are a good model and have the power to be used as a political tool to achieve economic growth. Clusters must be business orientated, ecosystem orientated, and investment is needed. Government making clusters possible with funding"*. On the other hand, Participant 7 suggested that now is a *"great opportunity to develop clusters, as the ambition needs to be high but change depends on the person leading the cluster. Clusters need to be industry driven and bottom-up growth. Cluster identity problem locally and internationally"*. Participant 8 claimed that:

> *Policies take time to be improved but long term cluster programmes with good leaders and structures are needed, for example, the Norwegian Cluster programme. Solid infrastructure with a national cluster programme and policy are required with trust being essential. Future must happen fast and mind shift needed, paradigm shift and capability shift. Do the cluster right is essential – do it right and properly. Trust is essential and must collaborate and build profitable industries. Too local focused, attract the best people in that field and export markets are key. Internationalise but a challenge is language and structural challenges. Invest in the industries of the future and EU Smart Specialisation Strategies focusing on regions developing new industries from scratch are important. Policymakers need a paradigm shift and must engage stakeholders - national and regional, university policy and industry leaders. Conversation based discussions are needed. People currently making policy decisions need upskilling. Think Global, Act Local is key.*

Participant 9 indicated that *"clusters must act as a voice for the sectors to achieve critical mass and a facilitator of economic growth inviting investors in as finance is needed. Bottom-up growth to become more efficient"*. It can be concluded that this work highlights what the participants believe are the main thematic nodes (mainly, clusters) to fully focus on regarding the 'Bootcamp' part of convergence influencing cluster-based economic growth in regions. Clusters should act as a strategic voice for their sectors and help to transform the industry, however as Dragomir (2020) stated, clusters should not be usual, but unusual. The future of policy development from an EU perspective should include the development and enhancement of clusters as a priority and this has been a key catalyst to come out of the Bootcamp. One

might suggest that the development of clusters and advancement of existing clusters has been identified as being vital to the future growth of regions. The main literature review areas of interest and themes (other measures) are now explored regarding the data analysis derived from the NVivo software after completing the six steps of thematic analysis (Braun and Clarke, 2006).

6.5 Data Sets by Other Measures

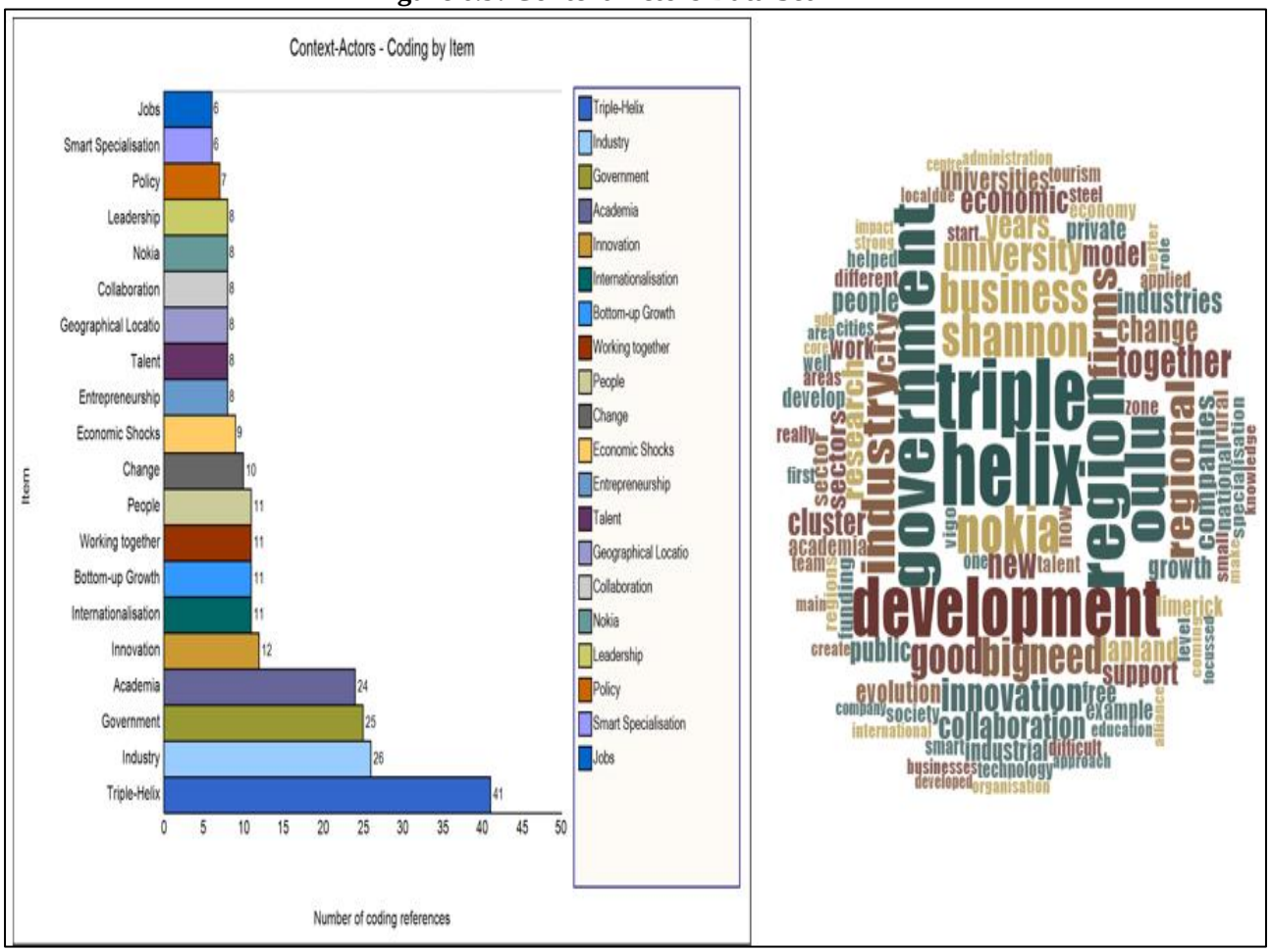
The data sets have been organised by other measures with relevance to the thematic areas of interest derived from the literature review chapters (see Section 4.8 and Figure 4.10). These areas of interest have been identified as: (1) Context/Actors; (2) Components; (3) Policy; (4) Enablers and (5) Outcomes. Each of the 30 participants have had their full input represented and analysed to effectively demonstrate their comprehension of this research study, the research question and to enable the reader to understand their contributions. The following sections have gone through each of the five literature areas of interest in detail and have illustrated the main nodes (and their frequency) that have evolved from the semi-structured interview approach (see Appendix M).

6.5.1. Data Set on Context/Actors

Of the entire 30 participants across the 5 contexts identified above and with the focus now being on the literature thematic areas of context-actors, components, policy, enablers and outcomes, this section will focus on the context-actors node. The analysis of this area indicated that the 'triple-helix' node with 41 references as the most important 'context-actor' category by the participants with industry having 26, government with 25 and academia with 24 (see Figure 6.9). Participant 1 stated that "*the triple-helix tourism strategy helped achieve 5-10 years growth but businesses need nurturing"*. Participant 11 argued that:

The triple-helix has been extremely important for innovation and to increase productivity. It has helped firms become more innovative and work together. The triple-helix tourism strategy in 2000 helped achieve 5-10 years growth but businesses need nurturing. Rural areas need to be supported by government as there is the potential but a need for strong companies. Academia are not concentrated on rural areas but vocational schools are critical.

Figure 6.9: Context-Actors Data Set



Source: Drawn by Author from Data

Participant 12 stated that the *"triple-helix is important with the systematic innovation connected to it to create change, thus influencing economic growth"*. From the triple-helix standpoint, *"universities have been doing branding projects and team development with the team at Quieton and government support R&D projects and loans of up to 50%"*, as posited by Participant 20. Participant 14 posited that the *"triple-helix does not have enough support to fully develop and industry and academia have difficulties for SME transition from the triple-*

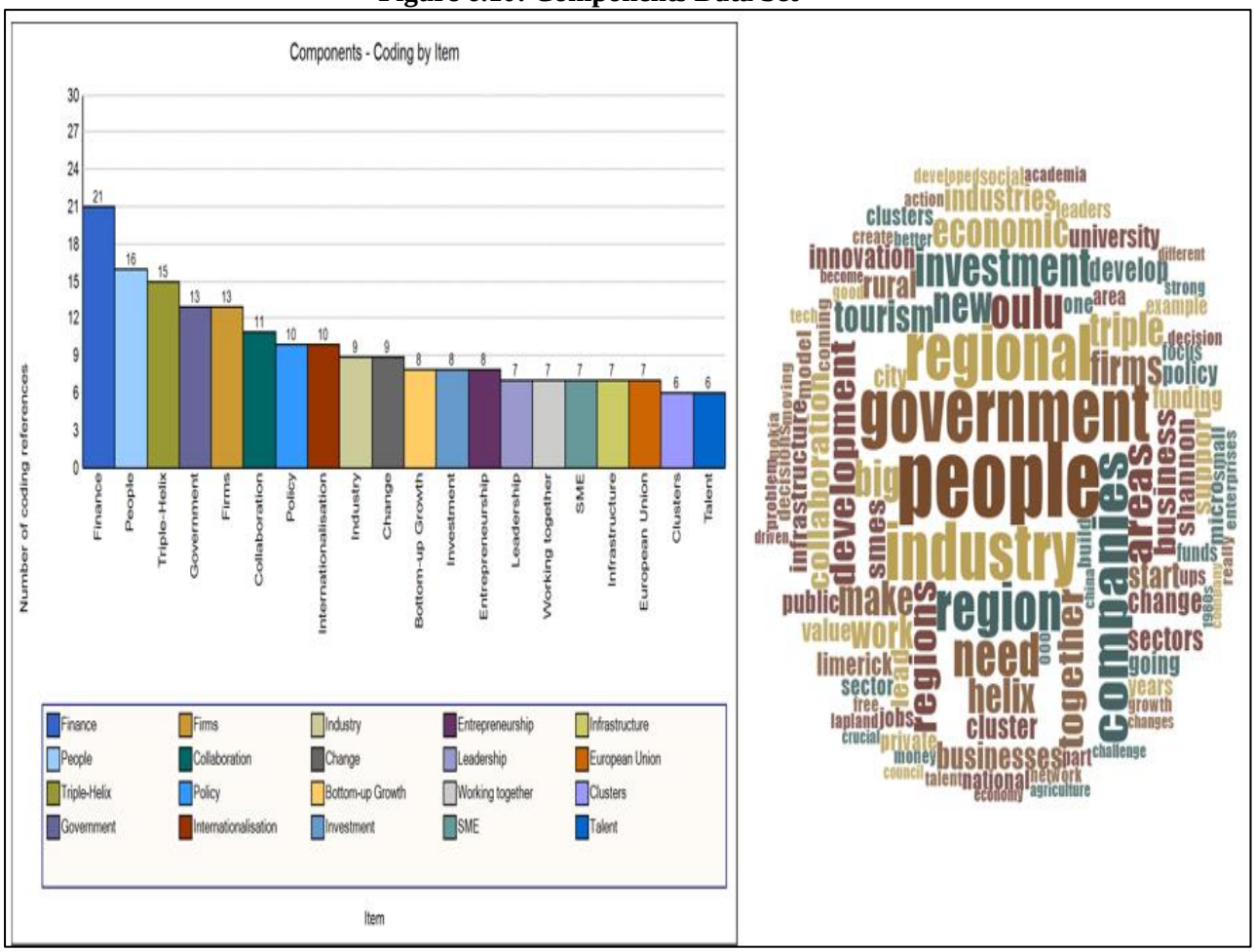
helix. Something is breaking within the triple-helix, it is like a bike pulling the chain to run". Participant 15 debated that the *"triple-helix is very important and is increasing every day a bit more can not do anything without innovation and need collaboration with academia and administration"*. Whereas, participant 16 mentioned that the *"triple-helix is very important and one and only way for Universities to reach impact to market and society"* and participant 18 said the "*triple-helix is the most important and the University of Vigo are working for this".* Participant 22 stated that *"triple-helix knowledge alliance approach is crucial to see/foresee emerging industries"*. Participant 1 mentioned that not to forget the *"quadruple-helix as society are key and government clear consistent policy is lacking with the system needing to move together not separately"*. It can be said that this procedure signifies what the participants believe are the main context-actors thematic nodes (primarily, the triple-helix approach) to focus on for convergence to influence cluster-based economic growth in regions. Creating the correct triple-helix environment is imperative for any region going forward.

6.5.2. Data Set on Components

The 30 participants stressed that 'finance' was the most important component with 21 references (see Figure 6.10). As described in Table 1.3 in Section 1.7, finance (Lagendijk, 1999, p 23; Dailey, Demo and Spillman, 2003; Pinoyme.com, 2011; Appelgren, 2004) is a key factor of convergence, thus the data analysis would suggest that finance is the key component area for policymakers to focus on when answering the research question. Participant 10 stated that *"government regional money needs to help the shift"*. Participant 12 suggested that *"ERDF funding has been important for regional entrepreneurship and talent. EU funds are very important for economic development".* Conversely, Participant 13 indicated that *"finance is tricky as funds are given to Galicia to develop certain types of industries and give up other*

industries, for example, Spanish agriculture is not prioritising the production of milk as much. EU funds help farms but face pressure in another way to adhere to EU standards".

Figure 6.10: Components Data Set



Source: Drawn by Author from Data

Participant 19 debated that *"financing is through projects currently and the funding systems of clusters is not there. Government funding, academic support for innovation and companies must see the value for this work to take part in and financial support needed"*. Participant 27 posited that finance is important with *"finance, investment and strategic decisions needed"* to achieve economic growth. Participant 29 argued that *"public and private collaboration is key and that public gives funds and private do their part"*. This process indicates what the participants believe are the core component thematic nodes (mainly, finance is required) to encourage convergence to influence cluster-based economic growth in regions. Finance is

important for any region and their policymakers. However, the sustainability and attraction of finance can be difficult to achieve. With the implementation of convergence cluster-based economic growth, this could help to attract more finance by working together more collaboratively and moving towards equality.

6.5.3. Data Set on Policy

Of the 30 participants 'policy' itself was indicated as the most important policy area with 33 references (see Figure 6.11). To support this, smart specialisation strategies were regarded as being the next most prevalent policy node with 15 references along with the European Union with 12 references. Participant 1 identified that *"government partial politics needs to be put to the side and must be policy-driven"*. Participant 12 argued that:

> *EU Smart Specialisation Strategies need speed and critical mass. These policies must transform regions and get regions to think about what matters the most. They must improve and work jointly with clusters and regional stakeholders to connect with the market in a meaningful way. New politicians need to build on the smart specialisation strategies in the past by doing interviews with key stakeholders. Continuity is needed and there is a lack of ownership. The bottom-up approach of critical mass of stakeholders is required.*

Participant 10 focused their discussion on the need to promote the regional level more so than the national level as there needs to be more attention dedicated to what is happening within the region. *"Regional level needs more competence on what works and less insight into national impact policies. Policies needs to be more regional focused to improve growth"*. Participant 11 mentioned that *"the regional strategy is concentrating on Tourism and Mining. National polices are not helping and smart specialisation strategies have been key to guiding funding and rural funding. A common strategy is happening now"*. Participant 13 maintained that *"a*

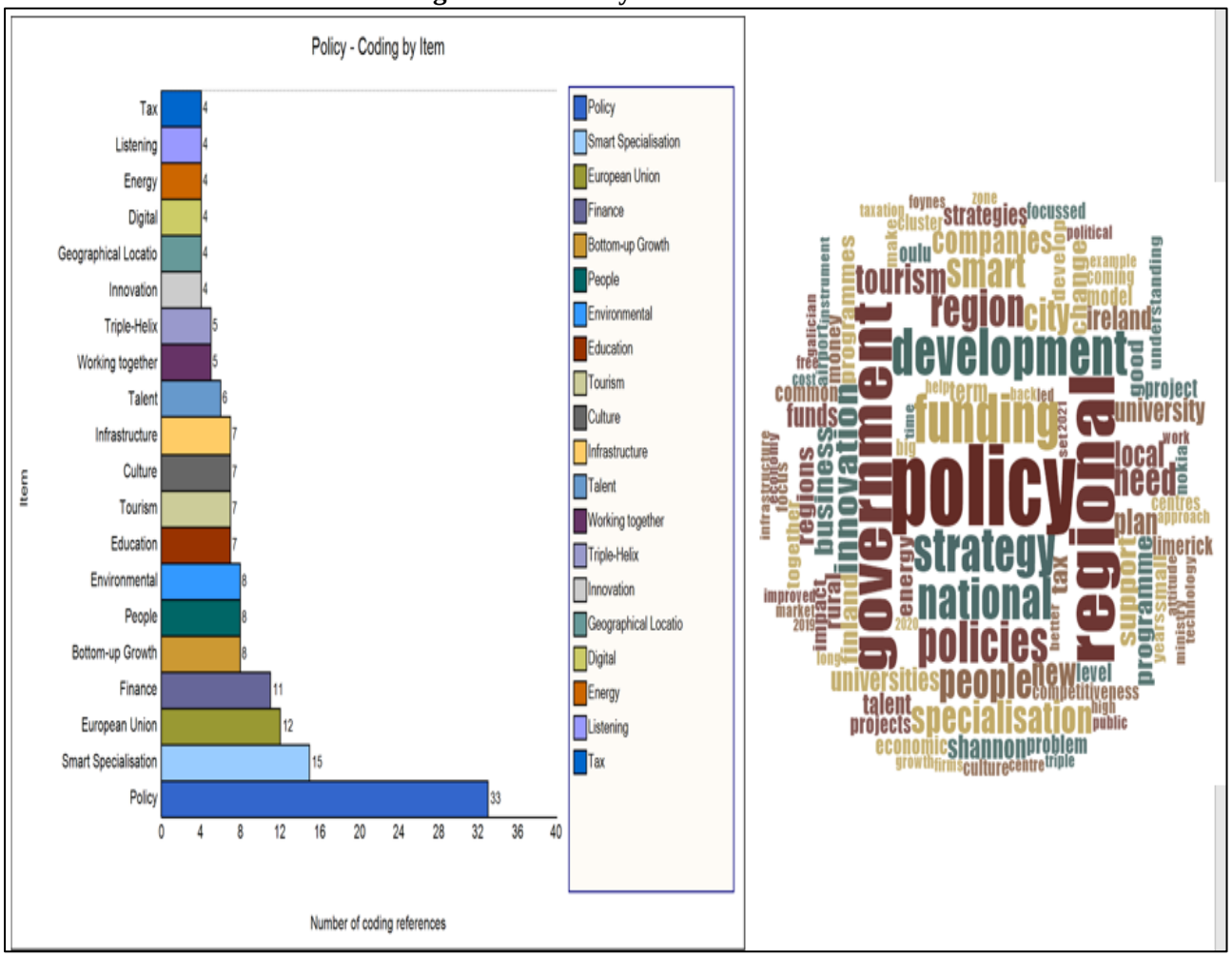
stronger voice in the Spanish parliament is needed for Galicia with training programmes and team of independent experts to set up a proper plan with steps and guidelines for council".

Participant 15 posited that *"S3 plan was important to understanding common and cross border collaboration and policy documents 2021 on regional tourism. Galician government 2021-2027 main areas examined are quality of life, sea, renewable energy, cars and automation sectors"*. Whereas, participant 16 suggested that *"government must support companies to do R&D"* and participant 17 said that *"the free zone was a medium to change the economic of the area and be different"*. Participant 18 referenced the *"Xunta de Galicia policy as the University of Vigo depend on this and the government decided to join better research in the research singular centres programme"*. The smart specialisation strategy of Galicia was highlighted as being crucial to the economic development of the region, supported by Xunta de Galicia. Some interesting insights provided by Participant 28 regarding how the smart specialisation strategy should look:

> *Smart specialisation strategies should have an economic promotion with a commercial focus. Asturias academia environment is the universities, technology centres and research centres. Some policy areas:*
> *(1) Reshaping stories – thinking more strategically and share common goals;*
> *(2) Strategies must be territorial based and retain & attract talent;*
> *(3) Promote Asturias as a metropolitan area with 3 close cities working together;*
> *(4) Training and innovation polices are key. Infrastructure and ports have been important; and*
> *(5) Environmental policies are key, as is circular economy.*

More collaboration between the triple-helix stakeholders are needed and not to be working on their own. Participant 19 concluded that the *"smart specialisation strategy needs to enhance the cooperation between academia and industry and companies to receive funding under the EU funding instruments such as Innosup-01".* For *"smart specialisation strategies to work, a clear understanding of the region must be there and its sectors"*, as stated by Participant 22.

Figure 6.11: Policy Data Set



Source: Drawn by Author from Data

Participant 27 identified that *"climate change, CO2 emissions and innovation policies are important"*. Participant 30 stated that *"smart specialisation strategies should be important but they are not enough, a regional approach to economic growth is required. From a policy level, particular attention to the future development of smart specialisation strategies at the regional level and EU-wide initiatives that influence regions could prove important"*. This whole practice alluded to what the participants believe are the fundamental policy thematic nodes (principally, smart specialisation strategies) for convergence influencing cluster-based economic growth in regions. The development of smart specialisation strategies for all regions based on the existing resources-at-hand and existing sectors could provide policymakers with a clear strategic plan for the future of their growth.

6.5.4. Data Set on Enablers

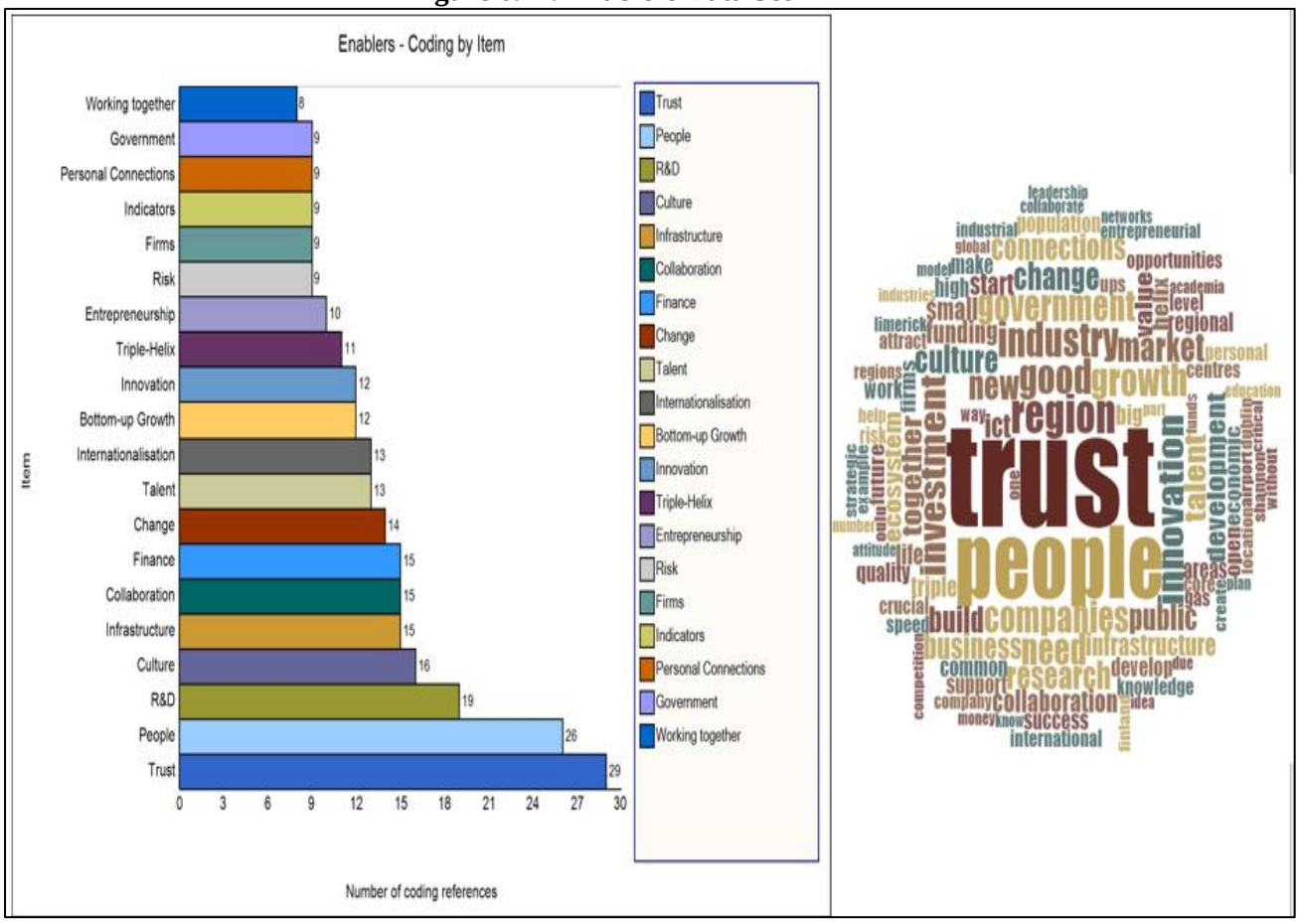
With the focus now on the enablers thematic area, of the 30 participants 'trust' was exemplified as the imperative enabler node with 29 references (see Figure 6.12) followed by people which received 26 references. Fostering trust between the key regional stakeholders that have great significance in terms of regional growth and policy development can be described as imperative with the support of the right people in place. The area of trust has been emphasised in the literature review (see Section 1.3) and in the data collection process. Participant 10 outlined that *"trust is openness and understand what really is an ecosystem. Need open innovation and dependent on each other. The future is trust and understand an open innovation ecosystem as the future must be open"*. Participant 12 stated that:

> *Trust is crucial to build within regions and the triple-helix stakeholders. Without trust, you cannot create change. A main weakness is to trust within and between the region is closely connected. The future must be open and trust is important to an open innovation ecosystem.*

Participant 13 said that *"trust, openness, motivation and people are key and that trust needs to be in the same position for the triple-helix to work"*. Whereas, participant 14 argued that *"there was not representation up until 2018 for SMEs so there was no trust up to then. Lack of trust came from not knowing how things are going. Trust is basic but hard to reach as lack of trust is based on the feeling of own agendas to reach targets"*. *"Trust is key as we must work together as silos are not enough"*, stated participant 15. Participant 16 shared the thoughts that *"trust is the most important thing to joining the triple-helix which is the main point"*. Participant 18 argued that *"trust is crucial and that without trust there is no investment, collaboration and R&D"*. This participant stated that *"the university problem is that the researchers do not trust others sometimes internally as there is more trust from others outside research centres but not internally"*. On the other hand, Participant 23 argued that *"trust is by default and it is a key factor for start-ups and VC's* and *"trust is key for everything"* said

participant 24. Participant 26 offered a different insight as *"trust is very low between the triple-helix and must change trust and potential of the region and mind-set".* Another opinion was provided by Participant 6 who posited that *"trust is earned and developed over time where you start small and grow over time. Shared common goals are the future".* The Shannon region participants believe that having the right people in place to provide strategic leadership and direction is crucial to answering the research question.

Figure 6.12: Enablers Data Set



Source: Drawn by Author from Data

One could propose that without a high level of trust between the key regional actors, achieving cluster-based economic growth in regions would be difficult to achieve. Collaboration, working together and getting things done would be more difficult and challenging without trust. The area of trust is a key enabling factor of convergence that has been discussed throughout this research study and must be embraced for change to occur. The data suggests that trust needs to

be developed between all regional stakeholders to encourage convergence to influence cluster-based economic growth in regions (Paniccia, 1998; Saxenian, 1994; Maskell, 2001; Delgado et al., 2010, 2011, 2014).

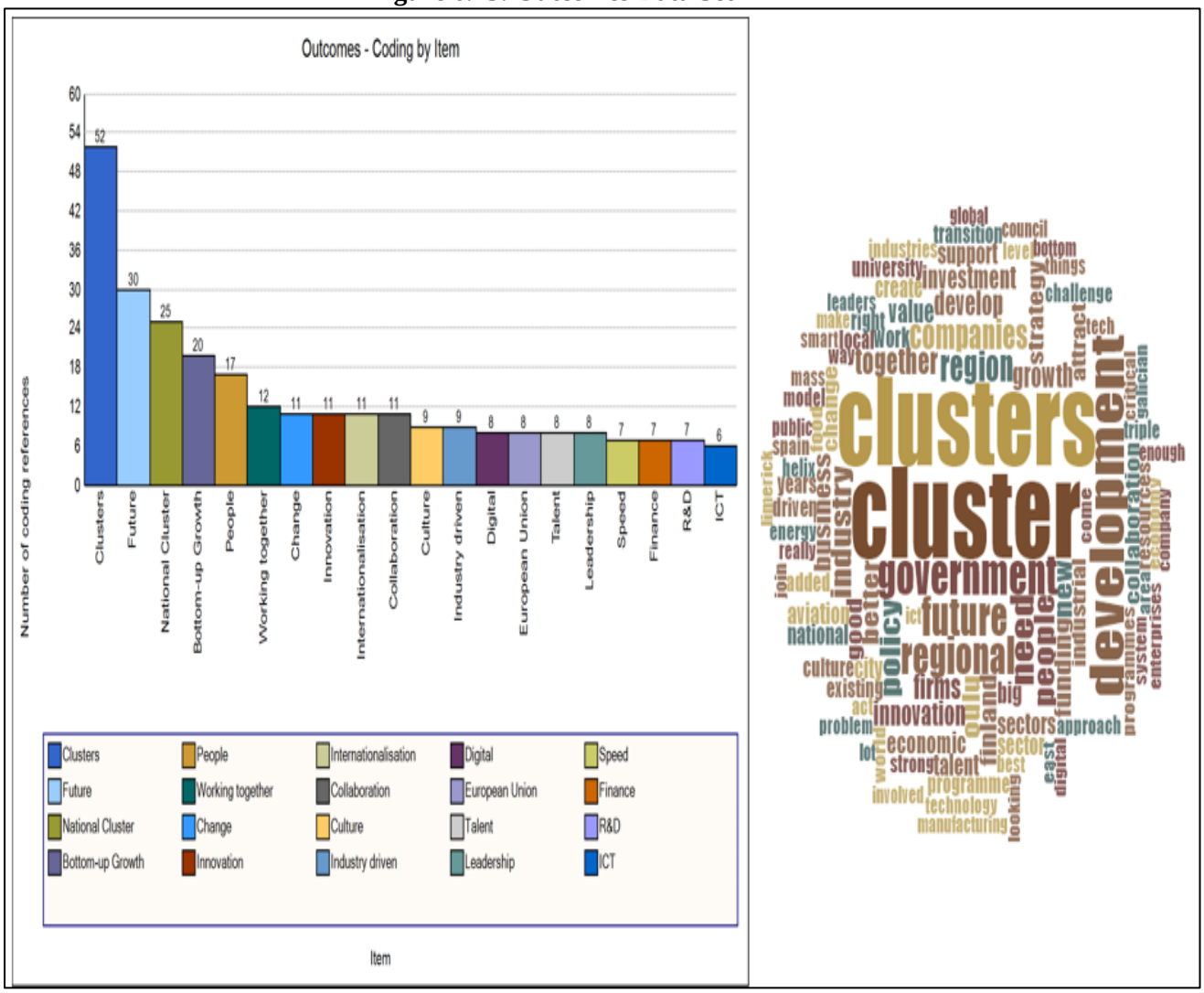
6.5.5. Data Set on Outcomes

Outcomes are the last literature review thematic area to be examined. Of the 30 participants 'clusters' have been identified as the most important outcome area with 52 references (see Figure 6.13). This outcome could serve as an opportunity for policymakers, academics and other interested parties to explore the development of clusters or growth of existing clusters as a tool for achieving economic growth and future research activities. Clusters may act as a driver of economic growth, but they must be developed strategically and aligned with the regional resources at hand. The development of clusters based on what is happening externally to the region could be used as a benchmark (e.g. Silicon Valley ICT Cluster), but the idea of replication should be tentatively explored. It can be said that not every region might require a cluster or has the capacity to develop a cluster, but the transformation and evolution of existing sectors through clusters could serve fruitful. Participant 1 argued that we must *"make decisions and back them between triple-helix actors and government are responsible for policy. Cluster development dies but doing it now, but clusters continue to emerge but need policy"*. Participant 8 emphasised that clusters must be done right and properly, but they are a natural phenomenon in regions with pre-existing clusters. *"Building a cluster takes time but a bottom-up approach is needed"*. Participant 10 highlighted that:

> *Cluster development is far too introvert as putting everything based on themselves and swimming inwards. Inward way of thinking is a big challenge and an open, willingness and cross-sectoral collaboration approach must be much stronger. Outward looking clusters are important.*

As stated by Participant 11, *"clusters must be business orientated, ecosystem orientated and investment is needed"*, whereas Participant 12 suggested that *"clusters need to be champions and become superclusters for their sectors. They need to be clusters of change, not usual to achieve big critical mass of clusters".* Whereas participant 13 debated that the *"promotion of clusters needs to be done better as they need to promote themselves better. Cluster development should open themselves and promote themselves better and offer programmes with education to develop training programmes with industry"*. Participant 14 identified that *"cluster development is important to foster trustful relationships between and within industries. SME point of view and they must have a presence within clusters"*.

Figure 6.13: Outcomes Data Set



Source: Drawn by Author from Data

Participant 16 suggested that the development of a cluster *"must be based on value and output"*. Participant 22 argued that clusters must be based on the *"biggest potential and future orientated and a joint game is a win. Collaboration, change mind-set and strategic planning are needed"*. Participant 27 thought that cluster development can evolve naturally with *"collaboration between firms and they must be based on clusters of innovation with a bottom-up approach"*. Participant 29 considered that clusters are modifying cultural behaviour. "*A bottom-up approach must be created by the industrial sector and a top-down approach by the administration. ICT ClusterTIC is a top-down cluster and the only one that still exists out of the 10 clusters in Asturias"*. Byrne (2016) and Hobbs (2019) have argued that for clusters to be successfully developed: (1) private/public funding; (2) a designated cluster manager; (3) a cluster organisation; and (4) a cluster strategy/policy are crucial. Someone to manage the daily operational activities and to bring the triple-helix actors together needs to be in place for clusters to be successful. The participants of this research study believe that the necessary outcome thematic node, 'clusters' are needed for convergence to influence cluster-based economic growth in regions. Therefore, clusters must form a strong part of the strategic plans developed by policymakers.

6.5.6. Comparison Analysis

When comparing the literature review thematic areas of interest, the data suggests that 'people' and 'triple-helix' were the nodes that received the most reference. These nodes have been emphasised throughout the data analysis as being of critical importance. This would indicate that with the right people and the right engagement of the triple-helix actors in place, economic growth could occur. For future works and policy developments, people and the triple-helix model should be explored as areas to address and include.

Table 6.5: Literature Review Nodes

No.	Node	Context-Actors	Components	Policy	Enablers	Outcomes	Total
1	Triple-Helix	41	15	5	11	0	72
2	Industry	26	9	0	0	0	35
3	Government	25	13	0	9	0	47
4	Academia	24	0	0	0	0	24
5	Innovation	12	0	4	12	11	39
6	Internationalisation	11	10	0	13	11	45
7	Bottom-up Growth	11	8	8	12	20	59
8	Working Together	11	7	5	8	12	43
9	People	11	16	8	26	17	78
10	Change	10	9	0	14	11	44
11	Economic Shocks	9	0	0	0	0	9
12	Entrepreneurship	8	8	0	10	0	26
13	Talent	8	6	6	13	8	41
14	ICT	0	0	0	0	6	6
15	Geographical Location	8	0	4	0	0	12
16	Collaboration	8	11	0	15	11	45
17	Nokia	8	0	0	0	0	8
18	Leadership	8	7	0	0	8	23
19	Policy	7	10	33	0	0	50
20	Smart Specialisation Strategies	6	0	15	0	0	21
21	Jobs	6	0	0	0	0	6
22	Finance	0	21	11	15	7	54
23	Firms	0	13	0	9	0	22
24	Investment	0	8	0	0	0	8
25	SME	0	7	0	0	0	7
26	Infrastructure	0	7	7	15	0	29
27	European Union	0	7	12	0	8	27
28	Clusters	0	6	0	0	52	58
29	Environmental	0	0	8	0	0	8
30	Education	0	0	7	0	0	7
31	Tourism	0	0	7	0	0	7
32	Culture	0	0	7	16	9	32
33	Digital	0	0	4	0	8	12
34	Energy	0	0	4	0	0	4
35	Listening	0	0	4	0	0	4
36	Tax	0	0	4	0	0	4
37	Trust	0	0	0	29	7	36
38	R&D	0	0	0	19	7	26
39	Risk	0	0	0	9	0	9
40	Indicators	0	0	0	9	0	9
41	Personal Connections	0	0	0	9	0	9
42	Future	0	0	0	0	30	30
43	National Cluster Policy	0	0	0	0	25	25
44	Industry-Driven	0	0	0	0	9	9
45	Speed	0	0	0	0	7	7

Level of Importance	
	1-20 = Low
	21-40 = Medium
	41-60 = High
	61-80 = Very High

Source: Drawn by Author from Data

Examining Figures 6.9-6.13 one-by-one, triple-helix, finance, smart specialisation strategies, trust and clusters were the areas that received the highest levels of importance. Russell (2019) argued in Section 4.2.2 in Chapter Four about people thriving and the **people** (Hulbert, 2012;

Blöchliger and Vammalle, 2012) node has been highlighted throughout the comparison data sets with a total of 230 references as the most pivotal to this research study (see Tables 6.3-6.5). Tables 6.3-6.5 demonstrates the derived data analysis and indicate that **triple-helix** (Etzkowitz, 2002) is the second most important node for this research study with a total of 217 references. The **clusters** node has been identified as the third most critical node with 183 references (Dragomir, 2020; Idepa.es, 2019; Clusterasturias.es, 2019; Clusters Galicia, 2019; Eastnorth.fi, 2019; Clusters of change, 2020; Edmond, 2015). Antonescu (2014) argued that a more bottom-up convergence approach to regional development is required placing 'businesses', 'entrepreneurship' and 'capital investment' at the heart of regional development (Rodríguez-Pose, 2000). To support this, industry (business) was referenced 94 times, entrepreneurship received 57 references and investment incorporated 19. The data in Tables 6.3-6.5 suggest that jobs received a low level of importance throughout, which would indicate that jobs need more research and support from the key regional stakeholders.

6.6 Other Areas of Interest

After conducting the data analysis with the 30 participants, some other key areas of interest were extracted (see Table 6.6). These serve as a consensus of the sample and serve as an output of this research study and have been illustrated in a table format to clearly and transparently showcase them and their particular relevance. It could be argued that convergence studies in conjunction with cluster studies and cluster strategies can not be solely regarded as the key to solving a region's economic challenges. People, businesses, workers, owners - they can all be described as forming part of a local economy and there is no magic formula for solving any one problem (Dreyfuss, 2011). People, triple-helix and clusters have all been identified as the most pertinent nodes to this research study which can be argued as being critical areas to research and examine based on 'how does convergence influence cluster-based economic

growth in regions'. There is a consensus that a multi-faceted approach must be taken and the convergence approach within cluster strategies may be one factor to a region's economic growth approach. Overall, convergence and cluster studies can surprise and delight economic developers by providing new insights and deeper acumens of their local or regional economy (Brown, 2006).

Table 6.6: Data Analysis: Other Areas of Interest

- Clusters must act as a strategic voice for sectors with real added-value and they need level playing fields. A strong communication channel to government is needed.
- Clusters evolve as a facilitator of economic growth and help to educate the future workforce and invite investors in.
- Cluster development is far too introvert as putting everything based on themselves and swimming inwards. Inward way of thinking is a big challenge. Open, willingness and cross-sectoral collaboration must be much stronger.
- The government should act as a glue and join this initiative. Involve society at the heart of the cluster.
- Clusters must be based on the biggest potential i.e. Energy, environmental issues, CleanTech, circular economy and IN4.0 technologies - Cluster development must be future-orientated and must change the mind-set and needs strategic planning.
- Triple helix must come together and change agents and new ideas around regional talent and capital.
- Speed and energy, solve with more technology – the challenge of energy transition is bigger.
- Upward convergence adoption and bottom-up growth with business and society at the core to become more efficient.
- Develop pre-existing industry sectors.
- Needed: A new entrepreneurial way of thinking and the education of cluster managers is key. Need for a new cluster definition to suit the modern era
- Future: Continue the growth of cluster development and the spirits to be developed further. Start-ups are key.
- Attract investment from outside, people and talent are needed – Innovation.
- Vision for digital solutions and attracting labour. Focus on collaboration and solutions to find labour is needed. A strategic plan is needed for long term economic development.
- To achieve significant and sustainable growth, must group the resources and skills to work more effectively on a common goal, according to a strategic plan with shared bases.
- Coming together of leaders and wrap yourself around leaders.
- New innovative ideas such as high-speed trains, port re-development, rejuvenation and digitisation of existing and declining sectors.
- Identify long-term strategic plans for low added value jobs that are being taken over by technology.
- Enhanced regional chambers of commerce strategy and continuous rural regeneration programmes are needed.

Source: Drawn by Author from Data

Economies are much better viewed as linked clusters of activity across various industrial sectors rather than as secluded sectors, thus the cluster approach is more of a lens through which a regional economy can be more efficiently explored and understood than it is a set of prescriptive policies. Since the assessment of a conceptual framework is its value in understanding the world, cluster analysis easily qualifies as a significant approach (Wolman

and Hincapie, 2014; 2015) to regional economic growth. For the purposes of this research study, the consensus is that there is a great emphasis on government initiatives and public funding mechanisms for regional development (Muro and Katz, 2010; Burke, 1995). However, as argued by Antonescu (2014), a bottom-up approach to regional development is required by placing predominantly 'people', 'triple-helix' and 'clusters' at the heart of regional economic development and that industry come together to improve regional development (Rodríguez-Pose, 2000; Valdenebro, Fernández and Renders, 2020; Cor.europa.eu., 2019; Dragomir, 2020; Clusters of change, 2020).

6.7. Answering the Primary Research Question

In answering *'How Does Convergence Influence Cluster-Based Economic Growth in Regions'*, the data suggests that convergence can influence cluster-based economic growth in regions with the right 'people', 'triple-helix' environment and 'clusters' in place. The answer to the primary research question is 'people', 'triple-helix' and 'clusters' are needed for convergence to influence cluster-based economic growth in regions. These nodes received the most frequent references as per the participant's analysed (see Table 6.2), thus positing that if they are in existence and effectively put in place, then: (a) there is a presence of convergence; and (b) the convergence approach can influence cluster-based economic growth in regions.

This is open to interpretation and can be argued by researchers, policymakers and industry experts, but for the purposes of this research study, they are the most salient nodes of interest to answer the research question. In support, there are other nodes of importance which have been highlighted throughout this chapter (mainly in Tables 6.3-6.5) and one might posit that these too need to be examined when answering the research question. On reflection of the three comparison tables, the nodes which were identified in commonality and formed part of the blue

category (signifies ‘high’ ranging from 41-60 level of frequency) are: Government; Bottom-up Growth; Policy; and Finance.

These nodes have been identified in the literature review chapters as being important and are now discussed. **Government** are a key cluster factor that are required to improve the development of an economy and its regions (Muro and Katz, 2010). Burke (1995) further highlighted that governments are crucial facilitators which must take an active role in encouraging enterprise (see Section 3.6.1) and regional development through policymaking decisions (Porter, 2000a). Nakaoka (1982, 1987, 1990, 1994, 1996) has debated that many criticise the theory suggesting that government policies are much more powerful drivers of economic growth. Antonescu (2014) argued that convergence (**bottom-up growth**) and the act of moving towards equality and high levels of co-opetition between the triple-helix actors (Etzkowitz, 2002; Etzkowitz and Zhou, 2017) are key areas of convergence with the emphasis on bottom-up (Feser, 2006) collaboration as the enablement of growth for the regional economy (Etzkowitz, 2002).

Lundström and Stevenson (2001) have identified that key **policy** areas regarding the development of start-ups, early-stage growth of entrepreneurial businesses and entrepreneurial businesses engaging in innovation are important to local, regional and national policy issues. (Porter, 2000a). The advantage of cluster policy is that it supports groups of actors (firms, suppliers, service providers, related industries, research) to address problems common above the industry level, yet are more targeted than the sector level without threatening competition. According to the Commission of the European Communities (2008), access to **finance** for any business and regional environment can be classified as a fundamental requirement (Pinoyme.com 2011; Kuah, 1998). Arguably, some or all the nodes that have been identified in the comparison tables 6.3-6.5 must be adopted in some regard as every region is different

and has different resources available (Bergman and Feser, 1999; Feser and Bergman, 2000). Nevertheless, if the nodes are adapted to the resources at hand, the research question can be answered. It is important to compare the data analysis with the factors of convergence (human capital, social capital, entrepreneurship, communities, trust, bottom-up growth, working together, enterprise developments, coopetition, content, knowledge sharing, distribution, finance and cross-promotion) in Table 1.3 in order to answer the research question (Lagendijk, 1999, p 23; Dailey, Demo and Spillman, 2003; Pinoyme.com, 2011; Appelgren, 2004). The data suggests that human capital, entrepreneurship, trust, bottom-up growth, working together and finance are the most important convergence factors needed to answer the research question.

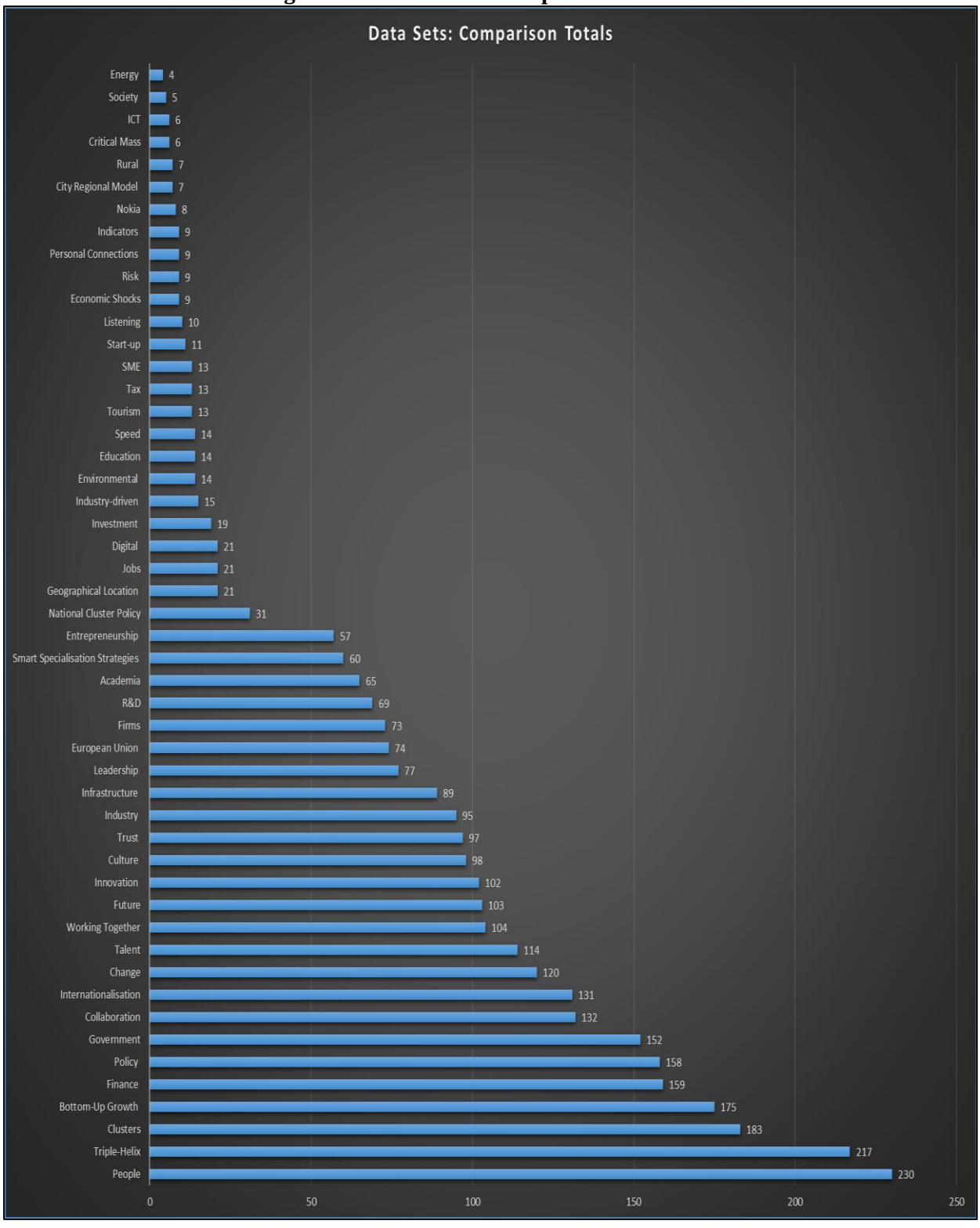
6.8 Conclusion

This chapter has concentrated on addressing the research question by intrinsically examining the data collated, thus highlighting the most important themes and nodes that are aligned with this research study. Each of the participants' profile (see Table 6.2) has been demonstrated, along with the process of analysing the data. Furthermore, the data sets were collated, organised, and analysed using NVivo to extract the key findings which the participants solely instigated. It was then graphically represented.

To answer the research question that forms the very basis of this research study, it has been concluded that: (1) People; (2) Triple-helix; and (3) Clusters (see Figures 6.14 and 6.15 were the most referenced nodes. These three nodes are the most fundamental fields to explore and implement when trying to answer the research question '*How Does Convergence Influence Cluster-Based Economic Growth in Regions?'*. Throughout all the comparison tables (see Tables 6.3-6.5), 'jobs' received a low level of importance and as these participants are, arguably experts in their fields of work, jobs need more strategic attention and focus. 26 nodes in total came from the triple-helix actors (data sets by role), with 44 from the regions and

Bootcamp (data sets by region) and 45 nodes have been extracted from the literature review thematic areas (data sets by other measures).

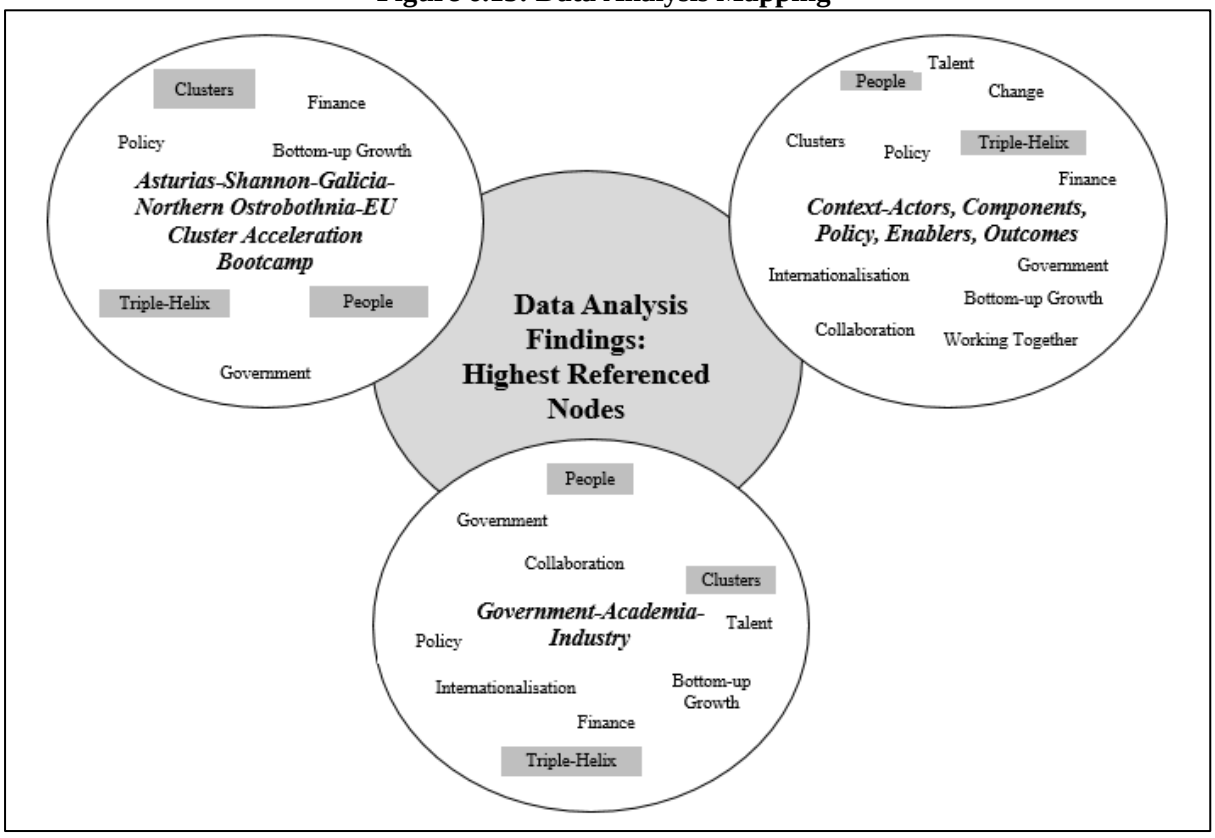
Figure 6.14: Data Sets: Comparison Totals



Source: Drawn by Author from Data

When exploring and examining these three tables (6.3-6.5), it can be said that the following nodes of *'people'*, *'triple-helix'* and *'clusters'* have been identified as vital. There are other nodes to explore which have been illustrated in Tables 6.3-6.5 and Figures 6.14 and 6.15 which are also important, but these three have been referenced by the 30 participants as the core. The creation of the 'data analysis mapping' model was created to understand the fundamental factors and themes which have been derived from the data collated to answer the research question and the overall title of this research study. The fundamental factors of convergence were highlighted in Chapter One as human capital, social capital, entrepreneurship, communities, trust, bottom-up growth, working together, enterprise developments, coopetition, content/knowledge sharing, distribution, finance and cross-promotion which play a vital role in the growth of regions (Dailey, Demo and Spillman, 2003; Pinoyme.com, 2011; Appelgren, 2004; Saxenian, 1994; Maskell, 2001).

Figure 6.15: Data Analysis Mapping



Source: Drawn by Author from Data

Many of these areas in Figures 6.14 and 6.15 have been illustrated in Tables 6.3-6.5 as being of importance to this research study. When comparing the factors of convergence with the data analysis, human capital can be aligned with the people node (230 references), the entrepreneurship node received 57 references, trust got 97 references, bottom-up growth got 175, working together received 104 and finance received 159. On examination of the current cluster literature in Chapter Two, one could posit that based on existing theory geographical location (21 references), enterprises (73 references), change (120 references), triple-helix (217 references), clusters (183 references) collaboration (132 references) and entrepreneurship (57 references) were the key related nodes extracted from the data. These three nodes (people, triple-helix and clusters) are supported by the framework developed in Figure 3.13 which shows them as crucial factors to regional growth. For the purposes of this study, these three nodes transpired from the data analysis appearing from all participant responses. Without people, triple-helix and clusters, convergence will not influence cluster-based economic growth in regions.

It could be argued that the literature surrounding clusters is outdated and changing rapidly with the world continuously innovating. This research study was the first of its kind to interview and speak with key regional stakeholders across the 4 regions and the Bootcamp with the adoption of a triple-helix participant methodological approach. This study is unable to identify a conclusive rationale based upon what the participants mean by people and it is suggested that as part of a future research activity that the right people should be explored. The Shannon region participants placed people as the most important area to address, as did the Northern Ostrobothnia participants, whereas a cultural change is needed for Asturias and the coming together of the triple-helix actors needs to happen more in Galicia to achieve economic growth. From the Bootcamp perspective, the data suggests that the development of clusters is salient

for future growth. To provide some conclusions as well as recommendations for follow-up research in this field, Chapter Seven is now explored.

Chapter Seven

Conclusions and Recommendations

7. Conclusions and Recommendations

7.1 Introduction

The aim of this study has been to answer the research question: '*How Does Convergence Influence Cluster-Based Economic Growth in Regions*? Using an inductive methodological approach to the exploration of findings from the data set and literature review, the study found that their needs to be a key relationship between people, triple-helix and clusters. When these factors are present, they empower situations which enable the development of a convergence cluster-based economic growth approach. This is supported by Valdenebro, Fernández and Renders (2020). This chapter will set out the recommendations following-on from the key findings from three actors: Academia; industry; and government.

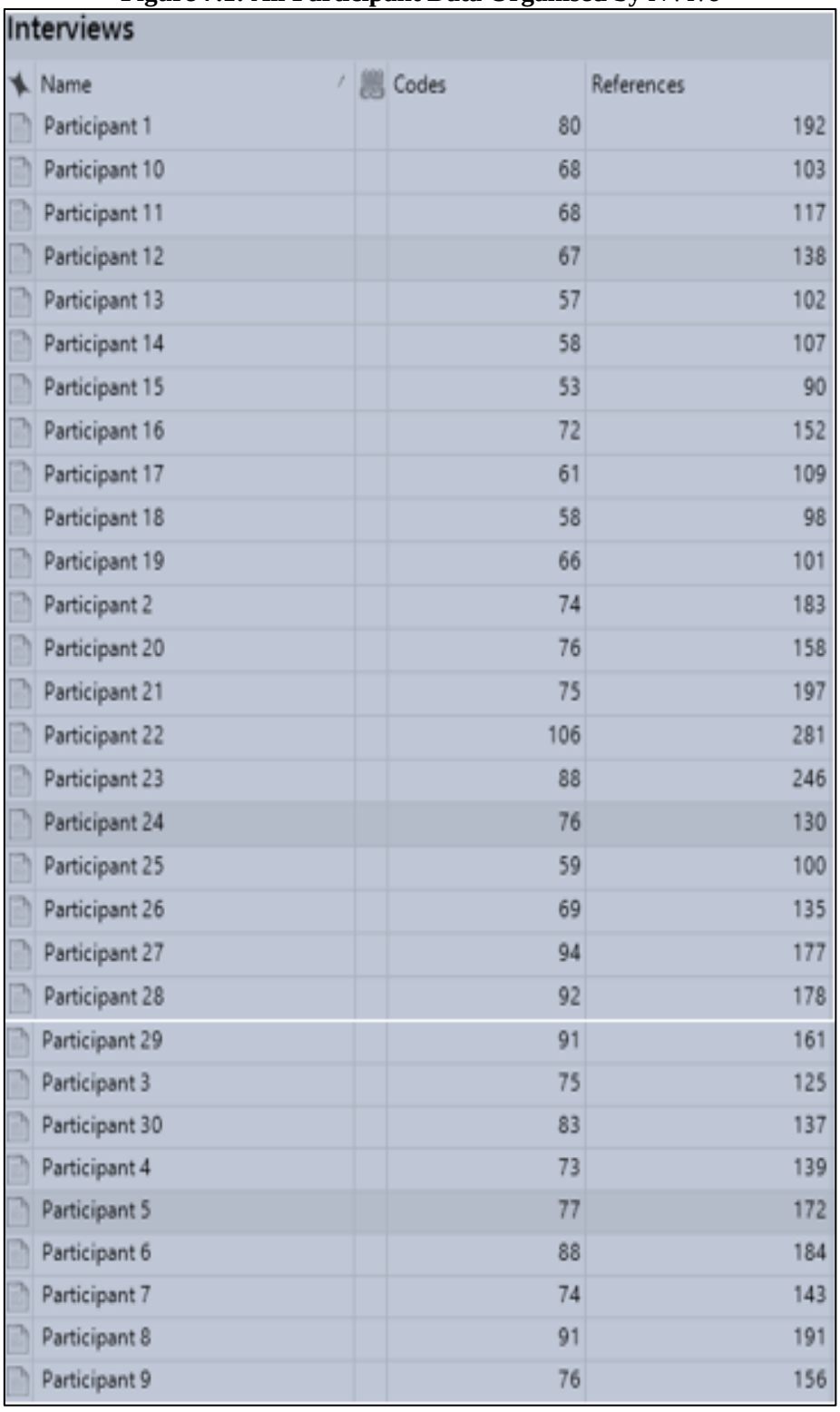
Table 7.1: Chapter Structure

Chapter Approach
Introduction to Chapter
Contributions to the Field of Research
Recommendations for Policymakers
Recommendations for Regional Triple-Helix Actors
Limitations of this Research
Future Research Opportunities
Conclusion
Source: Adapted from Literature Review by Author

This concluding chapter answers the research question and sub-questions and draws together the key theoretical implications of the findings presented in this work. There is an expectation that the findings presented will assist cluster organisations, cluster managers, entrepreneurs, policymakers and those who support them in their innovative processes. The theoretical, policy

and practical contributions are also outlined fully in this chapter. This work closes with recommendations for future research and suggests priorities for further work in the field.

Figure 7.1: All Participant Data Organised by NVivo



Interviews

Name	Codes	References
Participant 1	80	192
Participant 10	68	103
Participant 11	68	117
Participant 12	67	138
Participant 13	57	102
Participant 14	58	107
Participant 15	53	90
Participant 16	72	152
Participant 17	61	109
Participant 18	58	98
Participant 19	66	101
Participant 2	74	183
Participant 20	76	158
Participant 21	75	197
Participant 22	106	281
Participant 23	88	246
Participant 24	76	130
Participant 25	59	100
Participant 26	69	135
Participant 27	94	177
Participant 28	92	178
Participant 29	91	161
Participant 3	75	125
Participant 30	83	137
Participant 4	73	139
Participant 5	77	172
Participant 6	88	184
Participant 7	74	143
Participant 8	91	191
Participant 9	76	156

Source: Drawn by Author from Data

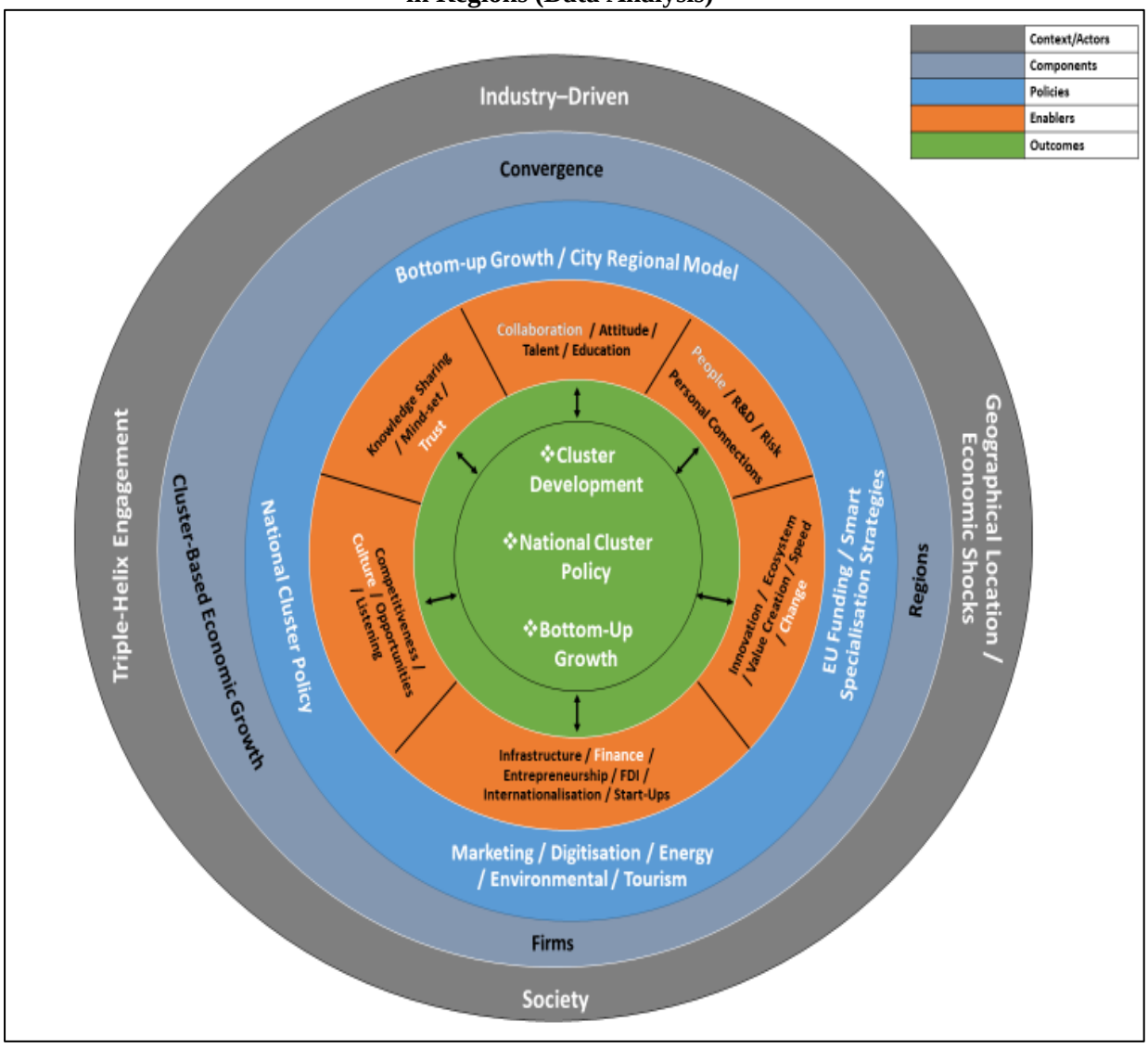
The 30 participants in the study are all involved in clusters across the European Union and are from the triple-helix model. Figure 7.1 delineates their level of interaction and the data analysis responses paid attention to the number of 'codes' and 'references' that they have discussed. Furthermore, this figure displays the number of participants in this research study and how many codes and references that they mentioned through the semi-structured interview process to highlight their level of input. The participants are involved in clusters in some regard, so their influence on the data analysis, contributions and recommendations are beneficial. As previously mentioned, looking at Table 5.8, of the 30 participants, 6 participants were interviewed in the Shannon region in the Republic of Ireland, 5 in the Asturias region of Spain, 7 in the Galician region of Spain, 6 in the Northern Ostrobothnia region of Finland and 6 at the first-ever EU Cluster Acceleration Bootcamp. There were 12 females and 18 males involved with 8 participants from government, 9 coming from academia and 13 from industry with cluster experts, cluster managers and cluster practitioners involved. To comprehend the research process, the contribution to literature is now examined.

7.2 Key Contributions to the Field of Research and Theoretical Issues

The principal contribution of this work and to the areas of clusters is the creation of a *framework* (see Figure 7.2 below) to answer the research question. The areas of economic geography and regional studies supported by entrepreneurship can also benefit from this framework contribution. In support, Table 7.2 illustrates the contributions to the main theoretical fields within this research study. The conceptual framework aims to highlight the presence of convergence (triple-helix bottom-up growth of moving towards equality) and to illustrate the gap in the literature on how convergence can influence cluster-based economic growth in regions. As convergence focuses on moving towards equality and the coming together of industry, academia and government (Etzkowitz, 2002; Etzkowitz and Zhou, 2017;

Keating, 1999) to work together more collaboratively to improve regional economic growth (Antonescu, 2014; Feser, 2006), these are the key actors that will be explored.

Figure 7.2: Conceptual Framework: Convergence Influencing Cluster-Based Economic Growth in Regions (Data Analysis)



Source: Drawn by Author from Data

This framework contribution is important as it demonstrates the various convergence, clusters and regional facets that are required to answer the research question. Furthermore, policymakers and regional actors can take this model and apply it to their own region to influence economic growth. Figure 4.10 highlighted the theoretical framework which was established based on the literature review findings. However, after the examination of the 30

semi-structured interviews and the use of NVivo, this model has evolved (see Figure 7.2). Comparing the initial framework with the data analysis which has been refined through Braun and Clarke's (2006) six-step thematic approach, this framework has now been developed further to represent the participant responses and has indicated novel factors to be included. Arising out of the data collated, the specific outcomes that were identified are: (a) Cluster Development; (b) National Cluster Policy; and (c) Bottom-Up Growth, thus suggesting that if all of the factors within the five thematic areas are embraced, regions may achieve positive transformation.

In this section, the 'contributions to knowledge' of the thesis are outlined (see Table 7.2 and Figure 7.3). These contributions are divided into the categories of 'contributions to theoretical issues' and 'future research opportunities' (see Section 7.6). The contributions to knowledge are presented in this way to provide an appropriate summary for the thesis. This conclusion summarises the significant contribution that this thesis has made to the wider bodies of literature concerned with how convergence influences cluster-based economic growth in regions, the existing enterprise support structure environment, business cluster analysis, aiding the betterment of the business landscape and the study of real-life clusters and regions. This research study examines the influence of convergence by exploring regions where clusters are present and have been for many years, the type of clusters that have been developed and their influence on economic growth. Further, enterprise support structures and critical enterprise metrics in the key areas of the triple-helix model have been included as part of this research study. This chapter aims to identify the areas for further research that could help improve the literature area of convergence, clusters, regions and entrepreneurship and aid the further development of clusters regionally, nationally and internationally to explore possible cross-collaboration opportunities. It is the purpose of this section to identify and/or influence further studies in these fields and in the development of some new theory.

Table 7.2: Research Contributions

Literature Field	Contribution
Clusters	**Gap in Literature:** Understanding the influence of convergence on cluster-based economic growth in regions **Proposed Target Journal:** Regional Studies **Contribution:** Conceptual Framework **Importance:** Bottom-up convergence approach to cluster-based economic growth
Economic Geography	**Gap in Literature:** Placing clusters as a strategic growth tool within the existing support structure environment **Proposed Target Journal:** Journal of Economic Geography **Contribution:** People, Triple-Helix and Cluster nodes evolved from data collection **Importance:** The 3 nodes were highlighted as the most important areas to focus on to achieve economic growth in these regions
Regional Studies	**Gap in Literature:** Cluster development across 4 international regions **Proposed Target Journal:** Journal of Regional Science **Contribution:** Empirical research study on the Shannon, Asturias, Galicia and Northern Ostrobothnia regions with the support of the Bootcamp **Importance:** Novel comparisons developed regarding these contexts, their cluster-based economic growth insights and convergence factors
Entrepreneurship	**Gap in Literature:** Promoting and improving the entrepreneurship environment through the development of a convergence cluster approach **Proposed Target Journal:** Entrepreneurship and Regional Development **Contribution:** National cluster policy can influence entrepreneurship levels **Importance:** Enterprise support structure environment needs a national cluster policy with a regional focus

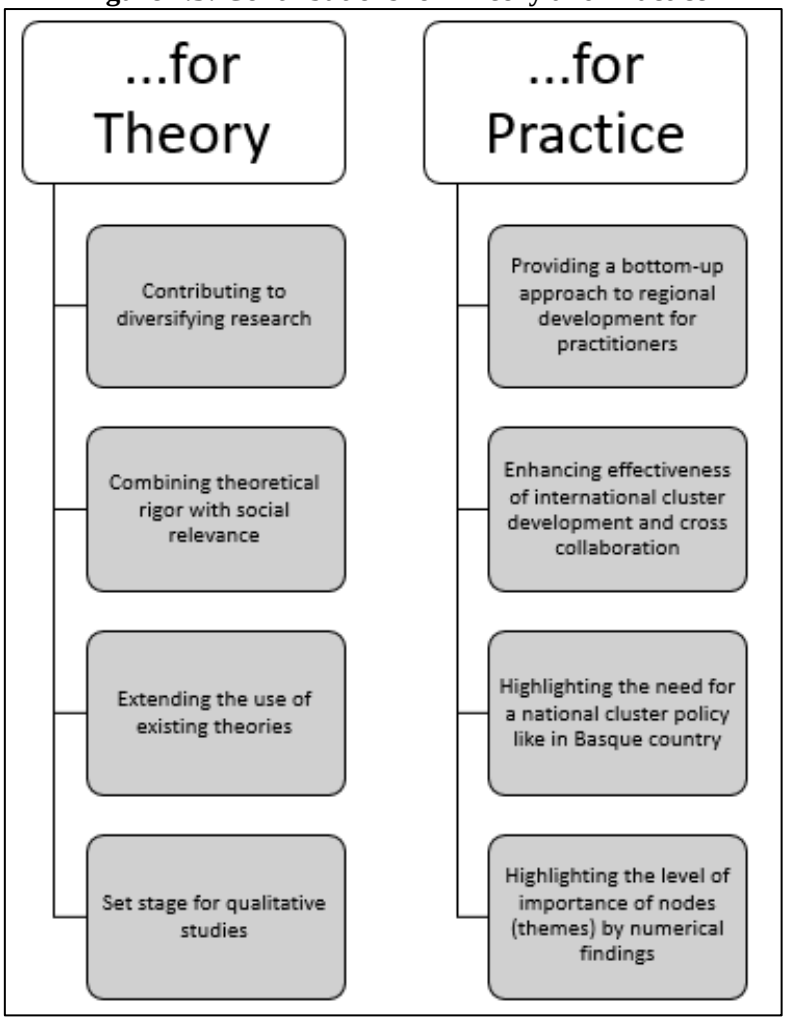
Source: Drawn by Author from Data

Important research findings are examined with particular attention to certain issues that may prove vital to: (1) The influence of convergence on cluster-based economic growth in regions; (2) Development of clusters across 4 regions and the Bootcamp; (3) Placing clusters as a strategic growth tool within the existing support structure environment; (4) Assessing the effectiveness of clusters; (5) Promoting and improving the entrepreneurship environment through the development of a convergence cluster approach; and (6) The attempt to improve the level and/or quality of enterprise activity in Ireland. These findings are also intended to provide future researchers with significant methodological aids and starting points for their work in the field of convergence, clusters and regions. Linking each of the literature fields in Table 7.2 with the respective novel and important contributions of this work provide the basis for future works. Through an extensive, robust and systematic literature review process and data collation and analysis, these contributions evolved.

The proposition of this thesis was theoretically informed and can be positioned mainly within the area of clusters, economic geography and regional studies and to some extent, the field of entrepreneurship due to its concentration on firms and collaboration (see Section 3.6). These three fields (convergence, clusters and regions), have predominantly been publicised and documented areas of economic geography and regional studies (Byrne, 2016; Martin and Sunley, 2003; Clark et al., 2003; Weiss, 1988; Porter, 1990; Pyke and Sengenberger, 1992; Saxenian, 1994; Van Dijk and Rabellotti, 1997; Steiner, 1997; Crouch et al., 2001; Todeva, 2006). One of the contributions to the fields of clusters, economic geography, regional studies and entrepreneurship would be the data suggesting that people, triple-helix and clusters are the primary nodes to focus on. This study has added to the currently limited body of work on convergence, thus providing a further exploration of its importance and application.

This research contributes to closing a knowledge gap by explaining the influence of convergence on cluster-based economic growth in regions and the decision to concentrate on this knowledge gap was motivated by the suggestion of Antonescu (2014). In conjunction with the development of the framework in Figure 7.2, the gap to literature focuses on the discovery that without people, the triple-helix engagement and clusters (as the most important areas of focus for policymakers and regional actors), convergence will not influence cluster-based economic growth in regions. Antonescu stated that convergence and bottom-up growth cluster approach in its current form explores less developed regions that 'catch-up' to more developed regions. However, a more modern collaborative approach of working together is required for regional economies (Crossman, 2019; Delgado et al., 2011).

Figure 7.3: Contributions for Theory and Practice



Source: Drawn by Author from Data

Current studies have focused on global clusters of innovation (Engel, 2016), the competitive advantage of nations (Porter, 2000) and the presence of convergence factors that have been identified as vital facets to achieving economic growth. These factors include human capital, social capital, entrepreneurship, communities, trust, bottom-up growth, working together, enterprise developments, coopetition, content/knowledge sharing, distribution, finance and cross-promotion (Lagendijk, 1999; Dailey, Demo and Spillman, 2003; Pinoyme.com, 2011; Appelgren, 2004). None of the above studies, however have highlighted the influence of convergence on clusters and regions. This research study has deemed that the convergence factor of 'people' as the most important convergence factor when researching this area. With the presence of people, triple-helix and clusters, cluster-based economic growth in regions will occur. For the purposes of this research study, these three nodes specifically that have transpired from the data analysis derived from all participant responses are, arguably the most salient findings.

This thesis has contributed to the development of several theoretical fields of study. The logical flow of the work has ensured that the research has informed the theoretical fields of convergence (relatively under-researched field), clusters, economic geography, regions and entrepreneurship. This has been achieved through the application of an empirical study in the specific case of the Shannon region in Ireland, Asturias and Galicia in Spain, Northern Ostrobothnia in Finland and the first-ever EU Cluster Acceleration Bootcamp in Frankfurt (Germany). A major contribution of this thesis to the specific fields in question is this identification of three specific nodes (thematic areas) which can be applied to the study of how convergence influences cluster-based economic growth in regions. This research study has provided a theoretical frame-of-reference for the analysis (and future analysis) of convergence, clusters, regions and entrepreneurship and providing an appropriate language for the analysis, and future analysis, of these fields. It has been concluded that the three nodes of (1) People, (2)

Triple-helix and (3) Clusters were the most referenced, therefore it can be posited that these are the most fundamental fields to address when trying to answer the research question '*How Does Convergence Influence Cluster-Based Economic Growth in Regions*?'

7.3 Recommendations for Policymakers

On examination and exploration of the literature review and findings from the data collection and analysis process, it is now possible to specify how this research study might benefit cluster policymakers. With the relatively under-researched area of convergence, cluster practitioners can now comprehend the true meaning of convergence, its approach and the factors that aid its development. Furthermore, a significant body of work has emphasised the importance of triple-helix, specific regions and Bootcamp and key literature review areas which have been well represented in Chapter Six in terms of findings and analysis. To support this the areas of people, triple-helix and clusters have been the most referenced nodes that can serve as areas to examine when conducting any future research on clusters.

(1) National Cluster Policy

There is no national cluster policy in Ireland or Finland. This has been highlighted throughout this research study specifically in Section 2.2.4 and Section 3.11. The Enterprise Ireland RTCF fund 2019 and Southern Regional Assembly RSES 2020 (see Section 3.11) were regional policy approaches for improvement and support of clusters and their development. However, a continuation of support for the development of the clusters through cluster training, management, and evaluation is needed with the development of a national cluster policy. The RTCF fund is an adequate cluster support strategy focusing on cross-collaboration of SMEs and a new innovative industrial value chain. Nevertheless, there needs to be specific cluster training and evaluation going forward for sustainability purposes. The question, '*what happens after the Enterprise Ireland government funding period is finished?*' is valid. The inauguration

of a national cluster policy in Ireland (see Section 2.2.4) may provide the basis for cluster development and bottom-up growth (see Figure 7.2). The focus of this national cluster policy should be on a cluster development support structure, cluster training, cluster evaluation, cluster manager skillset(s), cluster meetings and an adaptation of the Spanish Basque country cluster policy context.

An OECD (2010) report suggested that the Spanish Basque cluster policy includes: (1) Grounds Building; (2) Improving and Polishing; (3) Giving New Opportunities; and (4) Re-management Boost. This could serve as an example of how this policy could be structured in Ireland. Identifying strategic areas of importance and developing short-medium-long term goals around these areas could be an effective Phase 1 approach to the development of a national cluster policy strategy (Cyber Ireland, 2019; Valdenebro, Fernández and Renders, 2020; OECD, 2010). Having a national cluster policy approach similar to the Basque approach can provide policymakers with an idea of how to develop such a cluster policy (see Section 2.2.4). This national structured policy approach could serve as a guide for any future cluster developments. Further, placing an emphasis on 'people', the 'triple-helix' environment and 'clusters' of existing sectors within a geographical location would be important.

As suggested in Section 2.2.4 in Chapter Two, the advantage of cluster policy is that it supports groups of actors (firms, suppliers, service providers, related industries, research) to address problems common above the industry level (Porter, 2000a). Cluster policy can be developed at a national level, but it has a regional focus to build on the strengths of a region to pursue competitive advantage. Cluster policy should deliver: (a) The engagement of actors; (b) Collective services and business linkages; and (c) Collaborative R&D and commercialisation (Martin and Sunley, 2003; Andersson et al., 2004; National Governors Association and the US Council on Competitiveness, 2007; OECD, 2007; 2009; Oxford Research AS, 2008; World

Bank, 2009; Christensen et al., 2012). An OECD Report (2010) acknowledged factors such as building on existing strengths in terms of public assets, firms and research competencies; strong leadership to ensure the cluster is dynamic and evolves with market changes; leverage private sector investment; a bottom-up approach and industry leadership in providing services; collaborative projects and networking; recognising the available characteristics and externalities of the cluster. These contribute to the success of targeted cluster programmes. National and international policymakers should start to adopt a national cluster policy so that regional authorities can benchmark best practices to suit the resources at hand and to have a model to adhere. This national cluster policy would act as a go-to-strategy for cluster development across all regions and an exemplary approach regarding how clusters can be developed and grown. Cluster policy in Ireland can be described as being flawed and needs updating and the current policy approach is incorrect (Hobbs, 2019).

(2) EU Smart Specialisation Strategy

As emphasised in Section 4.8, the European Union's smart specialisation strategies have been important for regional development. Conversely, it has been found that no smart specialisation strategy has been adapted specifically for Irish regions as it is more a national strategy (Dbei.gov.ie, 2014). According to the Southern Regional Assembly (2020) RSES report, smart specialisation strategies were discussed, but not implemented. It can be posited that this can be regarded as a weakness when benchmarking Irish regions (see Section 3.7) compared with international regions (see Chapter Four). From the data analysis, the European Union had 12 references and smart specialisation strategies had 15 references and were highlighted as pivotal. The continuation and implementation of European Union policies, funding and smart specialisation strategies need to happen with Ireland prioritising a smart specialisation strategy approach for each regional assembly (see Section 3.3).

(3) People

As demonstrated in Figure 6.14, 'people' have been placed as the number one node (by the participants of this research study) for policymakers to strategically address for the benefit of a region. The data suggests that the people node received the highest level of importance with 230 references and putting the right people in place can be imperative for convergence influencing cluster-based economic growth in regions. It could be argued that without the right people, convergence will not influence cluster-based economic growth in regions. The development of a strategy comparable to *Putting People First* (2012, pp. 21-44) spatial strategy report in Section 3.3 should be explored. This strategy focussed on the vision for local government in Ireland with the aim to achieve regional economic development promotion through social enterprise and local community enhancement.

Horn (2012) argued that the core catalyst for regional growth is, of course, great people. Therefore, attracting and retaining the right people is imperative to improve regional resilience and growth. Talent and people have been key to attracting and retaining companies in the Shannon region (Courtney, 2019). As discussed in Section 6.3.2, having the right people can be vital to unlocking a region's potential and to attracting and retaining companies in the region and to achieve cluster-based economic growth in regions (Courtney, 2019; Horn, 2012). The majority of models in Table 3.2 argued that people are key to any region and the Bayareahouston.com (2012) study argued that, *"if there can be a European complement to the Bay Area, then attracting and retaining truly great people has to be the key".* Porter (2000) suggested that human capital (e.g. people), plays a significant role in regional enhancement. Policymakers need to attract and retain the right people for convergence to influence cluster-based economic growth in regions.

The recommendations in Section 7.3 serve as novel opportunities and areas of interest for policymakers. This allows them to implement them into their works. Important research findings are included with relevance to the recommendations section, the contributions to knowledge (theoretical issues and issues informing further research) have been concluded and limitations to this research are highlighted in this chapter.

(4) Conceptual Framework

The development of a conceptual framework in Figure 7.2 provides policymakers with a novel model to economic growth through its extensive understanding and research on convergence, clusters and regions. This model has been transformed, initially through the main literature review areas (see Figure 4.10) and then assessed through the data collation process. This process helped to assess the theory with the practical data responses. Furthermore, it can provide a new strategic framework to how economies can put certain facets and elements in place to give themselves the best fighting chance to achieve cluster-based economic growth, economic recovery and resilience. The salient context/actors, components, policy, enablers and outcome areas are described in full and have particular elements that if adopted to the available economic resources; higher economic growth prospects can be accomplished.

Convergence is that bottom-up growth (industry-driven), collaboration and moving towards equality approach to economic growth and recovery. The convergence cluster approach is a strategy that policymakers can explore as it differs from agglomeration top-down FDI and governmental route. Policymakers should look at existing sectors to see how they can become more transformational and evolve through the adoption of the convergence approach. The coming together of the key regional actors would create a greater level of trust, which in turn can improve the influence of the convergence approach on the region and its economic growth.

Moving towards equality and the development of higher levels of collaboration between existing actors and industry sectors will help to augment the growth prospects of the region.

7.4 Recommendations for Regional Triple-Helix Actors

From a regional actor (government-academic-industry) perspective, there are particular learnings to take from this research study with reference to the main support agencies (see Section 3.7) across the contextualisation areas of the 4 main regions and the Bootcamp.

(1) Organisations and Agencies Involved

Some of the agencies are as follows Local Enterprise Offices (LEOs), City and County Councils, Department of Enterprise, Business and Innovation (DEBI), Shannon Group plc, Shannon International Development Consultants (SIDC), Foynes Flying boat Museum, Xunta de Galicia, IDEPA, IDONIAL, Free Zone of Vigo, ECOBAS R&D, EspazoCoop, Aclunaga, ClusterTIC, MetaIndustry4, Innovation centre Oulu, Wetsus, EnageInnovate, Avaesen (see Table 6.2 for more detail). Furthermore, these agencies provided insights into the themes and nodes of interest to regional actors and can provide the reader with a greater level of understanding with regards to what organisations were involved in this research study. Regional actors can learn from the agencies that have participated in this research study with regards to their findings and analysis. Subsequently, this research study (combined with the existing literature discussed and the data analysis) can serve as a guide for any cluster or regional development related work.

(2) Cluster Development

The development of clusters can be dependent on the regions' strengths and resources at hand and the best solution would be to explore the development of clusters within strong pre-existing industry sectors. Byrne (2016) and Hobbs (2019) have argued that for clusters to be

successfully developed: (1) private/public funding; (2) a designated cluster manager; (3) a cluster organisation; and (4) a cluster strategy/policy are crucial. Someone to manage the daily operational activities and to bring the triple-helix actors together needs to be in place for clusters to be successful. Cluster training, management and evaluation are required to aid its sustainability and achieve critical mass. Regional smart specialisation strategies are needed in Ireland to enhance cluster development and growth (like that in Asturias, Galicia and Northern Ostrobothnia) as these could prove more useful and effective (see Section 4.7). Regional actors need to work more collaboratively and lobby national government policy on the development of a regional smart specialisation strategy, which encompasses cluster development as a tool to achieve economic growth.

7.5 Limitations of this Research

It is now important to include limitations of this research. While COVID-19 has had limited effect on this research study, it did influence the follow-up data collation process in terms of online co-ordination. Furthermore, research progress meetings had to be conducted remotely which was a bit of an inconvenience due to some technical constraints. This brief section has been provided to summarise any limitations that have been referred to throughout the thesis.

(1) Qualitative NVivo Software

Initially, one of the limiting areas was the fact that the use of NVivo software for data organisation was a complex undertaking initially due to limited familiarity with this software. To solve this, NVivo training was undertaken, but this did not make the researcher an expert in this field, therefore the entire data analysis process through NVivo was quite time-consuming. On examination of Figure 7.1, arguably due to how NVivo organises data by default, the way in which the numerical sequence of participants are structured highlights an example of a challenge with using this software.

Once the application of the software became more familiar, the ability to utilise it effectively along with managing and organising the data sets were invaluable to this qualitative research study. NVivo develops graphs and organises data in a certain manner which might not be the most aesthetically pleasing on the eye.

(2) Choice of Regions

The second limitation is regarding the selection of regions. The personal travel expense of the primary research activity was quite high. Travelling to each region had logistical challenges as some did not have direct flight routes and a rental car had to be purchased to get to each participant on time across the different regions. Other regions were considered such as the region of Thessaly in Greece and the Gelderland region in the Netherlands as they were the other winners of the EER award in 2019. Unfortunately, no response from the triple-helix actors (that were involved in the EER award success) in these regions was obtained by the researcher or the EU Committee of The Regions Policy Officer. The pragmatic approach was to undertake the interviews with triple-helix participants that were willing to engage and had strong cluster traditions and knowledge, but the aim is to go to the regions of Thessaly and Gelderland as part of the post-doctoral work.

(3) Access to Participants

Access to participants was a challenge for some time particularly in international contexts as the researcher is Irish and lives in Ireland. The incorporation of the snowball sampling strategy during the interview stage helped to bridge this gap, but it was a time consuming endeavour that restricted the progress of data collection. Direct contact by email and telephone with the institutions that have been directly involved in their region's smart specialisation strategies, acknowledged as winners of the EER award in 2019 and who formed part of the European

Cluster Collaboration Platform helped to alleviate this limitation. The utilisation of secondary data was an important factor to ease this challenge.

(4) Limited Convergence Literature

Lastly, on reflection of the work in Chapter One, the theory underlining convergence and the existing literature is quite limited. This demonstrates the need for a greater emphasis in this area from research and industry works. On examination of the literature, cluster and regional studies fail to represent convergence at any great level and so further exploration is required. It could be argued that the theory that supports convergence, clusters and regions needs to be updated. These limitations are provided to contribute to the refinement and improvement of any related further study.

7.6 Future Research Opportunities

By summarising the literature and research findings derived from this mostly exploratory work, it became apparent that many new avenues and subjects present themselves for further and deeper examination. Some of the areas for further research that have become evident as logical steps in further examining convergence, clusters, economic geography, regions, and entrepreneurship are described below.

(1) The Right People

An area which has been identified as requiring further study is the examination of the right people that are needed for convergence to influence cluster-based economic growth in regions. What is meant by people or the right people, how to attract or retain the right people and what type of upskilling must occur so that the right people are successfully enhancing economic growth. This examination will form part of a post-doctoral activity to identify what the triple-helix actors (that formed the contextualisation of this research study) meant by placing people

as the most important node to address. The data would suggest that there is a robust need for people to achieve cluster-based economic growth, but what does this mean and what type of people will form the basis of the post-doctoral undertaking.

(2) Regional Case Studies

More case studies will be developed on the regions that are recipients of the EER award to indicate what changes (if any) have occurred, new ideas and areas of interest have been developed. This will help to comprehend what the new standards are for the regions to be successful in obtaining this award. Moreover, the Gdansk & Pomorskie Region (Poland), Gothenburg Business Region (Sweden) and Navarra Region (Spain) won the EER award status in 2020 (Ec.europa.eu., 2020) and these regions will be examined and their triple-helix actors interviewed to continue this research undertaking. The same qualitative methodological process will be utilised so that objective comparisons can be made and differences explained regarding the 2019 and 2020 winners. The future examination of Middle and Eastern European regions could provide an interesting insight(s) into how cluster-based economic growth is occurring to help provide an EU-wide comparative analysis. This research activity will form the basis of future works regarding how convergence influences cluster-based economic growth in regions.

(3) Cluster Development Support Structure

The creation of a clear cluster development support structure is needed (Valdenebro, Fernández and Renders, 2020). To support this, the introduction of a national cluster policy (see Section 2.2.4) is required, similar to that in the Spanish Basque country context (Four policy areas: Grounds Building, Improving and Polishing, Giving New Opportunities and Re-management Boost) and how it may affect the future of cluster-based economic growth (OECD, 2010). Further research is required on how national cluster policy is designed and what is needed for

it to take shape. Adopting the cluster policy approach of: (a) The engagement of actors; (b) Collective services and business linkages; and (c) Collaborative R&D and commercialisation could prove beneficial. Furthermore, in terms of further research studies, it is important to examine the connection between companies and triple-helix actors once they become members or involved in the cluster.

Derived from the conceptual framework and data analysis (see Figure 7.2), firms formed a critical part of the components thematic area. This could serve as an avenue to explore the connection between firms, convergence, cluster-based economic growth, and regions. Many of the findings presented in Figures 6.1-6.13 could be separate subjects for a more in-depth study of this sample population (see Table 6.2). With the general results of the exploratory research, herein showing a high level of importance with regards people, triple-helix and clusters, these could be opened to future studies by economists, entrepreneurial researchers, and commentators. The issue of how to develop the right triple-helix milieu and how to cultivate the right clusters within a region could be areas for further research opportunities.

(4) Trust

Further research could be conducted in the area of trust. Throughout the literature review and data collection/analysis process, trust has been examined as a key influencing factor of convergence. What is meant by trust, how it is formed and what influence it has on cluster development could be questioned. If you do not have trust, collaboration is difficult to achieve so how do you develop that trust is important. How can trust help to open collaboration prospects. Participant 12 suggested that *"trust is crucial to build within regions and the triple-helix stakeholders. Without trust, you can not create change"*. Participant 16 said that *"trust is the most important thing to joining the triple-helix which is the main point"*. Participant 22 claimed that:

> *Trust is the core of the triple-helix model. Do not have trust then you do not collaborate so it is the core and how you develop that trust is important. How to make trust open to collaboration is step by step.*

The examination of how influential the area of trust is on the triple-helix environment within a region could be assessed. The exploration of the area of trust as the core of the triple-helix model could provide an interesting future research opportunity.

7.7 Conclusion to the Thesis

After careful examination of the preceding chapters of the literature, collated data, and analysis, the following is apparent. Increasing the levels of trust, interaction and collaboration between industry, academia, and government are paramount to the success of clusters. It is for this reason that a combination of convergence and cluster-based economic growth, with a regional focus, can support the cooperation of triple helix actors (Etzkowitz, 2002; Etzkowitz and Zhou, 2017) and in turn facilitate collaboration. Furthermore, when trust is developed, arguably commercialisation and economic growth can prosper. As emphasised by Schmiedeberg (2010), there is an increasing focus on the design and development of cluster policies. Many governments are adopting the concept of clusters as mechanisms for stimulating regional economic growth and prosperity. However, there is an increasing awareness and focus on the need for policy evaluation tools and frameworks, which can assess the extent to which cluster developments have been successful and have achieved their desired outcomes.

Nevertheless, a problem emphasised by Giuliani and Pietrobelli (2011) is that there is not a clearly defined or an accepted approach to cluster evaluation. Schmiedeberg (2010) highlighted that most industrial and regional development policies are financially constrained. Therefore, there is a need for careful consideration of where to invest government resources. In light of these issues, the adoption of a more modern convergence bottom-up cluster-based economic growth approach in regions can be important. The fields of convergence, cluster-based

economic growth, and regions have further research and economic growth potential if the right ***people*** (Porter, 2000; Horn, 2012; Dreyfuss, 2011; Moinuddin, 2017), ***triple-helix*** environment (Etzkowitz, 2002; Etzkowitz and Zhou, 2017) and ***clusters*** (van Egeraat and Doyle, 2018) are developed. These must have a bottom-up and moving towards equality approach. The most highlighted node was 'people' in the data sets with a total 230 references, 'triple-helix' was the second most important node with a total 217 references and lastly, 'clusters' was the third most critical node with 183 references. To answer the research question of *'how does convergence influence cluster-based economic growth in regions?'* these three key areas are needed, but of these three, people are the most important. Horn (2012) argued that the core catalyst for regional growth is, of course, great people. However, attracting and retaining the right people is imperative to improve regional resilience and growth. How one activates this could potentially serve as an issue for further research. To further support this, in the Shannon 2.0 study (see Section 4.2.3 in Chapter Four) talent and people have been key to attracting and retaining companies in the region (Courtney, 2019).

Under the RTCF initiative (Enterprise-ireland.com, 2019), 12 SME clusters are being funded for a period of up to three years across Ireland and there is a need for an Educational Outreach Manager (Cluster Manager) to develop, promote and grow the cluster. The SME sectors that are being funded to create a new cluster are IN4.0 technologies, Cyber Security, Circular Economy, Construction, Manufacturing, Engineering, Health and Wellbeing, AgriTech, Maritime and MedTech & Lifesciences. As a result, there is an opportunity to explore an employment position as a cluster manager, which would help to further assess this research study. By doing so, the prospective cluster organisation could act as a case study to examine the influence of convergence on cluster-based economic growth in its region. The knowledge, expertise and understanding that the researcher has developed throughout this research study

could prove useful for this position. The learnings that have been inaugurated by conducting this research study can be applied in this cluster manager role within a new cluster organisation.

The global cluster competitiveness conference, TCI Network is an annual conference that brings together the world leaders on all cluster related activities. The aim is to bring this conference to Ireland to highlight the potential for cluster growth nationally and the work that has been achieved to date. In addition, as the first-ever EU Cluster Acceleration Bootcamp programme was in Frankfurt (Germany) in 2019, the objective is to hold this programme in Ireland so that the new RTCF clusters (Enterprise-ireland.com, 2019), policymakers, academics and researchers and industry experts can undertake the programme and learn international best practices with regards cluster development and growth. Another area of note is the 'INNOSUP-1' Horizon 2020 EU funding programme application of cluster-facilitated projects for new industrial value chains which support SMEs to develop new industrial value chains and cross-sectoral collaborations. If the application is successful, there will be scope to develop and deliver a global cluster research study with an EU consortium over a three-year period. This Horizon 2020 research undertaking would help to further this qualitative cluster research approach across different regions.

By highlighting the contribution of this research study in both the areas of (1) Theoretical issues and theory building, and (2) Practice for future research and economic growth potential, the value and relevance of this thesis have been established. It seems fitting to acknowledge the researcher's expression of appreciation to the participants for their contributions to this research study and for their valued contribution and time. The case for '*How Does Convergence Influence Cluster-Based Economic Growth in Region*s' is more relevant than ever given the current economic and social climate (Ffowcs-williams, 2019). It is time to open up the debate for a national cluster policy development, cluster training, management, and evaluation

programme along with a cluster development support structure to form part of the national enterprise support framework in Ireland.

To assist with the understanding of clusters and to improve cluster policy developments in Ireland, there is a need for the delivery of the EU Cluster Acceleration Bootcamp (TheCAP) programme in Ireland. This programme would act as a catalyst and paradigm shift in national policy and regional strategies to improve cluster development and growth. It would also help to upskill existing cluster managers and the new RTCF funded cluster managers on international best practices regarding the development, importance and future of clusters.

References and Bibliography

References

A Framework for the development of Regional Enterprise Strategies. (2014). 1st ed. [eBook] Dublin: Department of Jobs, Enterprise and Innovation, pp.1-28. available at: https://www.djei.ie/en/Publications/Publication-files/A-Framework-for-the-development-of-Regional-Enterprise-Strategies-.pdf [accessed: 19th December 2015].

A New Approach to Tech-Based Economic Development, (2008). Ontario Commercialization Networks. [online] available at: http://www.slideshare.net/GHBN/ontario-commercialization-networks-presentation [accessed: 2nd January 2016].

Abdin, M. (2015). Establishing SME clusters for sustainable development. [online] thefinancialexpress.com. available at: http://print.thefinancialexpress-bd.com/2015/08/20/104583 [accessed: 22nd September 2016].

Abdullah, M., Anderson, M., Anderson, M., Augustyn, A., Barton, M., Bauer, P. and Berris, L. (2015). region | geography. [online] Encyclopedia Britannica. available at: http://www.britannica.com/science/region-geography [accessed: 10th December 2015].

Acemoglu, D. and Robinson, J. (2014). The Rise and Decline of General Laws of Capitalism. SSRN Electronic Journal.

Aclunaga.es. (2019). Galician Naval Cluster Association. [online] available at: http://www.aclunaga.es/(S(nqnlprn3npe1woefo4uc0lpt))/Default.aspx [accessed: 6th December 2019].

Acs, Z. J. and A. Varga, (2005), Entrepreneurship, Agglomeration and Technological Change. *Small Business Economics*, 24(3), pp. 323–334.

Acs, Z. J., and Armington, C. (2004). Employment growth and entrepreneurial activity in cities. *Regional Studies*, 38(8), 911-927. doi: 10.1080/0034340042000280938.

Acs, Z., Audretsch, D., Braunerhjelm, P. and Carlsson, B. (2005). Growth and Entrepreneurship: An Empirical Assessment. Entrepreneurship, Growth and Public Policy, [online] pp.1-29. available at: http://ftp://papers.econ.mpg.de/egp/discussionpapers/2005-32.pdf [accessed 10th January 2017].

Action Plan for Jobs: Mid-West Region 2015 - 2017. (2015). 1st ed. [eBook] Dublin: DJEI, pp.1-114. available at: https://www.djei.ie/en/Publications/Publication-files/Action-Plan-for-Jobs-West-Region-2015-2017.pdf [accessed: 17th December 2015].

Agnew, A.J. (2013): Arguing with Regions, Regional Studies, 47:1, 6-17.

Ahmad, N. and Hoffman, A. (2007). A Framework for Addressing and Measuring Entrepreneurship. 1st ed. [eBook] Entrepreneurship Indicators Steering Group, pp.1-31. available at: https://www1.oecd.org/std/business-stats/39629644.pdf [accessed: 3rd March 2016].

Ahmad, N. and Seymour, R. (2006). DEFINING ENTREPRENEURIAL ACTIVITY. 1st ed. [eBook] Sydney, pp.1-22. available at: http://www.oecd.org/std/business-stats/39651330.pdf [accessed: 25th February 2016].

Ahokas, J. (2010). Towards a comprehensive view of regional economic development in Finland. *European Regional Science Association*, [online] pp.1-27. available at: https://www.researchgate.net/publication/241769042_A_comprehensive_view_of_regional_economic_development_in_Finland [accessed: 5th December 2019].

Albu, Lucian-Liviu. (2016). Trends in the relation between regional convergence and economic growth in EU, 56th Congress of the European Regional Science Association: "Cities &

Regions: Smart, Sustainable, Inclusive?", 23-26 August 2016, Vienna, Austria, European Regional Science Association (ERSA), Louvain-la-Neuve.

Alcaide, J. (1988). The four economic pillars of Spain and regional solidarity. Spanish Economy Papers. 34, pp. 62-81.

Allen, J. and Potiowsky, T. (2008), 'Portland's Green Building Cluster: Economic Trends and Impacts,' Economic Development Quarterly, 22 (4): 303-315.

Alonso Sanz, I. (2009), "Evolution of decentralisation and public spending in Spain", Spanish Journal of External Control", Madrid.

Amaratunga, D., Baldry, D., Sarshar, M., and Newton, R. (2002). Quantitative and qualitative research in the built environment: application of "mixed" research approach. Work Study, 51(1), 17-31. https://doi.org/10.1108/00438020210415488

Amin, A. (1999). An Institutionalist Perspective on Regional Economic Development. *International Journal of Urban and Regional Research*, 23(2), pp.365-378.

Amin, A. and N. Thrift (1994), 'Living in the Global', in A. Amin and N. Thrift (eds), Globalization, Institutions, and Regional Development in Europe, Oxford: Oxford University Press.

Amin, A. and Thrift, N. J. (1992). Neo-Marshallian nodes in global networks. *International Journal of Urban and Regional Research*, 16 (4): 571–587.

Amin, A., and Thrift, N. (Eds) (1994) Globalization, Institutions and Regional Development in Europe. Oxford University Press.

Anderson, A. R. (2000). Paradox in the periphery: An entrepreneurial reconstruction? Entrepreneurship and Regional Development, 12(2), 91-109.

Anderson, G. (1994). “Industry Clustering for Economic Development.” Economic Development Review 12(2): 26-32.

Anderson, V. (2009). Research methods in human resource management: Chartered Institute of Personnel and Development, London.

Andersson, M., Solitander, A. and Ekman, P. (2012) Cluster Branding and Marketing – a Handbook on Cluster Brand Management, Stockholm Tendensor.

Andersson, T; Schwaag Serger, S.; Sörvik, J.; Wise Hansson, E. (2004): The Cluster Policies Whitebook. IKED - International Organisation for Knowledge Economy and Enterprise Development, Malmö, Sweden.

Andreosso-O’Callaghan, B. and Lenihan, H. (2008). Networking: a question of firm characteristics? The case of the Shannon region in Ireland. Entrepreneurship & Regional Development, 20(6), pp.561-580.

Andreosso-O'Callaghan, B. (2000). Territory, research and technology linkages - is the Shannon region a propitious local system of innovation? Entrepreneurship & Regional Development, 12(1), pp.69-87.

Antonescu, D. (2014). Regional convergence - theoretical approaches. Munich Personal RePEc Archive, [online] pp.1-17. available at: https://mpra.ub.uni-muenchen.de/60288/ [accessed: 25th February 2019].

Aoyama, Y. (2009). Entrepreneurship and regional culture: The case of Hamamatsu and Kyoto, Japan. Regional Studies, 43(3), 495-512. doi: 10.1080/00343400902777042.

Aoyama, Y., Murphy, J. and Hanson, S. (2011). Key concepts in economic geography. 1st ed. Los Angeles, Calif: SAGE, pp.1-278.

Appelgren, E. (2004). Convergence and divergence in media: Different perspectives. ResearchGate, [online] pp.1-13. available at: https://www.researchgate.net/publication/37676508_Convergence_and_divergence_in_media_Different_perspectives [accessed: 21st February 2019].

Aqua Vet. (2017). NILHR (National Institute of Labour and Human Resources) - Aqua Vet. [online] available at: http://www.aquavet.eu/partners/nilhr-en/ [accessed: 27th March 2019].

Arbia, G. and Piras, G. (2005). Convergence in per-capita GDP across European regions using panel data models extended to spatial autocorrelation effects. Working paper no. 51 May 2005. Institute for Studies and Economic Analyses. Roma.

Arbia, G., Basile, R. and Piras, G. (2005). Using Spatial Panel Data in Modelling Regional Growth and Convergence. – Working Paper. No 55. Regional Economic Growth Application Laboratory. University of Illinois at Urbana-Champaign.

Armstrong, H., and Taylor, J. (2000), "Regional Economics and Policy", 1st Edition, Oxford, UK: Blackwell Publishers.

Armstrong, H.W. (1995). An appraisal of the evidence from cross-sectional analysis of the regional growth process within the European Union, in H.W. Armstrong & R.W. Vickerman, eds., Convergence and Divergence among European Regions, pp. 40-65. London: Pion.

Aronson, J. (1994). A pragmatic view of thematic analysis. The Qualitative Report, 2(1), 2(1).

Asian Development Bank. (2001). SME Development TA: Policy Discussion Papers 2001 / 2002 Best Practice in Developing Industry Clusters and Business Networks, Policy Discussion Paper No. 8.

Atlantic Aviation Group. (2017). Atlantic Aviation Institute - Atlantic Aviation Group. [online] available at: http://atlanticaviation.ie/atlantic-aviation-institute/ [accessed: 18th January 2017].

Audretsch, D. and Keilbach, M. (2005). Entrepreneurship capital and regional growth. Ann Reg Sci, 39(3), pp.457-469.

Audretsch, D. B. (1998), 'Agglomeration and the Location of Innovative Activity', Oxford Review of Economic Policy, 14 (2): 18–29.

Audretsch, D. B. and Dohse, D. (2007), 'Location: A Neglected Determinant of Firm Growth,'Review of World Economics, 143 (1): 79-107.

Audretsch, D. B. and Feldman, M. (2004), 'Knowledge Spillovers and the Geography of Innovation', Handbook of Regional and Urban Economics, 4: 2713-2739.

Audretsch, D. B., and Fritsch, M. (2002). Growth regimes over time and space. Regional Studies, 36(2), 113-124. doi: 10.1080/00343400220121909

Audretsch, D. B., and Keilbach, M. (2005). Entrepreneurship capital and regional growth. Annals of Regional Science, 39(3), 457-469. doi: 10.1007/s00168-005-0246-9

Audretsch, D. B., and Thurik, A. R. (2001). What's new about the new economy? Sources of growth in the managed and entrepreneurial economies. Industrial and Corporate Change, 10(1), 267-315.

Audretsch, D. B., Dohse, D., and Niebuhr, A. (2010). Cultural diversity and entrepreneurship: a regional analysis for Germany. Annals of Regional Science, 45(1), 55-85. doi: 10.1007/s00168-009-0291-x Avebury.

Ayres, G., Black, B., Davydenko, M., Mehrez, D. and Walsh, J. (2013). The Irish Internet Cluster: Helping a Tiger Regain its Stripes. isc.hbs.edu, [online] pp.1-36. available at: http://www.isc.hbs.edu/resources/courses/moc-course-at-harvard/Documents/pdf/student-projects/Ireland_Internet_2013.pdf [accessed: 25th January 2017].

Bacheller, J. (2000). ‘Commentary on State-Level Economic Development in New York,’ Economic Development Quarterly, 14 (1): 5-10.

Bagwell, S. (2008). Creative clusters and city growth. *Creative Industries Journal*, 1(1), pp.31-46.

Bailey, K. (2008). Methods of social research. *Simon and Schuster*.

Bailey, Robert G. (1996) Ecosystem Geography. New York: Springer-Verlag. ISBN 0-387-94586-5

Baker, T., and Nelson, R. E. (2005). Creating something from nothing: Resource construction through entrepreneurial bricolage. *Administrative Science Quarterly*, 50(3), 329-366.

Baklanov, P., Shetty, K., Zhang, B., Han, D., Ahern, J. and Miyamoto, T. (2006). A region in the model of sustainable development. [online] Sustain.oia.hokudai.ac.jp. available at: http://sustain.oia.hokudai.ac.jp/2007/05/speech.php [accessed: 3rd January 2016].

Balaguer-Coll, Prior and Tortosa-Ausina (2010), “Decentralisation and efficiency of local government.” *Annals of Regional Science.*

Bantel, K.A. (1998). “Technology-based “adolescent” firm configurations: strategy identification, context, and performance”, in: Journal of Business Venturing 13, pp. 205-230.

Baptista, R. and Swann, P. (1999) A Comparison of Clustering Dynamics in the Us and UK Computer Industries. *Journal of Evolutionary Economics* 9, 373-399.

Baptista, R. and Swann, P. (1998), ‘Do firms in clusters innovate more?’ Research Policy 27 (5): 525-540.

Baptista, R., Escaria, V., and Madruga, P. (2008). Entrepreneurship, regional development and job creation: the case of Portugal. Small Business Economics, 30(1), 49-58. doi: 10.1007/s11187-007-9055-0

Barret, S. (1995) "Rent-Seeking Opportunities'. In Burke, E. (ed.). *Enterprise and the Irish Economy*. Dublin: Oakey Press, pp. 271-298.

Barrington Report (1991), Local Government Reorganisation and Reform – Report of the Advisory Expert Committee, Dublin: Government Publications [Advisory Expert Committee on Local Government Reorganisation and Reform].

Barrington, T. (1976). From big government to local government. Dublin: Institute of Public Administration, pp.1-238.

Barro, R. and Sala-i-Martin, X. (1992). Convergence. Journal of Political Economy. 100(2): 223–251.

Barro, R. J. – Sala-I-Martin, X. (2004): Economic growth. MIT Press, Cambridge, London.

Barro, R., Martin, X., Blanchard, O. and Hall, R. (2004) Convergence Across States and Regions. jstor.org, 1991 (1), pp. 107-182. available at: http://miha.ef.uni-lj.si/_dokumenti3plus2/195003/BarroSalaiMartin1991Convergenceacrossstatesandregions.pdf [accessed: 1st July 2015].

Barro, R.J. and Sala-i-Martin, X. (1995), Economic Growth, Cambridge, MA: MIT Press.

Bauer, J.M. (2005) 'Bundling, differentation, alliances and mergers: convergence strategies in US communication markets', Communication & Strategies, Vol. 60, pp.59–82.

Baumol, W. J. (1986). Productivity growth, convergence and welfare: What the longrun data show. The American Economic Review 76(5): 1072–1085.

Baumont, C., Ertur, C. and Le Gallo, J. (2002). The European Regional Convergence Process. 1980–1995: Do Spatial Regimes and Spatial Dependence Matter? University of Burgundy. http:// cournot2.u-strasbg.fr/users/j-econometres02/papers/SR1101. Pd.

Baxter, P., and Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. The Qualitative Report, 13(4), 544-559. Retrieved from http://nsuworks.nova.edu/tqr/vol13/iss4/2.

Baxter, P., and Rideout, L. (2006). Decision making of 2nd year baccalaureate nursing CA: Sage.

Bayareahouston.com, (2012). Bay Area Houston Economic Partnership. [online] available at: http://www.bayareahouston.com/content/about_us/regional_model [accessed: 2nd January 2016].

Bazely, P. (2007). Qualitative Data Analysis with NVivo (Book review. 2nd ed. London: Monash University and Australian College of Ambulance Professionals, pp.1-217.

Bbvaresearch.com. (2019). Galicia Economic Outlook 2019 | BBVA Research. [online] Available at: https://www.bbvaresearch.com/en/publicaciones/galicia-economic-outlook-2019/ [Accessed 6 Dec. 2019].

Bechhofer, F. (1974). Small Shopkeepers: Matters of Money and Meaning. The Sociological Review. 22. 465 - 482. 10.1111/j.1467-954X.1974.tb00504.x.

Bechhofer, F., Elliott B., Rushforth M., and and Bland, R. (2011). Small Shopkeepers: Matters of Money and Meaning. The Sociological Review. 22. 465 - 482. 10.1111/j.1467-954X.1974.tb00504.x.

Becker, J., and Niehaves, B. (2007). Epistemological perspectives on IS research: a framework for analysing and systematizing epistemological assumptions. Information Systems Journal, 17(2), 197-214. https://doi.org/10.1111/j.1365-2575.2007.00234.x

Bell, J. (2005). Doing your Research Project. Buckingham: Open University Press.

Benneworth, P. (2004). In what sense 'regional development?': Entrepreneurship, underdevelopment and strong tradition in the periphery. Entrepreneurship and Regional Development, 16(6), 439-458.

Benz, A. and Fürst, D. (2002) Policy learning in regional networks. European Urban and Regional Research 9:1, 21–35.

Berglund, K., and Johansson, A. W. (2007). Entrepreneurship, discourses and conscientization in processes of regional development. Entrepreneurship and Regional Development, 19(6), 499-525.

Berglund, K., and Johansson A.W. (2007), 'Constructions of Entrepreneurship: A discourse analysis of academic publications', Journal of Enterprising Communities, 1(1), pp. 77-102.

Bergman, E. and Feser E. (1999) 'Industrial and Regional Clusters Concepts and Comparative Applications,' The Web Book of Regional Science, West Virginia University, http://www.rri.wvu.edu/webbook/bergman-feser/contents.htm

Bergman, Edward M. and Edward J. Feser. (2000). "Industrial and Regional Clusters: Concepts and Comparative Applications." West Virginia University, the Web Book of Regional Science, Regional Research Institute.

Beugelsdijk, S., and Noorderhaven, N. (2004). Entrepreneurial attitude and economic growth: A cross-section of 54 regions. Annals of Regional Science, 38(2), 199-218. doi: 10.1007/s00168-004-0192-y

Beyers, W.B. (2005), "Services and the changing economic base of regions in the united states", The Service Industries Journal, vol. 25, no. 4, pp. 461-476.

Bieńkowska, E. and Creţu, C. (2016) Smart Guide to Cluster Policy. [online] Belgium: European Publications Office, pp.1-60. available at: http://www.cluster-analysis.org/downloads/smart-guide-to-cluster-policy [accessed 16th August 2016].

Birch, L. (1979). The Job Generation Process, unpublished report prepared by the MIT Program on Neighborhood and Regional Change for the Economic Development Administration, U.S. Department of Commerce, Washington, DC.

Birch, L. (1987). Job Creation in America: How Our Smallest Companies Put the Most People to Work, Free Press, New York.

Blake, M. K., and Hanson, S. (2005). Rethinking innovation: context and gender. Environment and Planning A, 37(4), 681-701. doi: 10.1068/a3710

Blöchliger, H. and C. Vammalle (2012), Reforming Fiscal Federalism and Local Government: Beyond the Zero-Sum Game, OECD Publishing, Paris, doi: 10.1787/9789264119970-en.

Bmwassembly.ie, (2016). Northern & Western Regional Assembly. [online] available at: http://www.bmwassembly.ie [accessed: 3rd March 2016].

Boja, C. (2011). Clusters models, factors and characteristics. International Journal of Economic Practices and Theories, 1(1), 34-43.

Boschma, R. (2005), 'Proximity and Innovation: A Critical Assessment,' Regional Studies, 39 (1): 61-74.

Boschma, R. (2016). Smart Specialisation and Regional Innovation Policy. Welsh Economic Review, 24, pp.17-17.

Bosworth, G. (2008). Entrepreneurial in-migrants and economic development in rural England. International Journal of Entrepreneurship and Small Business, 6(3), 355-369.

Botchway, Q., Goodall, G., Noon, D., and Lemon, M. (2002). “Emergence-based Local Economic Development Model: A way forward in responding to turbulent operating environments.” Entrepreneurship and Regional Development 14(2): 155-174.

Botric, V. (2003). Regional differences in unemployment: the case of Croatia. ERSA conference papers ersa03p25. European Regional Science Association.

Boyatzis, R. E. (1998). Transforming qualitative information: Thematic analysis and code development. Thousand Oaks, CA: Sage.

Braun, P. (2004). Regional Innovation and Tourism Networks: the nexus between ICT diffusion and change in Australia. Information Technology & Tourism, 6(4).

Braun, P., McRae-Williams, P. and Lowe, J. (2005) "Small Business Clustering: Accessing Knowledge through Local Networks", Journal of New Business Ideas & Trends, vol. 3, no. 2, pp. 57-63.

Braun, V., and Clarke, V. (2006). Using thematic analysis in psychology. Qualitative research in psychology, 3(2), 77-101.

Braun, V., and Clarke, V. (2013). Successful qualitative research: A practical guide for beginners. Sage.

Braunerhjelm, P., Acs, Z., Audretsch, D. and Carlsson, B. (2009). The missing link: knowledge diffusion and entrepreneurship in endogenous growth. Small Bus Econ, 34(2), pp.105-125.

Brennan, C. (2015). Rolling in it – the richest counties in Ireland are…. [online] TheJournal.ie. available at: http://www.thejournal.ie/cso-household-survey-1911617-Jan2015/ [accessed: 10th December 2015].

Breschi, S. and Lissoni, F. (2001) 'Localised knowledge spillovers vs. innovative milieux: Knowledge "tacitness" reconsidered', Papers in Regional Science, 80: 255–73.

Bresnahan, T., and Gambardella, A. (2004), Building High-Tech Clusters. Silicon Valley and Beyond. Cambridge University Press, New York.

Bresnahan, T., Gambardella, A. and Saxenian, A. (2001), 'Old Economy inputs for New Economy outcomes: Cluster formation in the New Silicon Valleys', Industrial and Corporate Change 10, 835–860.

Brown, R (2000b), 'Cluster Dynamics m Theory and Practice with Application to Scotland' Regional and Industry Policy Research Paper 38 Glasgow European Policies Research Centre.

Brown, R. (2000), Cluster dynamics in theory and practice with application to Scotland, Regional and Industrial Policy Research Paper Number 38, Glasgow, U.K.: European Policies Research Centre.

Brown, R. (2006). A Practical Guide to Rural, Cluster-Based Economic Development Strategies. Ph.D. University of North Carolina.

Bruno, A.V. and Tyebjee, T.T. (1982). The Environment for Entrepreneurship. In C. Kent, D. Sexton, & K. Vesper (Eds.), Encylopedia of Entrepreneurship (pp. 288-315). Englewood Cliffs, NJ: Prentice-Hall Inc.

Bryman, A. (1992) Quantitative and qualitative research: further reflections on their integration. In Brannen, J. (ed) Mixing Methods: Qualitative and Quantitative Research. Aldershot: Avebury.

Bryman, A. (2006). Integrating quantitative and qualitative research: How is it done? Qualitative Research, 6(1), 97–113. https://doi.org/10.1177/1468794106058877

Bryman, A. and Bell, E. (2015). Business research methods. 4th ed. Oxford: Oxford University Press, pp.1-764.

Buchanan, C. (1968). Regional Development in Ireland: A Summary, A project prepared in association with Economic Consultants Limited and An For as Forbatha.

Buckley, J. (2016). Articles: Business Airport International. [online] Businessairportinternational.com. available at: http://www.businessairportinternational.com/articles.php?ArticleID=158 [accessed: 24th July 2017].

Buckley, M. (2011). A Sustainable Regional Economic Growth Strategy for Ireland's Mid West: Target and Policies. Master of Business Studies. University of Limerick.

Burke, A. (1995) "The Re-Emergence of Entrepreneurial Analyses", in A. Burke (ed) Enterprise and the Irish Economy, Oak Tree Press: Dublin.

Burke-Kennedy, E. (2015). Nevin Institute: Recovery almost exclusively concentrated around Dublin. [online] The Irish Times. available at: http://www.irishtimes.com/business/economy/nevin-institute-recovery-almost-exclusively-concentrated-around-dublin-1.2144575 [accessed: 29th December. 2015].

Burns, R (2000) Introduction to Research Methods, London, Sage.

Burrell, G., and Morgan, G. (1979). Sociological Paradigms and Organisational Analysis: Heinemann, London.

Burton, J. (2015). Regional Economic Strategy focuses on promoting recovery in every region. [online] Labour. available at: https://www.labour.ie/news/blog/2015/02/11/regional-economic-strategy-focuses-on-promoting-re/ [accessed: 10th December 2015].

Business Culture. (2017). Ireland. [online] available at: http://businessculture.org/northern-europe/ireland/ [accessed: 12th January 2017].

Business.com, (2015). What is a region? definition and meaning. [online] available at: http://www.businessdictionary.com/definition/region.html [accessed: 10th December 2015].

Butel, L., and Watkins, A. (2006) Clusters of entrepreneurs: The application of ant colony optimisation modelling. Journal of Modelling in Management, Vol. 1, No. 3, pp. 255–269.

Bygrave, W. D. and Hofer, C. W. (1991) Theorizing about entrepreneurship. Entrepreneurship Theory and Practice, 16, 13-22.

Byrne, E. (2016). Incorporating Network Theory and Visualisation into Cluster Analysis: A Hybrid Methodology Applied to European ICT Clusters.. PhD. Cork Institute of Technology.

Callanan, B. (2000). Ireland's Shannon Story - A case study of Local and Regional Development. 1st ed. Dublin: Irish Academic Press, pp.1-204.

Callanan, M. and Keogan, J. (2003). Local government in Ireland. Dublin: IPA, pp.1-610.

Camagni, R. and Capello, R. (2000), 'The role of SME networking and links in innovativehigh-technology milieu,' Keeble, D. and F. Wilkinson, (eds.) in High-technology Clusters, Networking and Collective Learning in Europe, Aldershot: Ashgate Publishing, 118 – 155.

Campbell and Ahrens (1998). Innovative community services for rape victims: An application of multiple case study methodology. American Journal of Community Psychology, 26, 537-571.

Cantillon R (1734) The Circulation and Exchange of Good and Merchandise. In: Casson M (ed) (1990) Entrepreneurship. Edward Elgar, Hants, pp 5–10

Cantillon R (1755) The Circulation and Exchange of Good and Merchandise. In: Casson M (ed) (1990) Entrepreneurship. Edward Elgar, Hants, pp 5–10

Cappelen, A. (2001). Convergence, Divergence and the Kuznetscurve. Paper prepared as part of the Project: "Technology, Economic Integration and Social Cohesion", sponsored by the European Commission under the TSER Programme.

Cappelen, A., Castellacci, F., Fagerberg, J. and Verspagen, B. (2003), "The Impact of EU Regional Support on Growth and Convergence in the European Union", Journal of Common Market Studies, 41, 621-644.

Carbonara, N. (2002) 'New Models of Inter-firm Networks within Industrial Districts,' Entrepreneurship and Regional Development 14 229-246.

Carecprogram.org, (2013). Central Asia Regional Economic Cooperation (CAREC) Program. [online] available at: http://www.carecprogram.org/index.php?page=carec-program [accessed: 16th December 2015].

Carroll, M. and Reid, N. (2015). Cluster Based Economic Development: A Comprehensive Strategy to Secure NW Ohio's Economic Future. Research Gate, [online] pp.1-6. available at: http://file:// Downloads/Cluster_Based_Economic_Development_A_Comprehensive.pdf [accessed: 9th January 2019].

Castro, A.J., B. Martın-Lopez, M. Garcıa-Llorente, P.A. Aguilera,E. Lopez, and J. Cabello, (2011). Social Preferences Regarding the Delivery of Ecosystem Services in a Semiarid Mediterranean Region. Journal of Arid Environments 75:1201-1208

Catalonia.com. (2019). A cluster hotspot | Catalonia: A cluster hotspot. [online] available at: http://catalonia.com/catalonia-barcelona/diverse-open-dynamic/cluster-hotspot.jsp [accessed: 30th April 2019].

CBS StatLine. (2018). Statline.cbs.nl. [online] Available at: https://statline.cbs.nl/Statweb/ [Accessed 27 Mar. 2019].

Cci-magnesia.gr. (2019). Chamber of Magnesia - Home Page. [online] available at: http://www.cci-magnesia.gr/en/articles/displayArticles/6 [accessed: 27th March 2019].

Ceaga.com. (2019). CEAGA. Galician Automotive Business Cluster. [online] available at: http://www.ceaga.com/ [accessed: 9th December 2019].

Cécora, J. (1999). Cultivating grass-roots for regional development in a globalising economy: innovation and entrepreneurship in organised markets. Aldershot: Ashgate.

Chambers.ie, (2014). Chambers Ireland - About. [online] available at: http://www.chambers.ie/about/ [accessed: 8th December 2015].

Champion, T., Mønnesland, J., and Vandermotten, C. (1996). The New Regional Map of Europe. Progress in Planning 46, pp. 1-89.

Charles, D. (2006). Universities as key knowledge infrastructures in regional innovation systems. Innovation: The European Journal of Social Sciences 19(1): 117-130.

Checherita, C., Nickel, C and Rother, P. (2009). The role of fiscal transfers for regional economic convergence in Europe. Working Paper Series. 1029. European Central Bank.

Chen, J. (2017). Convergence. [online] Investopedia. available at: https://www.investopedia.com/terms/c/convergence.asp [accessed: 14th January 2019].

Chinitz, B. (1961). Contrasts in Agglomeration: New York and Pittsburgh. jstor.org, 51 (2), pp. 279-289. available at: http://urbanpolicy.berkeley.edu/pdf/chinitz_contrastinagglomeration.pdf [accessed: 25th May 2013].

Cho, J. Y., and Lee, E.-H. (2014). Reducing Confusion about Grounded Theory and Qualitative Content Analysis: Similarities and Differences. The Qualitative Report, 19, 1–20.

Choi, Y., Choi, H. and O'Donnell, M. (2018). Disaster Reintegration Model: A Qualitative Analysis on Developing Korean Disaster Mental Health Support Model. International Journal of Environmental Research and Public Health, 15(2), p.362.

Christensen, T., Lämmer-Gamp, T. and Meier zu Köcker, G. (2012), Let's make a perfect cluster policy and cluster programme, Berlin/Copenhagen: VDI/VDE.

Chung, Y., and Tibben, W. (2006). Understanding the adoption of clusters by SMEs using innovation theory. In Y. Ryung, K. Chung, & W. Tibben (Eds.), Management of Innovation and Technology, 2006 IEEE International Conference (vol. 1, pp. 389-393). Institute of Electrical and Electronics Engineers.

Citizensinformation.ie, (2015). Functions of local authorities. [online] available at: http://www.citizensinformation.ie/en/government_in_ireland/local_and_regional_government/functions_of_local_authorities.html [accessed: 8th December 2015].

Citizensinformation.ie. (2013). Government of Ireland. [online] available at: http://www.citizensinformation.ie/en/government_in_ireland/national_government/the_irish_government/the_government_introduction.html [accessed: 7th December 2015].

Clancy, L. (2015). Ireland's Technology Cluster. In: 3rd International Cluster Conference. [online] Limerick: Innovate Limerick, pp.1-26. available at: http://innovatelimerick.ie/currentprojects/cluster-conf-presentations/ [accessed: 18th August 2016].

Clancy, P., O'Malley, E., O'Connell, L. and Van Egeraat, C. (2001). Industry Clusters in Ireland: An Application of Porter's Model of National Competitive Advantage to Three Sectors. European Planning Studies, 9(1), pp.7-28.

Clark, G., Feldman, M., Gertler, M. and Williams, K. (eds.) (2003), The Oxford Handbook of Economic Geography. Oxford University Press.

Clarke, A. and Eustace, A. (2009). Exploring Social Enterprise In Nine Areas in Ireland. Eustace Patterson Ltd, pp. 1-68. available at: http://www.dublinpact.ie/new/Doc%2004%20-%20PLANET%20Exploing%20Social%20Enterprise.Oct.09.pdf [accessed: 10th December 2015]

Cluster Observatory (2013) Classroom, dynamics, policy and management [online], available at: http://www.clusterobservatory.eu/index.html#!view=classroom;url=/classroom/ [accessed: 15th May 2015].

Cluster Observatory (2013b) Clusters at your fingertips [online], available at: http://www.clusterobservatory.eu/index.html#!view=organizationalmapping;p=map;ll=56.3,26.1;z=4 [accessed: 23rd July 2015].

Cluster TIC. (2019). Home. [online] available at: https://www.clustertic.net/ [accessed: 11th December 2019].

Cluster-analysis.org. (2016). The European Secretariat for Cluster Analysis — ESCA. [online] available at: http://www.cluster-analysis.org/ [accessed: 30th August 2016].

Clusterasturias.es. (2019). INTRODUCTION | Asturias Clusters Network. [online] available at: https://www.clusterasturias.es/en/presentacion/ [accessed: 5th December 2019].

Clustercollaboration.eu. (2020). European Cluster Accelerator Programme: Clusters of Change Bootcamp. [online] available at: https://www.clustercollaboration.eu/event-

calendar/european-cluster-accelerator-programme-clusters-change-bootcamp [accessed: 6th January 2020].

Clusterdevelopment.com. (2016). Cluster-based Economic Development Approaches. [online] available at: http://www.clusterdevelopment.com/services.htm [accessed: 22nd June 2016].

Clusterdevelopment.com. (2016). Services. [online] available at: http://www.clusterdevelopment.com/services.htm [accessed: 22nd June 2016]

ClusterMapping.us. (2014). Cluster Mapping. [online] available at: https://www.clustermapping.us/content/cluster-mapping-methodology [accessed: 15th August. 2016].

Clusterobservatory.eu. (2016). Cluster Observatory. [online] available at: http://www.clusterobservatory.eu/index.html#!view=regionalmapping;i=V16140;y=2011;r=NC10;rsl=0;rp=NC10;s=CC20-it;sp=CC20-STND;p=map;ll=50.606158,15.377344;z=4 [accessed: 25th September 2016].

Clusters Galicia. (2019). Who we are |Clusters of Galicia. [online] available at: http://clustersgalicia.com/quienes-somos/ [accessed: 6th December 2019].

Clusters in Business. (2014). NetworkingForEnterprise, [online] 6(49), p.1. available at: http://www.maltaenterprise.com/sites/default/files/clusters.pdf [accessed: 5th September 2016].

Clusters of change. (2020). Clusters of change. [online] available at: http://clustersofchange.eu/ [accessed: 8th January 2020].

Colley, M. (2010). Economic Growth Quotes. QuotesGram. [online] Quotesgram.com. available at: https://quotesgram.com/economic-growth-quotes/#vJyjRQFc6a [accessed: 5th January 2016].

Commission of the European Communities (2008). Towards world-class clusters in the European Union: Implementing the broad-based innovation strategy. Communication from the commission to the council, the European Parlament, the European Economic and Social

Common tools for European regional growth – ERDF in Practice in West Finland. (2019). West Finland EU Office, [online] pp.1-12. available at: https://www.wfeo.fi/assets/6/Uploads/West-Finland-Cohesion-Policy-2020+.pdf [accessed: 5th December 2019].

Cooke, P. and Huggins, R. (2002), 'High technology clustering in Cambridge,' in A. Amin, S. Goglio and F. Sforzi, (eds.), The Institutions of Local Development, London: IGU, 234–259.

Cooke, P. and Morgan, K. (1998). The Associational Economy: Firms, Regions and Innovation, Oxford: Oxford University Press.

Cooke, P., Boekholt, P., Schall, N., and Schienstock, G. (1996): Regional Innovation Systems: Concepts, Analysis and Typology. Paper presented during the EU-RESTPOR Conference "Global Comparison of Regional RTD and Innovation Strategies for Development and Cohesion". Brussels, 19-21 September.

Cooney, T. (2008) A mapping of entrepreneurship and innovation policy in Ireland. Institute of Minority Entrepreneurship, Dublin Institute of Technology.

Cooper, D. and Schindler, P. (2003), Business Research Methods, 8th Edition, US: McGraw-Hill Higher Education.

Cooper, H. (1984) "The integrative research review: a systematic approach," Sage., Beverly Hills.

Cor.europa.eu. (2019). Previous EER applications. [online] available at: https://cor.europa.eu/en/engage/Pages/previous-applications-eer-page.aspx [accessed: 6th March 2019].

Corbin, J., and Strauss, A. (2008). Basics of qualitative research: Techniques and procedures for developing grounded theory (3rd ed.). Thousand Oaks, CA, US: Sage Publications, Inc.http://dx.doi.org/10.4135/9781452230153

Cornett, A.P. (2009) Aims and strategies in regional innovation and growth policy: A Danish perspective, Entrepreneurship & Regional Development 21(4), 399- 420.

Cortright, J. (2006) "Making sense of clusters: regional competitiveness and economic development", Brookings Institution Metropolitan Policy Program, Washington, DC.

Cortright, J. (2006), 'Making Sense of Clusters: Regional Competitiveness and Economic Development,' Discussion Paper, Washington, DC: Brookings Institution Metropolitan Policy Program.

Council of Oulu Region (2019). [online] Available at: https://www.pohjois-pohjanmaa.fi/region [Accessed 5 Dec. 2019].

Countries. available at: http://www.ifama.org/conferences/2001Conference/Papers/Area%20VI/Neven_David.pdf [accessed: 10th August 2016].

Courtney, L. (2019). Shannon 2.0 - 'Our Story is one of constant reinvention'. The Sunday Business Post, p.13.

Crabtree, B. and Miller, W. (eds.) (1999), Doing Qualitative Research. 2nd edition, Newbury Park, California: Sage.

Crawley, A. and Hill, S. (2008), 'Mapping sectoral specialisation,' Technical report, Presentation at Clustering Forumn in University College Cork on 22nd of May.

Creswell, J.W. (1994) "Research design: qualitative and quantitative approaches, Sage" London

Creswell, J.W. (2013) Research Design: Qualitative, Quantitative, and Mixed Methods Approaches, Sage, UK.

Crone, M. (2004) Celtic Tiger Cubs: Ireland's VC-funded Software Start-ups. Paper presented to ISBA National Conference, Newcastle-Gateshead, November.

Crossman, A. (2019). Kerr's Convergence Theory -- What It Is and How It Affects Nations. [online] ThoughtCo. Available at: https://www.thoughtco.com/convergence-theory-3026158 [Accessed 14 Jan. 2019].

Crotty, M. (1998). The foundations of social research: Meaning and perspective in the research process: Sage.

Crouch, C., Le Galés, P., Trogilia, C. and Voelzkow, H. (2001). Local Production System in Europe: Rise or Demise? Oxford: Oxford University Press.

CSO. (2013). 1st ed. [ebook] Dublin: Stationery Office, pp.1-87. available at: http://www.cso.ie/en/media/csoie/releasespublications/documents/otherreleases/2013/regqualityfull.pdf [accessed: 21st December 2015].

CSO.ie, (2011). Census 2011 Population Classified by Area. [online] available at: http://www.cso.ie/px/pxeirestat/Statire/SelectVarVal/saveselections.asp [accessed: 21st December 2015].

CSO.ie, (2014). County Incomes and Regional GDP 2011 - CSO - Central Statistics Office. [online] available at:

http://www.cso.ie/en/releasesandpublications/er/cirgdp/countyincomesandregionalgdp2011/ [accessed: 29th December 2015].

Cuadrado-Roura, J.R. and García-Greciano, B. (1995). Interregional difference in Spain. Evolution and perspective, in several authors. The Spanish economy in an open scenario. Madrid: Foundation Argentina.

Cuadrado-Roura, J.R., García-Greciano, B. and Raymond, J.L. (1999). Regional convergence in productivity and productive structure: the Spanish case. International Regional Science Review 22, pp. 35-53

Culliton, I. (1992), 'A Time for Change Industrial Policy for the 1990's, Report of the Industrial Policy Review Group Dublin Stationary Office.

Cyber Ireland. (2019). Home Page - Cyber Ireland. [online] available at: https://cyberireland.ie/ [accessed: 24th April 2019].

Czamanski, D. Z., Czamanski, S. (1977). Industrial complexes: their typology, structure and relation to economic development, in: Papers of the Regional Science Association, vol. 38, 93-111.

Dahl, M. S. and Pedersen, C. O. R. (2004), 'Knowledge Flows through Informal Contacts in Industrial Clusters: Myth or Reality?' Research Policy, 33 (10): 1673-86.

Dailey L., Demo L., Spillman M. (2003). The Convergence Continuum: A Model for Studying Collaboration Between Media Newsrooms. Ball State University, Muncie, Indiana, USA: Paper submitted to the Newspaper Division of the Association for Education in Journalism and Mass Communication, Kansas City, Missouri, July- August.

Dairymaster, (2015). Dairymaster Dairy Farming Equipment - Company Profile Information. [online] available at: http://www.dairymaster.com/about [accessed: 8th December 2015].

Daly, H. E. (1987). The economic growth debate: what some economists have learned but many have not. Journal of Environmental Economics and Management, 14(4), 323- 336.

Dan, M. (2012). Innovative clusters: a solution for the economic development of Romania. Theoretical and Applied Economics, [online] XIX(9(574), pp.1-12. available at: http://store.ectap.ro/articole/771.pdf [accessed: 16th August 2016].

Das, S. and Heinrich, M. (2015). Local Economic Development and Clusters. [online] Enterprise-development.org. available at: http://www.enterprise-development.org/page/ledclusters [accessed: 16th December 2015].

Daveri, F. and Silva, O. (2004). Not only Nokia: what Finland tells us about new economy growth. Economic Policy, 19(38), pp.118-163.

Davidsson, P. (1995). Culture, structure and regional levels of entrepreneurship. Entrepreneurship & Regional Development, 7(1), 41-62.

Dbei.gov.ie. (2014). Ireland's Smart Specialisation Strategy for Research and Innovation - DBEI. [online] available at: https://dbei.gov.ie/en/Publications/Summary-of-Ireland%E2%80%99s-Smart-Specialisation-Strategy-for-Research-and-Innovation.html [accessed: 6th December 2019].

Dbei.gov.ie. (2019). Mid-West Regional Enterprise Plan to 2020 - DBEI. [online] available at: https://dbei.gov.ie/en/Publications/Mid-West-Regional-Enterprise-Plan-to-2020.html [accessed: 4th March 2019].

De la Mothe, J. and Paquet, G. (1998), Local and Regional Systems of Innovation, Boston, MA.: Kluwer.

Deardorff, A. V. (2005), 'Deardorff's Glossary of International Economics,' [Website] available at http://www-personal.umich.edu/~alandear/glossary/ [26/1/2016].

DeBresson, C. and Amesse, F. (1991), 'Networks of innovators: a review and introduction to the issue,' Research Policy, 20: 363-379.

Dec-ced.gc.ca, (2012). Strategic Framework 2012-2017: Canada Economic Development for Quebec Regions. [online] available at: http://www.dec-ced.gc.ca/eng/publications/agency/strategic/2012/261/index.html [accessed: 6th January. 2016].

DECLG.ie, (2016). LEADER 2014 - 2020. [online] available at: http://www.environ.ie/community/rural-development/leader/leader-2014-2020 [accessed: 3rd March 2016].

Deegan, G. (2017). Dublin Airport dominance 'not in national interest'. [online] www.irishexaminer.com. available at: https://amp-irishexaminer-com.cdn.ampproject.org/c/amp.irishexaminer.com/business/dublin-airport-dominance-not-in-national-interest-450683.html [accessed: 4th July 2017].

Dejardin, M., and Fritsch, M. (2011). Entrepreneurial dynamics and regional growth. Small Business Economics, 36(4), 377-382.

Delgado, M. (2015). Benchmark Cluster Definitions: U.S. Cluster Mapping Project.

Delgado, M. Porter, M., and Scott, S. (2010). Cluster and Entrepreneurship. hbs.edu, 1 (1), p.32. available at: http://www.isc.hbs.edu/pdf/Clusters-and-Entrepreneurship---SSRN-id1689084.pdf [accessed: 14th April 2016].

Delgado, M. Porter, M., and Scott, S. (2011). Clusters, Convergence and Economic Performance. hbs.edu, 1 (1), p.49. available at: http://www.isc.hbs.edu/pdf/DPS_Clusters_Performance_2011-0311.pdf [accessed: 14th April 2016].

Delgado, M., Porter, M. E. and Stern, S. (2014), 'Clusters, convergence, and economic performance,' Research Policy, 43 (10): 1785–1799

Denscombe, M. (2003). The good research guide: for small scale social projects:

Denzin, N. (1998). The New Ethnography. Journal of Contemporary Ethnography, 27(3), pp.405-415.

Department of Jobs, Enterprise and Innovation (2013) Public Consultation: A National Entrepreneurship Policy Statement for Ireland, http://www.djei.ie/publications/enterprise/2013/Public_Consultation_A_National_Entrepreneurship_Policy_Statement_for_Ireland.pdf [accessed: 12th September 2013].

Despotovic, D. and Cvetanovic, S. (2017). The theoretical explication of the factors of regional growth and the economic convergence (divergence) of the region. Ekonomski horizonti, 19(2), pp.109-123.

Devlin, L. (1969). The Devlin Report - An Overview. 1st ed. [ebook] Dublin: Institute of Public Administration, pp.340-353. available at: http://ftp://78.153.208.68/bkp/ipa/PDF/The_devlin_report_an_overview.pdf [accessed: 4th January 2016].

DG AGRI (2014-2020). Rural Development Programme for Galicia, November 2015 http://ec.europa.eu/agriculture/rural-development-2014-2020/country-files/es/factsheet-galicia_en.pdf

DiCicco-Bloom, B., and Crabtree, B. F. (2006). The qualitative research interview.

Dictionary.com. (2019). the definition of region. [online] available at: https://www.dictionary.com/browse/region [accessed: 26th March 2019].

Dineen, D.J., and Lenihan, H. (2011) ‘Rebuilding the Irish economy: Policy responses to stimulate regional recovery in the real economy’, paper presented to the UK Urban and Regional Economics (URESG) meeting, London, 6-7 January (invited paper).

DJEI.ie (2013) DJEI - Action Plan for Jobs 2013 – Taoiseach, Tánaiste, Minister for Jobs. [online] Available at: http://www.djei.ie/press/2013/20130222.htm [accessed: 7th December 2015].

DJEI.ie (2014). National Policy Statement on Entrepreneurship in Ireland. 1st ed. [ebook] Dublin, pp.1-70. available at: https://www.localenterprise.ie/Documents-and-Publications/Entrepreneurship-in-Ireland-2014.pdf [accessed: 3rd March 2016].

DJEI.ie, (2015). Government launches Mid-West Action Plan for Jobs, part of €250million regional jobs strategy - DJEI. [online] available at: https://www.djei.ie/en/News-And-Events/Department-News/2015/October/19102015.html [accessed: 5th January 2016].

Donahue, R., Parilla, J. and McDearman, B. (2018). RETHINKING CLUSTER INITIATIVES. [online] Washington D.C: Brookings, pp.1-52. available at: https://www.brookings.edu/wp-content/uploads/2018/07/201807_Brookings-Metro_Rethinking-Clusters-Initiatives_Full-report-final.pdf [accessed: 9th January 2019].

Donahue, R., Parilla, J. and McDearman, B. (2018). RETHINKING CLUSTER INITIATIVES. Brookings, [online] pp.1-52. available at: https://www.brookings.edu/wp-content/uploads/2018/07/201807_Brookings-Metro_Rethinking-Clusters-Initiatives_Full-report-final.pdf [accessed: 20 Feb. 2019].

Donovan, E. (2017). Shannon Region - Shannon Commercial Properties. [online] Shannon Commercial Properties. available at: http://www.shannonproperties.ie/shannon-region/shannon-region/ [accessed: 13th January 2017].

Doran, J. and Fingleton, B. (2013). Economic shocks and growth: Spatio-temporal perspectives on Europe's economies in a time of crisis. Papers in Regional Science, 93, pp.S137-S165.

Douthwaite, R. (1996), Short Circuit, Strengthening Local Economies for Security in an Unstable World. Dublin. The Lilliput Press Ltd.

Downes, H. (2019). Shannon 2.0 - 'Our Story is one of constant reinvention'. The Sunday Business Post, p.2.

Doyle, E. (2015). Clusters, Economic Performance: Irish Regions. In: 3rd International Cluster Conference. [online] Limerick: Innovate Limerick, pp.1-20. available at: http://innovatelimerick.ie/currentprojects/cluster-conf-presentations/ [accessed: 22nd August. 2016].

Doyle, E. and Fanning, C. (2007). The role for clusters in Irish economic development policy. Perspectives on Irish productivity: A selection of essays by Irish and international economists, pp.267-281.

Dragomir, B. (2020). European Cluster Accelerator Programme: Clusters of Change Bootcamp. [online] Clustercollaboration.eu. available at: https://www.clustercollaboration.eu/event-calendar/european-cluster-accelerator-programme-clusters-change-bootcamp [accessed: 8th January 2020].

Dreijer, I., Kristensen, F. S. and Laursen, K. (1997), ‘Studies of Clusters as a Basis for Industrial and Technology Policy in the Danish Economy,’ paper presented at the OECD workshop on cluster analysis and cluster based policy, Amsterdam, 10-11 October.

Dreyfuss, R. (2011). Clusters: Sexy but Mysterious and Elusive. Journal of Applied Research in Economic Development, [online] 8(1), pp.1-8. available at:

https://www.c2er.org/journal/Download/V08I01/Vol8Issue1-02-Clusters.pdf [accessed: 9th January 2019].

Drezgić, S. (2011). Public investments and regional income convergence: empirical analysis of Croatian regions. Social research. 3 (24): 43-55.

Drilhon, G., and Estime, M. (1993). Technology Watch and the Small Firm. OECD Observer 182. 31-34.

Drucker, P. F. (1985). Innovation and Entrepreneurship. New York: Harper & Row.

Dublin Regional Authority, (1995), Compatibility of Regional Boundaries, A Country of Regions, A Region of Areas. Dublin.

DublinCity.ie, (2016). Community & Social Development | Dublin City Council. [online] available at: http://www.dublincity.ie/main-menu-services/community [accessed: 2nd January. 2016].

Dudovskiy, J., (2014). The Ultimate Guide to Writing a Dissertation in Business Studies. http://research-methodology.net/research-philosophy/pragmatism-research-philosophy/

Duggan, B. (2012). How it began: O'Regan's innovative dream allowed region to take off - Independent.ie. [online] Independent.ie. available at: http://www.independent.ie/opinion/analysis/how-it-began-oregans-innovative-dream-allowed-region-to-take-off-26852088.html [accessed: 24th July 2017].

Dumgal.gov.uk, (2014). SOUTH OF SCOTLAND ALLIANCE RURAL REGIONAL ECONOMIC DEVELOPMENT PROGRAMME – 2014 – 2016. [online] available at: http://www.dumgal.gov.uk/CHttpHandler.ashx?id=15094&p=0 [accessed: 16th December 2015].

Dunning, J.H. (2001). The Eclectic (OLI) Paradigm of International Production: Past, Present and Future. International Journal of the Economics of Business, Vol. 8(2), pp. 173 – 190.

Dunning, J.H. (1993). Multinational Enterprises and the Global Economy. Reading MA: Addison-Wesley.

Duranton, G. (2011), 'California Dreamin': The Feeble Case for Cluster Policies,' Review of Economic Analysis, Rimini Centre for Economic Analysis, 3 (1): 3-45.

Durlauf, S. N. (2001). Manifesto for a growth econometrics. Journal of Econometrics. 100: 65–69. Economics, 70, 1, pp. 65-94.

Easterby-Smith, M., R., T., and Lowe, A. (2002). Management research: an introduction (Second edition ed.): Sage.

Eastnorth.fi. (2019). Oulu Region. [online] pp.1-18. available at: http://www.eastnorth.fi/regions/oulu_region [accessed: 5th December 2019].

EC (2008b), 'Towards world-class clusters in the European Union: Implementing the broad-based innovation strategy,' EC Communication {SEC(2008) 2637}, available at: http://eurlex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52008DC0652R(01) [22/3/2016].

Ec.europa.eu, (2014). COSME - European Commission. [online] available at: http://ec.europa.eu/enterprise/initiatives/cosme/index_en.htm [accessed 7th December 2015].

Ec.europa.eu, (2015). Key achievements of Regional Policy. [online] available at: http://ec.europa.eu/regional_policy/en/policy/what/key-achievements/ [accessed: 16th December 2015].

Ec.europa.eu. (2016). EU Cluster Portal - Growth - European Commission. [online] available at: http://ec.europa.eu/growth/smes/cluster/ [accessed: 30th August 2016].

Ec.europa.eu. (2019). Eurostat - Tables, Graphs and Maps Interface (TGM) table. [online] Available at: https://ec.europa.eu/eurostat/tgm/table.do?tab=table&init=1&language=de&pcode=tgs00010&plugin=1 [Accessed 5 Dec. 2019].

Ec.europa.eu. (2019). Gelderland - Internal Market, Industry, Entrepreneurship and SMEs - European Commission. [online] available at: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/gelderland [accessed: 27th March 2019].

Ec.europa.eu. (2019). Principality of Asturias - Internal Market, Industry, Entrepreneurship and SMEs - European Commission. [online] available at: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/principality-asturias [accessed: 27th March 2019].

Ec.europa.eu. (2019). Region of Thessalia - Internal Market, Industry, Entrepreneurship and SMEs - European Commission. [online] available at: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/base-profile/region-thessalia [accessed: 27th March 2019].

Ec.europa.eu. (2019). Strategy of Smart Specialisation of the Principality of Asturias 2014-2020 - Internal Market, Industry, Entrepreneurship and SMEs - European Commission. [online] available at: https://ec.europa.eu/growth/tools-databases/regional-innovation-monitor/policy-document/strategy-smart-specialisation-principality-asturias-2014-2020 [accessed: 5th December 2019].

Ec.europa.eu. (2020). European Entrepreneurial Region (EER). [online] available at: https://cor.europa.eu/en/engage/Pages/european-entrepreneurial-region.aspx [accessed: 24th August 2020].

ECCP (2016), ‘European Cluster Collaboration Platform,’ [Website] available at: http://www.clustercollaboration.eu/ [30/5/2016].

ECCP (2019), ‘European Cluster Collaboration Platform,’ [Website] available at: http://www.clustercollaboration.eu/ [15/2/2019].

Ecgroup.com (2000) The Economic Competitiveness Group - What Is a Cluster?. [online] Available at: http://www.ecgroup.com/methodology/cluster.htm [accessed: 28th November 2015].

Eckey H.-F. and Türck, M. (2006), “Convergence of EU-Regions: A Literature Review”, Discussion Paper at the Economic Department of the University of Kassel, 86/06, Kassel.

Economic-geography.org (2012) Examples of Business Clusters. [online] available at: http://www.economicgeography.org/index.php?option=com_content&view=article&id=114:examples-of-business-clusters&catid=89:case-studies&Itemid=74 [accessed: 28th November 2015].

Economicsonline.co.uk. (2013) Types of enterprise. [online] available at: http://www.economicsonline.co.uk/Business_economics/What_is_enterprise.html [accessed: 17th December 2015].

Economy”, in A. Burke (ed) Enterprise and the Irish Economy, Oak Tree Press: Dublin.

Edgell, D.L. (1993) New Initiative in Tourism Development…South Dakota’s Oyate Trail, Business America, Vol. 114, Pt. 7.

Edmond, P. (2015). Giving Ireland Wings: The Development of the Shannon Aviation & Aerospace Cluster as Smart Specialisation. In: 3rd International Cluster Conference. [online] Limerick: Innovate Limerick, pp.1-15. available at:

http://innovatelimerick.ie/currentprojects/cluster-conf-presentations/ [accessed: 18th August 2016].

Edquist, C., Eriksson, M. L. and Sjogren, H. (2002), 'Characteristics of Collaboration in Product Innovation in the Regional System of Innovation of East Gothia,' European Planning Studies 10 (5): 563-581.

E-Education.psu.edu. (2019). The Concept of Region | GEOG 597i: [online] available at: https://www.e-education.psu.edu/geog597i_02/node/720 [accessed: 26th March 2019].

Egeraat, C., Morgenroth, E., Kroes, R., Curran, D. and Gleeson, J. (2017). A measure for identifying substantial geographic concentrations of economic activity. ESRI, [online] pp.1-5. available at: http://www.esri.ie/pubs/RB20170202.pdf [accessed: 4th July 2017].

Eisenhardt, K. M. (1989). Building theories from case study research. Academy of Management Review, 1989, Vol. 14, No. 4, 532-550.

ELSTAT. (2018). Hellenic Statistical Authority. [online] available at: http://www.statistics.gr/en/home/ [accessed: 27th March 2019].

Emerson, R. (2015). "Without ambition one starts nothing. Without work one finishes nothing. The prize will not be sent to you. You have to win it.". [online] Values.com. available at: http://www.values.com/inspirational-quotes/7356-without-ambition-one-starts-nothing-without [accessed: 10th December 2015].

Energycork.ie. (2019). Energy Cork – Making More Using Less. [online] Available at: http://www.energycork.ie/ [Accessed 28 Feb. 2019].

Engel, J. (2016). Global clusters of innovation. 1st ed. Cheltenham: Edward Elgar Publishing Ltd, pp.1-409.

Engel, J. and del-Palacio, I. (2011). Global Clusters of Innovation: The Case of Israel and Silicon Valley. California Management Review, 53(2), pp.27-49.

Engerman, S. and Sokoloff, K. (2002). Factor Endowments, Inequality, and Paths of Development among New World Economies. Economía, 3(1), pp.41-109.

Engerman, S. and Sokoloff, K. (2012). Colonisation and Development. Economic History of Developing Regions, 27(sup1), pp. 28-40.

Enright J. M (2000) Regional Cluster and Multinational Enterprises. Int. Studies of Mgt. & Org., Vol.30, No.2, Summer 2000, pp. 114-138

Enright, M., and Roberts, H. (2001), 'Regional Clustering in Australia,' Australian Journal of Management 26 (2) 65-87.

Enright, M. (1996). Regional Clusters and Economic Development: A Research Agenda, in: Staber, Schaefer, Sharma (eds.), Business Networks – Prospects for Regional Development, Berlin, pp. 190 - 213.

Enright, M. (1994a): Regional clusters and economic development: a research agenda. Paper presented to a Conference on Regional Clusters and Business Networks, Fredericton, New Brunswick, Canada, 18-20 November., 1993.

Enterpriseboards.ie. (2010) City Enterprise Boards: starting a business - business startup - enterprise awards - business advice - business information. [online] available at: http://www.enterpriseboards.ie/index.aspx [accessed: 5th January 2016].

Enterprise-Ireland (2010). Who we work with – Enterprise-Ireland. [online] available at: http://www.enterprise-ireland.com/en/About-Us/Our-Clients/ [accessed: 21st July 2015].

Enterprise-Ireland (2012) Pharmaceuticals. [online] available at: http://www.enterprise-ireland.com/en/Source-a-Product-or-Service-from-Ireland/Sector-and-Company-Directories/Pharmaceutical-Sector-Profile.pdf [accessed: 10th October 2015].

Enterprise-Ireland.com, (2016). Enterprise-Ireland. [online] available at: https://www.enterprise-ireland.com/en/ [accessed: 3rd March 2016].

Enterprise-Ireland.com. (2013). €375k in new funding to support aviation sector in Ireland Minister Bruton - Enterprise Ireland. [online] available at: https://www.enterprise-ireland.com/en/News/PressReleases/2013-Press-Releases/%E2%82%AC375k-in-new-funding-to-support-aviation-sector-in-Ireland-Minister-Bruton.html [accessed: 18th January 2017].

Enterprise-Ireland.com. (2017). Regional Enterprise Development Fund 2017-2020 - Enterprise Ireland. [online] available at: https://www.enterprise-ireland.com/en/start-a-business-in-ireland/information-store-for-start-ups/regional-enterprise-development-fund.html [accessed: 29th June 2017].

Enterprise-Ireland.com. (2019). Ministers Humphreys and McHugh announce euro 4.6m in Government funding through the Regional Technology Clustering Fund - Enterprise Ireland. [online] available at: https://www.enterprise-ireland.com/en/News/PressReleases/2019-Press-Releases/Ministers-Humphreys-and-McHugh-announce-euro-4-6m-in-Government-funding-through-the-Regional-Technology-Clustering-Fund.html [accessed: 3rd March 2020].

Enterprise-Ireland.com. (2019). Regional Enterprise Development Fund 2017-2020 - Enterprise Ireland. [online] available at: https://www.enterprise-ireland.com/en/funding-supports/REDF/ [accessed: 31st December 2019].

Environ.ie, (2015). Home - Department of the Environment, Community & Local Government. [online] available at: http://www.environ.ie/en/ [accessed: 5th January 2016].

Eolas Magazine. (2019). Shannon: a regional overview | Eolas Magazine. [online] available at: https://www.eolasmagazine.ie/shannon-a-regional-overview/ [accessed: 9th December 2019].

ESCA (2012), 'Benchmarking as a Tool for Cluster Analysis,' European Secretariat for Cluster Analysis.

ESCA (2016), 'The European Secretariat for Cluster Analysis,' [Website] available at: http://www.cluster-analysis.org/ [22/3/2016].

Etymonline.com. (2019). region | Origin and meaning of region by Online Etymology Dictionary. [online] available at: https://www.etymonline.com/word/region [accessed: 26th March 2019].

Etzkowitz, H. (2002), The Triple Helix of University-Industry-Government: Implications for Policy and Evaluation, Working Paper 2002: 11, Science Policy Institute.

Etzkowitz, H., and Zhou, C. (2017). The triple helix: University–industry–government innovation and entrepreneurship. Routledge.

EU Cluster Portal. (2016). Growth - European Commission. [online] available at: http://ec.europa.eu/growth/smes/cluster/ [accessed: 26th September 2016].

Eu-lisa. (2016). europa. [online] available at: https://www.eulisa.europa.eu/Publications/Information%20Material/eu-LISA_EN_web.pdf [accessed: 27th March 2019].

Euro-access.eu. (2019). ROP Thessaly 2014-2020 | EuroAccess - Macro-Regions. [online] available at: https://www.euro-access.eu/calls/rop_thessaly_2014-2020 [accessed: 27th March 2019].

Europa.eu. (2016). Cluster mapping tool - Growth - European Commission. [online] available at: https://ec.europa.eu/growth/smes/cluster/observatory/cluster-mapping-services/mapping-tool_en [accessed: 18th August. 2016].

European Commission (2003) Green Paper – Entrepreneurship in Europe, European Commission (COM(2003) 27, January 2003).

European Commission (2008). Growing Regions, growing Europe. Economic and social cohesion. Luxembourg: European Communities, pp.1-36.

European Commission (2008): The concept of clusters and cluster policies and their role for competitiveness and innovation - Main statistical results and lessons learned. Brussels: Commission Staff Working Document, SEC (2008) 2637.

European Commission. (2015). Five motivations for using Cluster Mapping Portals. Clusters, Social Economy and Entrepreneurship Unit. [online] Boston: European Commission, pp.1-18. available at: https://www.clustermapping.us/sites/default/files/files/page/Schierenbeck_Reasons_to_Use_Portals.pdf [accessed: 26th August 2016].

European Commission. (2013). Enterprise and Industry Directorate-General, [online] pp.1-64. available at: http://www.central2013.eu/fileadmin/user_upload/Downloads/Tools_Resources/Cluster.pdf [accessed: 9th August 2016].

European Commission. (2014). Official Journal of the European Union, [online] 198(01), pp.1-29. available at: http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014XC0627(01)&from=EN [accessed: 19th August 2016].

European Commission. (2017). Departments and executive agencies. [online] available at: https://ec.europa.eu/info/departments_en [accessed: 10th June 2017].

European Commission. (2019). A European Green Deal. [online] available at: https://ec.europa.eu/info/strategy/priorities-2019-2024/european-green-deal_en [accessed: 3rd March 2020].

European Commission. (2019). Europe 2020 strategy. [online] available at: https://ec.europa.eu/info/business-economy-euro/economic-and-fiscal-policy-coordination/eu-economic-governance-monitoring-prevention-correction/european-semester/framework/europe-2020-strategy_en [accessed: 27th March 2019].

European Committee of the Regions (2019). European Entrepreneurial Region Award 2019 Region of Thessaly. Commission for Economic Policy (ECON), Europe 2020 Monitoring Platform, EER, pp.1-15.

European Committee of the Regions (2019). European Entrepreneurial Region Award 2019 Province of Gelderland, the Netherland. Commission for Economic Policy (ECON), Europe 2020 Monitoring Platform, EER, pp.1-18.

European Union. (2010). Clusters and clustering policy: a guide for regional and local policy makers. [online] Belgium: INNO Germany AG, pp.1-195. available at: http://cor.europa.eu/en/archived/documents/59e772fa-4526-45c1-b679-1da3bae37f72.pdf [accessed: 22nd September 2016].

Eurostat. (2018). Search - Eurostat. [online] available at: https://ec.europa.eu/eurostat/search?p_auth=iQxuArYj&p_p_id=estatsearchportlet_WAR_estatsearchportlet&p_p_lifecycle=1&p_p_state=maximized&p_p_mode=view&_estatsearchportlet_WAR_estatsearchportlet_action=search&text=gelderland [accessed: 27th March 2019].

Failteireland.ie. (2017). Failte Ireland - Irish Tourism Trade Support | National Tourism Development Authority |. [online] available at: http://www.failteireland.ie/ [accessed: 29th June 2017].

Faina, A., Lopez-Rodriguez, J., Montes-Solla, P., Calvo-Porral, C. and Bolea, C. (2013). Case Study Galicia. European Policies Research Centre, pp.1-139.

Faludi, A. (2006) From European Spatial Development to Territorial Cohesion Policy, Regional Studies, 40: 667-678.

Fanning, C.M. (1986) Renewing a Local Economy: The Entrepreneurial Response to Crisis, Cork University Press, University College, Cork.

Feldman, M. P. (2001). The entrepreneurial event revisited: Firm formation in a regional context. Industrial & Corporate Change, 10(4), 861-892.

Feser, E. J. (1998), 'Old and New Theories of Industry Clusters', in: Steiner, M. (ed.) Clusters and Regional Specialisation: On Geography, Technology and Networks, London: Pion, 18-40.

Feser, E. J. and Bergman, E. M. (2000), 'National Industry Cluster Templates: A Framework for Applied Regional Cluster Analysis.' Regional Studies, 34 (1): 1-19.

Ffowcs-Williams, I. (2013) Cluster Development "The Go To Handbook". New Zealand, Cluster Navigators Limited.

Ffowcs-williams, I. (2019). Ten Building Blocks to Successful Cluster Initiatives. In: TCI Network Global Conference. [online] Antwerp: TCI Network Global Conference, pp.1-8. available at: https://www.slideshare.net/TCINetwork/ifor-ffowcswilliams-presentation-tci2018-european-conference-sofia-92038352?qid=d1d90149-f449-44b5-a3ae-33f01ebdb3de&v=&b=&from_search=2 [accessed: 4th March 2020].

Fidel, R. (2008). Are we there yet?: Mixed methods research in library and information science. Library & Information Science Research, 30(4), pp.265-272.

Fiedler, M. and Welpe, I. (2011). Commercialisation of technology innovations: an empirical study on the influence of clusters and innovation networks. International Journal of Technology Management, 54(4), p.410.

Field, A. (2016). A Cluster of Possibilities Throughout Ontario | Canadian Sailings. [online] Canadiansailings.ca. available at: http://www.canadiansailings.ca/?p=5807 [accessed: 22nd June 2016].

Finland. (2004). Organisation for economic cooperation and development. OECD Economic Outlook, (75), 83-84.

Firestone, W.A. (1987) "Meaning in method: the rhetoric of quantitative and qualitative research," Educational Researcher, Vol. 16 No. 7, pp. 16-21.

Fischer, M. M. and Stirbock, C. (2004). Regional Income Convergence in the Enlarged Europe 1995–2000: A Spatial Econometric Perspective. ZEW Discussion Paper. 04: 42p.

Fischer, M. M., and Nijkamp, P. (2009). Entrepreneurship and regional development. Working Paper: Serie Research Memoranda 0035. VU University Amsterdam, Faculty of Economics, Business Administration and Econometrics, Amsterdam.

Fischer, M.M., and Nijkamp, P. (2009) "Entrepreneurship and Regional Development", Serie Research Memoranda 0035, VU University Amsterdam, Faculty of Economics, Business Administration and Econometrics.

Fitzpatrick Associates, (1997), Mid-Term Evaluation: Regional Impact of the Community Support Framework for Ireland 1994-1999. Dublin.

Fitzsimons, P. and O'Gorman, C. (2012) Entrepreneurship In Ireland. Enterprise-Ireland, pp. 1-82. available at: http://www.enterprise-ireland.com/en/publications/reports-published-strategies/gem-report-2012.pdf [accessed: 10th August 2013].

Fleming, P (1999), "Education for Enterprise : The Role of a Structured Intervention," Ph.D Thesis, University of Limerick.

Florida, R. (2010) The great reset: how new ways of living and working drive post-crash prosperity, rise of the creative class: and how it's transforming work, leisure, community and everyday life, New York: HarperCollins.

Florida, R. (2003). Entrepreneurship, creativity, and regional development. In D. Hart (Ed.), The emergence of entrepreneurship policy: Governance, start-ups, and growth in the U.S. knowledge economy. Cambridge, UK: Cambridge University Press.

Florida, R. (2007). Toward the learning region. In R. Rutten & F. Boekema (Eds.), The learning region: Foundations, state of the art, future. Cheltenham, UK: Edward Elgar.

Flynn, P. (2017). Bust of Dr Brendan O'Regan unveiled. [online] The Clare Herald. available at: http://clareherald.com/2017/05/bust-of-dr-brendan-oregan-unveiled-89785/ [accessed: 24th July 2017].

Foghani, S., Mahadi, B. and Omar, R. (2017). Promoting Clusters and Networks for Small and Medium Enterprises to Economic Development in the Globalization Era. SAGE Open, 7(1), p.215824401769715.

Forfas (2007) Towards Developing an Entrepreneurship Policy for Ireland, Dublin: Forfas, September.

Forfás (2009a) 'Regional Competitiveness Agenda Volume II – Realising Potential: Mid West', Dublin: Forfás.

Forfas (2010) Making it Happen: Growing Enterprise for Ireland, Dublin: Forfas.

Fornahl, D., Broekel, T. and Boschma, R. (2010), 'What drives patent performance of German biotech firms? The impact of R&D subsidies, knowledge networks and their location,' Papers in Evolutionary Economic Geography, 10 (9): 395–418.

Forster, M. and Smeeding, T. (2005). Regional Poverty and Income Inequality in Central and Eastern Europe: Evidence from the Luxembourg Income Study. in Kanbur R. Venables AJ (eds).. Spatial Inequality and Development. Oxford University Press.

Framke, W. and Jensen, P.R. (1987) Musikhuset I Arhus. Notat 63, Geografisk Institut, Aarhus Univeristet.

Freeman, C. (1991), 'Networks of innovators: A synthesis of research issues,' Research Policy, 20: 499–514.

Friedmann, J. (2009). Theoretical attempts to explain disparities in development.

Fritsch, M. (2008). How does new business formation affect regional development? Introduction to the special issue. Small Business Economics, 30(1), 1-14.

Fritsch, M. (2011). Handbook of Research on Entrepreneurship and Regional Development. 1st ed. Cheltenham: Edward Elgar Pub.

Fritsch, M. and Mueller, P. (2007). The effect of new business formation on regional development over time: the case of Germany. Small Bus Econ, 30(1), pp.15-29.

Fritsch, M., and Mueller, P. (2004). Effects of new business formation on regional development over time. Regional Studies, 38(8), 961-975. doi: 10.1080/0034340042000280965

Fujita, M., Krugman, P. and Venables, A. (1999), The Spatial Economy. Cities, Regions, and International Trade, Cambridge, MA.: MIT Press.

Fuller-Love, N., Midmore, P., Thomas, D., and Henley, A. (2006). Entrepreneurship and rural economic development: a scenario analysis approach. International Journal of Entrepreneurial Behaviour & Research, 12(5), 289-305.

Gallup, J. L., Sachs, J. D. and Mellinger, A. D. (1999), 'Geography and economic development,' International Regional Science Review, 22: 179–232.

Galor, O. (1996). "Convergence? Inferences from theoretical models". Economic Journal. 106 (437): 1056–1069.

Gaspar, A. (2012). Convergence analysis: A new approach. MPRA Paper No. 40363.

GEM (2009) 'Entrepreneurship in Ireland 2008', available: http://www.forfas.ie/media/gem_report_2008.pdf [accessed: 10th January 2020].

Georgellis, Y., and Wall, H. J. (2000). What makes a region entrepreneurial? Evidence from Britain. Annals of Regional Science, 34(3), 385-403.

Gerolamo, M., Carpinetti, L., Seliger, G. and Galdamez, E. (2008). Performance management of regional clusters and SME cooperation networks. IJBEX, 1(4), p.457.

Gerschenkron, A. (1962), Economic backwardness in historical perspective, a book of essays, Cambridge, Massachusetts: Belknap Press of Harvard University Press.

Gibb, A. (1988). "The Enterprise Culture: Threat or Opportunity?" Management Decision 26(4): 5-12.

Gibb, A. (1987). "Education for Enterprise: Training for Small Business Initiation - Some Contrasts." Journal of Small Business and Entrepreneurship 4(3): 42-47.

Gill, J. and Johnson, P. (1991) Research Methods for Managers, Chapman, London.

Gill, J., and Johnson, P. (2002), Research methods for managers, 3rd, SAGE publication, London

Giuliani, E. and Pietrobelli, C. (2014), 'Social Network Analysis Methodologies for the Evaluation of Cluster Development Programs,' Papers in Innovation Studies 2014/11, Lund University, CIRCLE - Center for Innovation, Research and Competences in the Learning Economy.

Giuliani, E., and Pietrobelli, C. (2011). Social network analysis methodologies for the evaluation of cluster development programs. Inter-American Development Bank

Glaeser, E. L. and Kerr, W. (2009), 'Local industrial conditions and entrepreneurship: How much of the spatial distribution can we explain?' Journal of Economics and Management Strategy 18 (3): 623-663.

Glaeser, E. L., Kallal, H. D., Scheinkman, J. A. and Shleifer, A. (1992), 'Growth of cities', Journal of Political Economy, 100: 1126–1152.

Glaser, B. (1978) "Theoretical Sensitivity," Mill Valley, Sociology Press.

Glaser, B. and Strauss, A. (eds.) (1967) The Discovery of Grounded Theory: Strategies for Qualitative Research, Chicago, Illinois: Aldine.

Global Entrepreneurship Monitor (2009) 'Entrepreneurship in Ireland 2008', available: http://www.forfas.ie/media/gem_report_2008.pdf [accessed: 10th January 2017].

Goddard, J. (2014). The role of the university in the development of its region. [online] Slideshare.net. available at: http://www.slideshare.net/EUROsociAL-II/the-role-of-the-university-in-the-development-of-its-region-john-goddard-emeritus-professor-of-regional-development-studies-universidad-de-newcastle [accessed: 16th December 2015].

Goddard, J., and Kempton, L. (2011). Connecting Universities to Regional Growth: A Practical Guide. Brussels, Belgium. http://ec.europa.eu/regional_policy/sources/docgener/presenta/universities2011/universities2011_en.pdf. [accessed: 10th March 2014].

Gompers, P., Lerner, J. and Scharfstein, D. (2005), 'Entrepreneurial spawning: public corporations and the formation of new ventures, 1986–1999,' Journal of Finance, 60 (2): 577–614.

Gordon, I. R. and McCann, P. (2000), 'Industrial clusters: complexes, agglomeration and/or social networks?' Urban Studies, 37 (3): 513-532.

Gordon, R. (2003). Convergence Defined, in Digital Journalism: Emerging Media and the Changing Horizons of Journalism, Inc. Editor: Kevin Kawamoto, USA: Rowman & Littlefield Publishers, October.

Gorman, W. and Cooney, T. (2007) An Anthology of Enterprise Policy in Ireland. Irish Journal of Management; Vol. 28, Issue 2, pp.1-28.

Gov.ie, (2015). local authorities | www.gov.ie. [online] available at: http://www.gov.ie/tag/local-authorities/ [accessed: 7th January 2016].

Government of Ireland, (1991), The Barrington Report - Local Government Reorganisation and Reform. Dublin. Government Publications.

Graham-royce.blogspot.ie (2011) Graham Royce: Hartnett Enterprise Acceleration Centre. [online] available at: http://graham-royce.blogspot.ie/2011/06/hartnett-enterprise-acceleration-centre.html [accessed: 20th July 2015].

Granovetter, M. (1973), 'The Strength of Weak Ties,' American Journal of Sociology, 78 (6): 1360-1380.

Granovetter, M. (1985), 'Economic action and social structure: the problem of embeddedness,' American Journal of Sociology, 91: 481–510.

Green, R. (2000). IRISH ICT CLUSTER. OECD, [online] pp.1-5. available at: http://www.oecd.org/sti/inno/2754426.pdf [accessed: 31st March 2016].

Greener, S. (2008). Business research methods. Frederiksberg: Ventus Publishing.

Grondeau, A. (2006). Technopole and public governance: the case of Sophia-Antipolis. Norois, (200), pp.39-50.

Gruber, T. (1993) Ontology. International Journal of Human-Computer Studies, [online] 43(4-5), pp.1-11. available at: http://queksiewkhoon.tripod.com/ontology_01.pdf [accessed 16 May. 2014].

Guba, E. G., and Lincoln, Y. S. (1994). Competing paradigms in qualitative research. Handbook of qualitative research, 2, 163-194.

Guillén, M. F. (2000), 'Business groups in emerging economies: A resource-based view,'Academy of Management Journal, 43 (3): 362-380.

Guiomard, C. (1995), The Irish Disease and How to Cure It, Common-Sense Economics for a Competitive World. Dublin. Oak Tree Press.

Guiso, L. and Schivardi, F. (2007), 'Spillovers in Industrial Districts,' Economic Journal, Royal Economic Society, 117 (516): 68-93.

Gustafasson, B.A. (1986) Culture in Entrepreneurship, Tromso-Oslo.

Hackett S. M., Dilts D. M. (2004) "A Systematic Review of Business Incubation Research", Journal of Entrepreneurship.

Hall, R. E. and Jones, C. I. (1999), 'Why do some countries produce so much more output per worker than others?' Quarterly Journal of Economics, 114: 83–116.

Hancock, C. (2015). Ireland ranked third easiest place for conducting business. [online] The Irish Times. available at: http://www.irishtimes.com/business/financial-services/ireland-ranked-third-easiest-place-for-conducting-business-1.2081928 [accessed: 25th February 2016].

Harkin, S. and Hazelkorn, E. (2015). Restructuring Irish Higher Education through Collaboration and Merger. In Curaj, A. et al. eds Mergers and alliances in higher education: International practice and emerging opportunities. Springer, 2014, pp.1-14.

Harris, A. (2019). Shannon 2.0 - 'Our Story is one of constant reinvention'. The Sunday Business Post, p.4.

Harrison, B. and Glasmeier, A. (1997), 'Why business alone won't redevelop the inner city: A friendly critique of Michael Porter's approach to urban revitalization,' Economic Development Quarterly, 11: 28-38.

Harvie, C. (1994), The Rise of Regional Europe, London: Routledge.

Hazelkorn, E. (2010) Community Engagement as Social Innovation. In: Weber, L. and Duderstadt, J. (Eds.) The Role of the Research University in an Innovation-Driven Global Society. London and Genève, Economica.

Healey, M., and Rawlinson, M. (1994). Interviewing techniques in business and management research', in V.J. Wass, V.J. and P.E. Wells (eds) *Principles and Practices in Business and Management Research*. Aldershot: Dartmouth, pp. 123-46.

Held, J. R. (1996), 'Clusters as an economic development tool: Beyond the pitfalls', Economic Development Quarterly 10: 249–261.

Henderson, J. (1997), “Externalities and Industrial Development,” Journal of Urban Economics, 42(3), pp. 449-470.

Henderson, J. (2003). Marshall's scale economies. Journal of Urban Economics, 53(1), pp.1-28.

Henderson, J., Kuncoro, A. and Turner, M. (1995). Industrial Development in Cities. Journal of Political Economy, 103 (5), pp. 1067-1090. available at: http://homes.chass.utoronto.ca/~mturner/papers/published/Henderson_Kuncoro_Turner_JPE_1995.pdf [accessed: 10th June 2015].

Henry, G. T. (1990). Practical sampling (Vol. 21): Sage.

Henwood, K., and Pidgeon, N. (1992). Qualitative Research and Psychological Theorizing. British Journal of Psychology, 83, 97-111.

Hill, E. W. and Brennan, J. F. (2000), ‘A methodology for identifying the drivers of industrial clusters: The foundation of regional competitive advantage’, Economic Development Quarterly 14: 65–96.

Hill, J. and McGowan, P. (1999) “Small business and enterprise development: questions about research methodology,” International Journal of Entrepreneurship Behaviour and Research, Vol. 5 No. 1, pp. 5-18.

Hisrich, R.D. and Brush C.G. (1985), Women and Minority Entrepreneurs: a Comparative Analysis, in Frontiers of Entrepreneurial Research. Ed. Hornaday, J.A., Shils, E.B., Timmons, J.A., Vesper, K.H. Wellesley, Babson College.

History Ireland (2017). An Irish industrial revolution: the creation of the Industrial Development Authority (IDA), 1949–59. [online] available at: http://www.historyireland.com/20th-century-contemporary-history/an-irish-industrial-

revolution-the-creation-of-the-industrial-development-authority-ida-1949-59/ [accessed: 17th January 2017].

Hobbs, A. and McCann, R. (2014). Enterprise Irelands End of Year Statement 2013 - Enterprise Ireland. [online] Enterprise-ireland.com. available at: https://www.enterprise-ireland.com/en/News/PressReleases/2014-Press-Releases/Enterprise-Irelands-End-of-Year-Statement-2013.html [accessed: 3rd March 2016].

Hobbs, J. (2010), A Framework for Analysis of Spatial Specialisations of Industry, PhD thesis, Cork Institute of Technology.

Hobbs, J. (2019). ecoRIS3. [online] Interreg Europe. available at: https://www.interregeurope.eu/ecoris3/ [accessed: 31st December 2019].

Hobbs, J. (2019). V-LINC. [online] Cork Institute of Technology. available at: https://www.cit.ie/vlinc [accessed: 25th April 2019].

Hobbs, J., Wilson, J., Jamison, L., Mcmullen, J. and Torreros, D. (2018). Evidencing the Role of Clusters in Smart Specialisation Strategies. [online] Bilbao: ClusterS3 Interreg Europe, pp.1-29. available at: https://www.cit.ie/contentfiles/vlinc/TCI%20Event/6.%20TCI%20-%20RIS3%20and%20Clusters%2015-5-2018%20JW.pdf [accessed: 28th February 2019].

Hoen, A. (2002), 'Three Variations on Identifying Clusters,' OECD NIS (Phase III),

Hofstede, G. (1980), Culture's Consequences, International Differences in Work Related Values, Sage, Beverly Hills, CA [accessed: 21st December 2015].

Holden, M. T., and Lynch, P. (2004). Choosing the appropriate methodology: understanding research philosophy. The marketing review, 4(4), 397-409. https://doi.org/10.1362/1469347042772428

Hoover, E. (1936). Spatial price discrimination, in: Greenhut, M. and Norman, G. (eds.), The economics of location. Volume 2: Space and Value, Edward Elgar 1995, pages 19-28.

Hoover, E. (1937), Location Theory and the Shoe Leather Industries, Cambridge, MA: Harvard University Press.

Hoover, E. and Fisher, J. (1949). Research in Regional Economic Growth. 1st ed. [ebook] Chicago: NBER, pp.173-250. available at: http://www.nber.org/chapters/c9514.pdf [accessed: 10th December 2015].

Horizon 2020. (2014). What is Horizon 2020? - Horizon 2020 - European Commission. [online] available at: http://ec.europa.eu/programmes/horizon2020/en/what-horizon-2020 [accessed 7th December 2015].

Horn, C. (2012). A cluster of great people in one location is key to the next Google. [online] The Irish Times. available at: http://www.irishtimes.com/business/technology/a-cluster-of-great-people-in-one-location-is-key-to-the-next-google-1.555879 [accessed: 3rd March. 2016].

Howe, K. R. (1988). Against the quantitative-qualitative incompatibility thesis or dogmas die hard. Educational researcher, 17(8), 10-16. https://doi.org/10.3102/0013189x017008010

http://dx.doi.org/10.4135/9781849208963.

Hudson, C. (2006). Regional Development Partnerships in Sweden: A Way for Higher Education Institutions to Develop Their Role in the Processes of Regional Governance? Higher Education 51(3): 387-410.

Hudson, L., and Ozanne, J. (1988). Alternative Ways of Seeking Knowledge in Consumer Research. Journal of Consumer Research, 14(4), 508–521.

Hudson, R (1999) ‘The Learning Economy, The Learning Firms and The Learning Region, A Sympathetic Critique of the Limits to Learning’ European Urban and Regional Studies 6 (1) 59-72.

Hughes, B. (2015) "Effects of the 2002-2020 National Spatial Strategy (NSS) on Ireland's Settlement Growth, Its Cities and on Other Gateways and Hubs". Articles. Paper 34.

Hulbert, C. (2012). Public Investment across Levels of Government: The Case of Galicia, Spain. OECD, [online] pp.1-22. available at: http://www.oecd.org/cfe/regional-policy/Galicia_edited.pdf [accessed: 6th December 2019].

Hunt, M., Doyle, G., McDermot, D. and McCormack, P. (2006). Business Networks on the Island of Ireland. Newry: InterTradeIreland, pp.1-72.

Hussey, J., and Hussey, R. (1997). Business Research: A Practical Guide for Undergraduate and Postgraduate Students: Basingstoke: Macmillan Press Ltd.

Icma.org. (2012). Cluster-Based Economic Development Strategies. [online] available at: https://icma.org/articles/cluster-based-economic-development-strategies [accessed: 9th January 2019].

IDA Ireland. (2016). Bio Pharmaceuticals. [online] available at: http://www.idaireland.com/business-in-ireland/industry-sectors/bio-pharmaceuticals/ [accessed: 31st March 2016].

IDA Ireland. (2017). Promoting Foreign Direct Investment into Ireland - IDA. [online] available at: http://www.idaireland.com/about-ida/ [accessed: 29th June 2017].

Idepa.es. (2019). Asturias Clusters Network - IDEPA. [online] available at: https://www.idepa.es/innovacion/clusters/red-de-clusteres-de-asturias [accessed: 5th December 2019].

Idepa.es. (2019). Business Tissue - IDEPA. [online] available at: https://www.idepa.es/conocimiento/asturias-en-cifras/tejido-empresarial [accessed: 5th December 2019].

Ie.china-embassy.org, (2015). SPARK PROGRAMME. [online] available at: http://ie.china-embassy.org/eng/ScienceTech/ScienceandTechnologyDevelopmentProgrammes/t112842.htm [accessed: 16th December 2015].

Igape.es. (2019). Igape - Clusters. [online] available at: http://www.igape.es/es/proxectos-e-cooperacion/clusters [accessed: 6th December 2019].

Implementing the National Spatial Strategy: Preparing Regional Planning Guidelines. (2003). 1st ed. [ebook] Dublin: Department of Environment and Local Government, pp.1-54. available at: http://www.irishspatialstrategy.ie/docs/RPG%20Guidance%20Note%20Fifth%20draft.pdf [accessed: 21st December 2015].

In My Region. (2019). What Europe does for me. [online] available at: https://what-europe-does-for-me.eu/en/portal/1/FI1D9 [accessed: 5th December 2019].

Inditex.com. (2019). Conócenos - inditex.com. [online] available at: https://www.inditex.com/es/quienes-somos/conocenos [accessed: 9th December 2019].

Industrial Development Agency (2015), Our Focus [online], available at: http://www.limerick.ie/business/businesssupports/idaireland [accessed: 23rd February 2016].

Industrial Policy Review Group (1992) A Time for Change: Industrial Policy in the 1990s, Dublin: The Stationary Office.

Insights, W. (2016). WDC Insights. [online] WDC Insights. available at: https://wdcinsights.wordpress.com/page/7/ [accessed: 5th January 2016].

Interreg Europe. (2017). Energy Cork: Clustering for Growth. [online] available at: https://www.interregeurope.eu/ecoris3/news/news-article/1741/energy-cork-clustering-for-growth/ [accessed: 28th February 2019].

Intertradeireland.com. (2013). Cross Border Business Development & Business Support - IntertradeIreland. [online] available at: http://www.intertradeireland.com/ [accessed: 8th December 2015].

Intertradeireland.com. (2017). IntertradeIreland - Cross Border Business Development & Business Support. [online] available at: http://www.intertradeireland.com/ [accessed: 29th June 2017].

Invest in Asturias. (2019). Where. [online] available at: https://www.investinasturias.es/en/where-en/ [accessed: 5th December 2019].

Investopedia. (2009). Microenterprise Definition | Investopedia. [online] available at: http://www.investopedia.com/terms/m/microenterprise.asp [accessed: 15th December 2015].

Investopedia. (2009). Multinational Corporation (MNC) Definition | Investopedia. [online] available at: http://www.investopedia.com/terms/m/multinationalcorporation.asp [accessed: 16th December 2015].

Ipa.ie, (2001). Public Administration Series. [online] available at: http://www.ipa.ie/index.php?lang=en&p=product&id=253&prodid=255 [accessed: 17th December 2015].

Ireland, R. Duane., Hitt, Michael A. and Sirmon, David G. (2003) A Model of Strategic Entrepreneurship: The Construct and its Dimensions. Journal of Management, Vol. 29, No. 6.

Ireland's Rural Development Programme 2014-2020. (2014). 1st ed. [ebook] Dublin: DAFM, pp.1-271. available at:

http://www.agriculture.gov.ie/media/migration/ruralenvironment/ruraldevelopment/ruraldevelopmentprogramme2014-2020/RDPFinaldraft03072014.pdf [accessed: 16th December 2015].

Irelandwales.ie, (2015). Ireland Wales Programme 2007 - 2013. [online] available at: http://www.irelandwales.ie/ [accessed: 5th January. 2016].

IRETETH. (2019). Institute for Research and Technology - Thessalia (I.RE.TE.TH.) - Internal Market, Industry, Entrepreneurship And Smes - European Commission. [online] available at: https://ec.europa.eu/growth/tools-databases/regional-innovationmonitor/organisation/institute-research-and-technology-thessalia-ireteth [accessed: 27th March 2019].

Irishexaminer.com, (2015). Economic Recovery: Mid-West promised 23,000 jobs. [online] available at: http://www.irishexaminer.com/ireland/economic-recovery-mid-west-promised-23000-jobs-360219.html [accessed: 8th January 2016].

Irishtimes.com (2012) Bruton announces €2m 'cluster' scheme - The Irish Times - Mon, Jul 09, 2012. [online] available at: http://www.irishtimes.com/search/search-7.1213540?q=Bruton%20announces%20%E2%82%AC2m%20%27cluster%27%20scheme%20 [accessed: 10th October 2015].

Isaksen, A. and Hauge, E. (2001) 'Thematic Report 3 Regional Clusters in Europe,' Brussels Observatory of European SMEs

Islam, N. (2003). What have we learnt about the convergence debate? Journal of Economic Surveys, 17(3), pp.1-54.

ISME. (2014) About ISME - ISME. [online] available at: http://isme.ie/about/overview [accessed 14th December 2015].

Itmati.com. (2019). Regional Minister of Economy and Industry in Galicia. [online] available at: http://www.itmati.com/en/regional-minister-economy-and-industry-galicia-highlighted-report-spain-2018-galician-collaboration [accessed: 6th December 2019].

J. Acs, B. Carlsson and K. Karlsson (Eds.), Entrepreneurship, small and medium-sized firms and the macroeconomy (pp. 97-136). Cambridge: Cambridge University Press.

Jacobs, D. (1997): Knowledge-intensive innovation: the potential of the cluster approach. The IPTS Report 16, 22-28.

Jacobson, D., Heanue, K., Van Egeraat, C. (2002) 'Industrial Agglomeration', in W Lazonick, cd IEBM Handbook of Economics, Thomson International.

Jauhiainen, J. and Moilanen, H. (2012). Regional innovation systems, high-technology development, and governance in the periphery: The case of Northern Finland. Norwegian Journal of Geography, 66(3), pp.119-132.

Jayaratna, N. (1998). Research notes. International Journal of Information Management, 17(6), pp.465-467.

Jenkins, H. (2001). Convergence? I Diverge. Technology Review, June.

Johannisson, B. (1990) Between Territory and Function – on the Interfaces Between Small Business, Large Business and Communities, in New Findings and Perspectives in Entrepreneurship, ed. R. Donckels and A. Miettinen.

Johansson, A. W. (2009). Regional development by means of broadened entrepreneurship. European Planning Studies, 17(8), 1205-1222.

Jones, J. (2016). Economic Growth Quotes. QuotesGram. [online] Quotesgram.com. available at: https://quotesgram.com/economic-growth-quotes/#756O1ouksI [accessed: 5th January 2016].

Kahn, R. L., and Cannell, C. F. (1957). The dynamics of interviewing; theory, Institute of Personnel and Development. Integration. Mixing methods: Qualitative and quantitative research, 57-78.

Kalantaridis, C., and Bika, Z. (2006). Local embeddedness and rural entrepreneurship: case-study evidence from Cumbria, England. Environment and Planning A, 38(8), 1561-1579.

Kamath, S., Agrawal, J. and Chase, K. (2012). Explaining Geographic Cluster Success-The GEMS Model. American Journal of Economics and Sociology, 71(1), pp.184-214.

Karlsson, C. (2007). Clusters, Functional Regions and Cluster Policies. CESIS, [online] 84, pp.1-25. available at: http://www.insme.org/files/2580 [accessed: 22nd September 2016].

Karvonen, M., Kassi, T. and Kapoor, R. (2010). Technological innovation strategies in converging industries. International Journal of Business Innovation and Research, 4(5), p.391.

Kasabov, E. and Sundaram, U. (2011). A Stakeholder Approach to Branding Clusters: Pointers to a Research Agenda. Regional Studies, 47, 530-543.

Keady, A. (2015). Regions of Ireland: Regional Authorities. [online] Iro.ie. available at: http://www.iro.ie/regional_authorities.html [accessed: 18th December 2015].

Keane, C. (2012). New business culture 'on the way'. [online] Irishexaminer.com. available at: http://www.irishexaminer.com/business/new-business-culture-on-the-way-218017.html [accessed: 25th February 2016].

Keane, Dr. M. (1995), Trends in Regional Development. In G. Sweeney. Ed. Regional and Local Development. 1. Built Environment Research Centre, Dublin Institute of Technology.

Keating, M. (1999). Rethinking the Region. Culture, Institutions and Economic Development in Catalonia and Galicia. ECPR, pp.1-35.

Keating, P and Desmond, D. (1993) Culture and Capitalism in Contemporary Ireland,

Keeble, D., Lawson, C., Moore, B., and Wilkinson, F. (1999) 'Collective Learning Processes, Networking and Institutional Thickness in the Cambridge Region' Regional Studies 33 (4) 319-332.

Keen, C. and Etemad, H. (2012). Rapid growth and rapid internationalization: the case of smaller enterprises from Canada. Management Decision, 50, 569-590.

Kenney, M. (2001). Regional Clusters, Venture Capital and Entrepreneurship: What can the social sciences tell us about Silicon Valley? University of California, Davis, OECD Workshop Proceedings.

Kenton, W. (2018). Catch-Up Effect - Convergence. [online] Investopedia. available at: https://www.investopedia.com/terms/c/catch-up-effect.asp [accessed: 14th January 2019].

Kerr, C. (1960). Convergence Theory. [online] Encyclopedia69.com. available at: http://www.encyclopedia69.com/eng/d/convergence-theory/convergence-theory.htm [accessed: 14th January 2019].

Kesidou, E. and Romijn, H. (2008). Local Knowledge Spillovers and Innovation in Clusters in Developing Countries. World Development, 36 (10), pp. 2004-2028. available at: http://www.socialsciences.manchester.ac.uk/disciplines/economics/research/workshops/development/documents/Effie%20Kesidou-17th%20Feb.pdf [accessed: 3rd July 2015].

Ketels C., and Sölvell O. (2007). Innovation Clusters in the 10 New Member States of The European Union, Europe INNOVA paper N° 1.

Ketels, C. (2000). Cluster basics: Setting the Stage - Competitiveness, Innovation and C…. [online] Slideshare.net. available at: http://www.slideshare.net/TCINetwork/2008-cape-town-c1011christian-ketelssetting-the-stage [accessed: 13th June 2016].

Ketels, C. (2003) The Development of the cluster concept – present experiences and further developments, in NRW, Conference on Clusters, Duisburg, Germany, 5th December, 2003, Duisburg, Germany. 192

Ketels, C. (2004). Cluster-Based Economic Development: What Have We Learned.

Ketels, C. (2005) How to Evaluate Clusters [online], available at: http://www.larevueparlementaire.fr/pages/DS_juill05/DSpole_cketels.htm [accessed: 16th July 2015].

Ketels, C. (2006), European Clusters, Bollschweil: Hagbarth Publications.

Ketels, C. (2013). Setting the Stage - Competitiveness, Innovation and Clusters.

Ketels, C. (2015). Business Cluster Strategy in Ireland.

Ketels, C. and Memedovic, O. (2008). From clusters to cluster-based economic development. International Journal of Technological Learning, Innovation and Development, 1(3), p.375.

Ketels, C. and Protsiv, S. (2013). Clusters and the New Growth Path for Europe. WWWFOREUROPE, [online] (14), pp.1-73. available at: http://www.foreurope.eu/fileadmin/documents/pdf/Workingpapers/WWWforEurope_WPS_no014_MS47.pdf [accessed: 17th August 2016].

Ketels, C. and Protsiv, S. (2014). European Cluster Panorama 2014. [online] European Cluster Observatory: Enterprise and Industry, pp.1-74. available at: http://www.clusterobservatory.eu/system/modules/com.gridnine.opencms.modules.eco/providers/getpdf.jsp?uid=cc331e2f-c19e-4e32-91bd-a1100b9cea8b [accessed: 16th August 2016].

Ketels, C., Lindqvist, G. and Sölvell, Ö. (2012), Strengthening Clusters and Competitiveness in Europe: The Role of Cluster Organisations, The Cluster Observatory, Stockholm School of Economics: Centre for Strategy and Competitiveness.

Ketels, C., Lindqvist, G., and Solvell O. (2012) Strengthening Clusters and competitiveness in Europe: The role of cluster Organisation [online], available at: http://www.clusterobservatory.eu/index.html#!view=documents;mode=one;sort=author;uid=bef8b501-ec16-44ad-b7ec-42f3ad1f25ea;id [accessed: 10th March 2016].

Ketels, C., Lindqvist, G., Solvell, Ö. (2003) The Cluster Initiative Greenbook [online], available at: http://www.clusterobservatory.eu/system/modules/com.gridnine.opencms.modules.eco/providers/getpdf.jsp?uid=a9dab110-adb2-44fe-9618-b2f8d12e2f41 [accessed: 29th July 2013].

Ketels, C., Lindqvist, G., Sölvell, Ö. (2012) The Cluster Initiative Greenbook, 2nd ed., [online], available at: http://www.clusterobservatory.eu/system/modules/com.gridnine.opencms.modules.eco/providers/getpdf.jsp?uid=a9dab110-adb2-44fe-9618-b2f8d12e2f41 [accessed: 29th July 2015].

Khalid, M. (2011). Cluster Analysis – A Standard Setting Technique in Measurement and Testing. Journal of Applied Quantitative Methods, [online] 6(2), pp.1-13. available at: http://www.jaqm.ro/issues/volume-6,issue-2/pdfs/6_khalid_shafiq_khan.pdf [accessed: 23rd August 2016].

Khanna, T. and Rivkin, J. W. (2001), 'Estimating the performance effects of business groups in emerging markets,' Strategic Management Journal, 22: 45-74.

Kilby, P. (1971) "Hunting the Heffalump," in P. Kilby (ed) Entrepreneurship and Economic Development, New York: Free Press, pp. 1-40.

Kilby, P. (2003) "The Heffalump Revisited", Journal of International Entrepreneurship, 1(1), pp. 13-29.

Kim, S. (1995). Expansion of markets and the geographic distribution of economic activities: the trends in US regional manufacturing structure, 1860-1987, Quaterly Journal of Economics 110, 881-908.

Kim, W. and Mauborgne, R. (2015). Red Ocean Strategy vs Blue Ocean Strategy. [online] Blue Ocean Strategy. available at: https://www.blueoceanstrategy.com/tools/red-ocean-vs-blue-ocean-strategy/ [accessed: 16th December 2015].

Kind, S. and Köcker, G. (2012). Developing Successful Creative & Cultural Clusters. [online] Berlin: European Creative Industries Alliance, pp.1-85. available at: http://www.berlin.de/projektzukunft/fileadmin/user_upload/pdf/studien/Report_Impact_Assessment_2013-web.pdf [accessed: 12th September 2016].

Kingston, W. (1995) "Entrepreneurship or Rent-Seeking", in A. Burke (ed) Enterprise and the Irish Economy, Oak Tree Press: Dublin.

Kirzner, I. M. (1973). Competition and Entrepreneurship. Chicago, Ill.: The University of Chicago Press.

Kitson, M., Martin, R. and Tyler, P. (2004), 'Regional competitiveness: An elusive yet key concept?' Regional Studies, 38 (9): 991–999.

Klepper, S. (2008) The Geography of Organizational Knowledge, mimeo, Carnegie Mellon University.

Konstantynova, A. (2017). Basque Country cluster policy: the road of 25 years. Regional Studies, Regional Science, 4(1), pp.109-116.

Konu, A. and Pekkarinen, E. (2008). Provincial University of Lapland: Collaborating for Regional Development. Higher Education Management and Policy 20(2): 115-123.

Korotayev A., and Zinkina J. (2014) On the structure of the present-day convergence. Campus-Wide Information Systems. Vol. 31 No. 2/3, pp. 139-152

Korsgaard, S., and Anderson, A.R. (2011). Enacting entrepreneurship as social value creation. International Small Business Journal 29:2135-151.

Krishnaswami A, Ravi-Kumar S, Lewis JM. (2010) Thiazolidinediones: a 2010 perspective. Perm J. 2010;14(3):64–72. doi: 10.7812/TPP/09-052.

Krugman, P. (1995). Innovation and agglomeration: Two parables suggested by city-size distributions. Japan and the World Economy, 7(4), pp.371-390.

Krugman, P., (1991), Geography and Trade, The MIT Press, Cambridge, Massachusetts.

Kuah, T.H. (1998), Competitive strategies of the disk drive sector in Singapore, MBA dissertation, Scotland: Strathclyde University

Kuhn, T. S. (1962). The structure of scientific revolutions: University of Chicago press.

Kumral, N., and Ç. Deger. 2008. The Strategies and Policies for Economic Competitiveness in the Istanbul Metropolitan Region. working Paper 5. Istanbul: Ege University, Department of Economics.

Kvale, S. (2007) Doing Interviews. Sage Publications, Thousand Oaks.

Labour.ie, (2015). Joan Burton is the Tanaiste and Minister for Social Protection, and Leader of the Labour Party.. [online] available at: https://www.labour.ie/joanburton/ [accessed: 16th December 2015].

Lagendijk, A. (1999). Good practices in SME Cluster initiatives. Lessons from the 'Core' regions and beyond. Research Report. Centre for Urban and Regional Development Studies, University of Newcastle Upon Tyne.

Lagos, D. and Courtis, P. (2008). Business Clusters Formation as a Means of Improving Competitiveness in the Tourism Sector. European Research Studies,, XI(1-2), pp.1-11.

Lambie, G. (2013). Globalisation before the crash: the City of London and UK economic strategy. Contemporary Politics, 19(3), pp.339-360.

Lambooy, J. and Boschma, R. (2001) Evolutionary economics and regional policy. Annals of Regional Science 35, 113–131.

Lämmer-Gamp, T., Meier zu Köcker, G., Köhler, T., Pflanz, K. and Iszak, K. (2016). Clusters and Entrepreneurship in Emerging Industries. [online] pp.1-38. Available at: http://www.sgg.si/wp-content/uploads/2016/06/2016-Clusters-and-Entrepreneurship-in-Emerging-Industries.pdf [Accessed 14 Feb. 2019].

Lämmer-Gamp, T., Meier zu Köcker, G., and Nerger, M. (2014): Cluster collaboration and business support tools to facilitate entrepreneurship, cross-sectoral collaboration and growth, report to the European Cluster Observatory, European Commission, available at: http://ec.europa.eu/DocsRoom/documents/9972/attachments/1/translations/en/renditions/native.

Lather, P. (1992). Critical frames in educational research: Feminist and post-structural

Le Gallo, J., and Dall'erba, S. (2006) Evaluating the Temporal and the Spatial Heterogeneity for the European Convergence Process, 1980-1999, Journal of Regional Science, 46: 269-288.

Leaderpartnership.ie. (2014) About - LEADER Partnership Portal. [online] available at: http://leaderpartnership.ie/about/ [accessed 10th December 2015].

Ledp.ie (2014). Limerick Enterprise Development Partnership. Bringing Employment, Education and Social Prosperity to Limerick. [online] available at: http://www.ledp.ie/ [accessed: 1st March 2016].

Lee, J. (1989) Ireland, 1912-1985: Politics and Society, Cambridge University Press: UK.

Lee, R. and Wills, J. (1997). Geographies of economies. 1st ed. London: Arnold.

Lei, T.D. (2000) 'Industry evolution and competence development: the imperatives of technological convergence', International Journal of Technology Management, Vol. 19, Nos. 7/8, pp.699–738.

Levin, M. (1993). "Creating networks for rural economic development in Norway." Human Relations 46(2): 193.

Lgcsb.ie, (2011). Local Government in Ireland | LGMA. [online] available at: http://www.lgcsb.ie/en/irish-local-government [accessed: 7th January 2016].

Limerick Post (2017). Mid-West Industry Special. [online] available at: http://www.limerickpost.ie/digital/2017/midwest-industry-feature/html5/index.html?page=1&server [accessed: 4th July 2017].

Limerick.ie, (2015). Local Agenda 21 Environmental Partnership Fund. [online] available at: https://www.limerick.ie/council/local-agenda-21-environmental-partnership-fund [accessed: 2nd January. 2016].

Limerick.ie, (2015). Tourism Diaspora Grants 2015. [online] available at: https://www.limerick.ie/council/tourism-diaspora-grants-2015 [accessed: 2nd January. 2016].

Limerick.ie. (2013). Limerick 2030 An Economic and Spatial Plan for Limerick. Limerick.ie, pp. 1-172. available at: http://www.limerickcity.ie/Planning/EconomicDevelopment/Limerick2030AnEconomicandSpatialPlanforLimerick/An%20Economic%20and%20Spatial%20Plan%20for%20Limerick.pdf [accessed: 19th July 2015].

Limerick2030.ie. (2017). Limerick 2030. [online] available at: http://www.limerick2030.ie/ [accessed: 25th January 2017].

Limerickchamber.ie. (2013). About Us | Limerick Chamber. [online] available at: http://www.limerickchamber.ie/about-us/ [accessed: 1st November 2015].

Lindqvist, G., and Sölvell, Ö. (2011) Organising Clusters for Innovation: Lessons from city regions in Europe [online], available at: http://wbc-inco.net/object/document/9806 [accessed: 12th March 2016].

LIT (2014) LIT Research [online], available: http://www.lit.ie/Research/default.aspx [accessed: 26 July 2016].

LIT.ie. (2017). LIT News Centre - Ambassadors Make EUR35M Contribution to Shannon Region. [online] available at: http://www.lit.ie/NewsCentre/NewsArticles/Ambassadors%20Make%20EUR35M%20Contribution%20to%20Shannon%20Region.aspx [accessed: 17th January 2017].

Local Government: An Overview. (2004). 1st ed. [ebook] Dublin: IPA, pp.1-50. available at: http://www.environ.ie/en/LocalGovernment/LocalGovernmentAdministration/PublicationsDocuments/FileDownLoad,1961,en.pdf [accessed: 7th January 2016].

Localenterprise.ie, (2014). About Us - Local Enterprise Office. [online] available at: https://www.localenterprise.ie/About-Us/ [accessed 8th December 2015].

LocalEnterprise.ie, (2016). Enable Enterprise Culture - Local Enterprise Office. [online] available at: https://www.localenterprise.ie/Enable-Enterprise-Culture/ [accessed: 2nd January. 2016].

Localenterprise.ie, (2016). Local Enterprise Office. [online] available at: http://www.localenterprise.ie [accessed: 3rd March 2016].

Løkke, A.-K., and Sørensen, P. D. (2014). Theory Testing Using Case Studies. Electronic journal of business research methods, 12(1).

London Development Agency (2005). Strategies for Creative Spaces: Phase 1 Report, London: LDA.

López-Bazo, E. (2003), "Growth and Convergence Across Economies. The Experience of the European Regions", in Fingleton, B., Eraydin, A. and Paci, R. (eds.) Regional Economic Growth, SMEs and the Wider Europe, Aldershot et al., Ashgate, 49-74.

Lopez-Bazo, E., Valcarce, E. V. , Corral, A. J. M. and Caralt, J. S. (1997). Regional economic dynamics and convergence in the European Union. http://www.ere.ub.es/dtreball/E9712.rdf/at_download/file 62 p.

López-Bazo. E., Vayá, E., Mora, A.J. and Suriñach, J. (1999). Regional economic dynamics and convergence in the European Union. Annals of Regional Science, 33, pp. 343-70.

Lorenzen, M. (2001) Localized learning and policy: academic advice on enhancing regional competitiveness through learning. European Planning Studies 9:2, 163–185.

Lowe, M. (1993). Local hero! An examination of the role of the regional entrepreneur in the regeneration of Britain's regions. In G. Kearns & C. Philo (Eds.), Selling Places: the city as cultural capital, past and present (pp. 211-230): Pergamon Press.

Lundequist, P. and Power, D. (2002). Putting Porter into Practice? Practices of Regional Cluster Building: Evidence from Sweden. European Planning Studies, 10, 685-704.

Lundstrom, A.; Almerud, M. and Stevenson, L. (2008), Entrepreneurship and Innovation Policies: Analysing Measures in European Countries, Swedish Foundation for Small Business Research, Stockholm.

Lundström, H. and Stevenson, L. (2005) Entrepreneurship Policy: Theory and Practice, New York: Kluwer Academic Publishers.

Maher, A. (2014). Cluster-Focused Business Incubators Fuel Urban Economic Growth. Retrieved from ICIC: http://www.icic.org/connection/blog-entry/blogclusterfocused-business-incubators-fuel-urban-economic-growth.

Malakauskaite, A. and Navickas, V. (2011). Contribution of Clusters to the Competitiveness of Companies: Revelation and Evaluation. Engineering Economics, 22(1).

Malakauskaitė, A., Navickas, V. (2011) Relation between a cluster's lifecycle and competitiveness level, Economic and Management, 2011 (16) pp.5 [online], available: http://www.ktu.lt/lt/mokslas/zurnalai/ekovad/16/1822-6515-2011-0214.pdf [accessed: 18th May 2016].

Malecki, E. J. (1995), Entrepreneurs, Networks and Economic Development: A Review of Recent Research. Department of Geography, University of Florida, Gainesville, FL.

Malecki, E. J. (1994). Technology & economic development. Harlow: Addison Wesley Longman.

Maleković, S., Puljiz, J. and Tišma, S. (2011) New Opportunities for Regional and Local Actors in Croatia in Supporting Socio- Economic Development Source: Southeastern Europe. 35(2): 168-190.

Malerba, F. (2005) 'Sectoral systems of innovation: a framework for linking innovation to the knowledge base, structure and dynamics of sectors', Economics of Innovation and New Technology, Vol. 14, Nos. 1–2, pp.63–82.

Malhotra, N. K., Hall, J., Shaw, M., and Oppenheim, P. (2004). Essentials of marketingmanagement research: Dartmouth Publishing management review, 14(4), 532-550. https://doi.org/10.5465/amr.1989.4308385

Manca, F. (2012), "Human Capital Composition and Economic Growth at the Regional Level", Regional Studies, vol. 46, no. 10, pp. 1367-1388.

Mankiw, N.G. (1995). The Growth of Nations. Brookings Papers on Economic Activity. 275–326.

Marc.org, (2015). Regional Prosperity - MARC Data and Economy section. [online] available at: http://www.marc.org/Data-Economy/Regional-Prosperity [accessed: 16th December 2015].

Marchese, M. and J. Potter (2010), "Entrepreneurship, SMEs and Local Development in Andalusia, Spain", LEED Working Paper Series, LEED programme, OECD.

Maree, E. (2014). Dublin isn't the centre of the world for everybody - Independent.ie. [online] Independent.ie. available at: http://www.independent.ie/business/irish/dublin-isnt-the-centre-of-the-world-for-everybody-30354443.html [accessed: 29th August 2016].

Marklund, K. (1993), Convergence, National Encyclopedia, band 11, Höganäs, Sweden: Book publisher Bra Böcker AB.

Markusen, A. (1996), 'Sticky places in slippery space: A typology of industrial districts', Economic Geography, 72 (3): 293–313.

Maroto-Sánchez, A. and Cuadrado-Roura, J.R. (2009), "Is growth of services an obstacle to productivity growth? A comparative analysis", Structural Change and Economic Dynamics, vol. 20, no. 4, pp. 254-265.

Marshall, A. (1890). Principles of Economics. London: MacMillan. ——. (1920). “Industrial Organization: The Concentration of Specialized Industries in Particular Localities.” In Principles of Economics. Ed. A. Marshall, Book IV, Chapter 10, 8th Ed. McMillan.

Marshall, A. (1898, first edition 1890) Principles of Economics, London Macmillan.

Marshall, A. (1920). Principles of Economics. 8th ed. London: Macmillan, p. 319.

Marshall, A. 1920. Principles of Economics. 8th ed. London: Macmillan, p. 319.

Marshall, C. and Rossman, G. (2011). Designing qualitative research. 5th ed. Los Angeles, Calif.: Sage, pp.1-321.

Martin, R. and Sunley, P. (2003). Deconstructing clusters – chaotic concept or policy pancea?‘ Journal of Economic Geography, Vol. 3, pp3-35.

Martin, R. and Sunley, P. (2014). Towards a Developmental Turn in Evolutionary Economic Geography?. Regional Studies, 49(5), pp.712-732.

Mas, M., Maudós, J., Pérez, F. and Uriel, E. (1995). Growth and convergence in the Spanish provinces. In H.W. Armstrong and R.W. Vickerman (eds.), Convergence and divergence among European regions. London: Pion.

Maskell, P. (2001), ‘Towards a Knowledge-based Theory of the Geographical Cluster,’Industrial and Corporate Change, 10: 921-943.

Mason, C. and Brown, R. (2013), ‘Entrepreneurial Ecosystems and Growth Oriented Entrepreneurship,’ background paper prepared for the OECD international workshop on Entrepreneurial Ecosystems And Growth Oriented Entrepreneurship, The Hague, Netherlands, 7 November 2013.

Matopoulos, A., Vlachopoulou, M. and Manthou, V. (2005). Exploring clusters and their value as types of business networks in the agricultural sector. Operational Research, 5(1), pp.9-19.

Mattimoe, Ruth (2002) A Historical Profile of the Irish Economy and Irish Government Economic Policies with regard to the Enterprise Sector. In: Theile, Konstantin and Ó hÓgartaigh, Ciarán, (eds.) International New Enterprise Developments. International partnership of business schools publication series: volume 2, 2 . Shaker-Verlag, Aachen, pp. 79-108. ISBN 3-8322-0953-0

Mazzarol, T. (2003). Regional Entrepreneurship – Developing a Holistic Framework for Stimulating Regional Enterprise. 1st ed. [ebook] Adelaide: CEMI, pp.1-26. available at: http://www.cemi.com.au/sites/all/publications/RDSAMAZZAT.pdf [accessed: 5th January 2016].

Mazzarol, T., Patmore, R. and Van Heest, N. (2005), 'Mapping Industry Clusters in the Digital Economy - Using cluster analysis to identify emerging industries,' in P. Braun (ed.), Beyond Clusters: Current Practices and Future Strategies, Australia: University of Ballarat.

McCarthy, D. (2015). Employment, wages and economic recovery in the Republic of Ireland » NERI Blog » Nevin Economic Research Institute. [online] Nevin Economic Research Institute. available at: http://www.nerinstitute.net/blog/2015/05/21/employment-wages-and-economic-recovery-in-the-repu/ [accessed: 29th December 2015].

McCormick, D. (2001). Enterprise Clusters in Kenya. Africa Insight, 31(1).

McDermott, G., Corredoira, R. and Kruse, G. (2009), 'Public-private institutions as catalysts of upgrading in emerging market societies,' Academy of Management Journal, 52 (6): 1270-1296.

McDonald, P. and Nolan, D. (2013). County Incomes and Regional GDP. 1st ed. [ebook] Dublin: Central Statistics Office, Ireland, pp.1-28. available at: http://www.cso.ie/en/media/csoie/releasespublications/documents/economy/2010/regincome_2010.pdf [accessed: 29th December 2015].

McGrath, H. (2008), Industrial Clusters in local and Regional Economies: A Post Porter Approach to the Identification and Evaluation of Clusters in North Dublin, Dublin: Glasnevin Publishing.

Mchardy, D., De Martino, R. and Zyglidopoulos, S. C. (2005). The internationalization Journey of a high-tech cluster. International Business Review, 47, 529-554.

McMahon, P. (2017). Mid-West is fastest growing region outside of Dublin. [online] The Clare Herald. available at: http://clareherald.com/2016/12/mid-west-is-fastest-growing-region-outside-of-dublin/ [accessed: 13th January 2017].

McMahon, P. (2019). 30% increase in Shannon's population expected by 2040 - The Clare Echo News. [online] The Clare Echo News. available at: https://www.clareecho.ie/30-increase-in-shannons-population-expected-by-2040/ [accessed: 9th December 2019].

McManus, J. (2011). Bank of Ireland's behaviour shows bad old culture has not changed. [online] The Irish Times. available at: http://www.irishtimes.com/business/financial-services/bank-of-ireland-s-behaviour-shows-bad-old-culture-has-not-changed-1.10480 [accessed: 25th February 2016].

McNamara, C. (1999), General Guidelines for Conducting Interviews, Authenticity Consulting, LLC: Minnesota.

Meccheri, N., and Pelloni, G. (2006). Rural entrepreneurs and institutional assistance: An empirical study from mountainous Italy. Entrepreneurship and Regional Development, 18(5), 371-392.

Meinig, D.W. (1986). The Shaping of America: A Geographical Perspective on 500 Years of History, Volume 1: Atlantic America, 1492-1800. New Haven: Yale University Press. ISBN 0-300-03548-9

Melchior, A. (2009). Regional Inequality and Convergence in Europe 1995-2005. Norwegian Institute of International Affairs April 23. 2009 CASE Network Studies and Analyses No. 374.

Mesquita, LF. and Lazzarini, SG. (2008), 'Horizontal and vertical relationships in developing economies: implications for SMEs' access to global markets.' Academy of Management Journal, 51 (2): 359-380.

Mid-West Area Strategic Plan 2012-2030. (2012). 1st ed. [ebook] Limerick: kunnertandtierney, pp.1-130. available at: http://www.mwasp.ie/documents/Final%20MWASP%20May%202013%20English.pdf [accessed: 2nd January. 2016].

Mikulić, D., Lovrinčević, Ž. and Nagyszombaty, A. (2013). Regional Convergence in the European Union, new Member States and Croatia. South East European Journal of Economics and Business, 8(1), pp.9-21.

Miles, M.B. and Huberman, A.M. (1994). Qualitative Data Analysis (2nd edition). Thousand Oaks, CA: Sage Publications. Perspectives. Theory into Practice, 31(2), 87-99.

Mills, P. (2017). Balanced growth for all needed more than ever. [online] www.irishexaminer.com. available at: https://amp-irishexaminer-

com.cdn.ampproject.org/c/amp.irishexaminer.com/business/columnists/paul-mills/balanced-growth-for-all-needed-more-than-ever-450872.html [accessed: 4th July 2017].

Minalogic.com. (2016). About Minalogic | Minalogic. [online] available at: http://www.minalogic.com/en/minalogic/about-minalogic-0 [accessed: 22nd September 2016].

Ministry of Economic Affairs and Employment of Finland. (2019). Objectives and planning of regional development. [online] Available at: https://tem.fi/en/objectives-and-planning-of-regional-development [Accessed 5 Dec. 2019].

Ministry of the Interior (2004). Decision of the Government on national regional development objectives in accordance with the Regional Development Act 15.1.2004 [The Government decision on 15 January 2004 on the national goals for development of regions according to the Regional Development Act].

Minniti, M. (2005). Entrepreneurship and network externalities. Journal of Economic Behavior and Organization, 57(1), 1-27.

Mitchell, C.J.A. and Wall, G. (1989) The Arts and Employment: A Case Study of the Stratford Festival, Growth and Change, Vol. 20, Iss. 4.

Mitra, J. (2012). Entrepreneurship, innovation and regional development. 1st ed. Abingdon, Oxon: Routledge.

Moats Au, B. (2006). Regions Matter: Regional Prosperity and Convergence in the European Union. Carleton, [online] pp.1-33. available at: http://people.carleton.edu/~amontero/Benjamin%20Au.pdf [accessed: 11th December 2015].

Moinuddin Shekh. (2017) " Mediascape and the State: A Geographical Interpretation of Image Politics in Uttar Pradesh, India. Netherland, Springer.

Mokyr, J. (2003), The Oxford Encyclopaedia of Economic History. Oxford: Oxford University Press.

Monfort, P. (2008) 'Convergence of EU regions. Measures and evolution', Directorate-General for Regional Policy; Working papers. No. 01/2008 2008.

Morgan, G., and Smircich, L. (1980). The case for qualitative research. Academy of management review, 5(4), 491-500.

Morris, N. (2010). "Integrating Limerick" Plan Launched. [online] Jrs.ie. available at: http://www.jrs.ie/jrs-news/218-qintegrating-limericq-plan-launched [accessed: 2nd January. 2016].

Morrison, A. (2000). "Entrepreneurship: What triggers it?" International Journal of Entrepreneurial Behaviour & Research 6(6): 59-71.

Morrison, A. (2008), 'Gatekeepers of Knowledge within Industrial Districts: Who They Are, How They Interact,' Regional Studies, 42 (6): 817-835.

Motoyama, Y. (2008) "What Was New About the Cluster Theory? What Could It Answer and What Could It Not Answer?", Economic Development Quarterly, vol. 22, no. 4, pp. 353-363.

Mottiar, Z, Jacobson, D (2002) 'The Importance of Place, Space and Culture in the Development of an Industrial Agglomeration in Ireland. The Furniture Industry in Co Monaghan', in C O hOgartaigh and K Theile (eds) International New Enterprise Developments Aachen, Germany Shaker Verlag.

Moynihan, M. (2018). Crisis And Comeback: Cork In The Eighties. 1st ed. Cork: The Collins Press, pp.1-240.

Mueller, P. (2006). Entrepreneurship in the region: Breeding ground for nascent entrepreneurs? Small Business Economics, 27(1), 41-58.

Mueller, P., Van Stel, A., and Storey, D. J. (2008). The effects of new firm formation on regional development over time: The case of Great Britain. Small Business Economics, 30(1), 59- 71.

Muro, M. and Katz, B. (2010). The new cluster moment: How regional innovation clusters can foster the next economy. Metropolitan Policy Program, [online] pp.1-59. available at: https://www.brookings.edu/wp-content/uploads/2016/06/0921_clusters_muro_katz.pdf [accessed: 17th August 2016].

Myerscough, J. (1988) The Economic Importance of the Arts in Britain, Policy Research Institute, London.

Nakamura, R. (2008). Agglomeration Effects on Regional Economic Disparities: A Comparison between the UK and Japan. Urban Studies, 45(9), pp.1947-1971.

Nakaoka, T. (1982) Science and technology in the history of modern Japan: imitation or endogenous creativity? in A. Abdel-Malek, G. Blue and M. Pecujlic (Eds.) Science and Technology in the Transformation of the World, The United Nations University, 1982. ISBN 92-808-0339-5

Nakaoka, T. (1987) On technological leaps of Japan as a developing country. Osaka City University Economic Review, 22, 1-25.

Nakaoka, T. (1994). The learning process and the market: the Japanese capital goods sector in the early twentieth century. LSE STICERD Research Paper No. JS271.

Nakaoka, T. (1996). Technology in Japan: From the Opening of Ports to the Start of the Postwar Economic Growth. Technological Development and Economic Systems: Japanese Experiences and Lessons: October 1–2, 1994, Tokyo, Japan.

Nakaoka, T. (Ed.) (1990) InternationalComparisonof Technological Formation-social capability of industrialization. Tokyo, Chikumashobo (Japanese).

Napier, G. and Bjerregaard, H. (2013), 'Towards an International Food Cluster in Denmark: An analysis of the food sector in Central Denmark Region,' REG X – The Danish Cluster Academy.

National Governors Association and the US Council on Competitiveness (2007), Cluster-Based Strategies for Growing State Economies, Washington, D.C.: National Governors Association and the US Council on Competitiveness.

National Spatial Strategy (2002-2020), DoECLG, Dublin, (2002).

Nationalfranchisecentre.ie. (2011). National Franchise Centre. [online] available at: http://www.nationalfranchisecentre.ie/nfc.php [accessed: 27th August 2016].

Naudé, W., Gries, T., Wood, E., and Meintjes, A. (2008). Regional determinants of entrepreneurial start-ups in a developing country. Entrepreneurship and Regional Development, 20(2), 111-124.

NCOE (2000). Building Companies, Building Communities: Entrepreneurs in the New Economy. Washington, D.C., The National Commission on Entrepreneurship.

NCOE (2001). Five Myths About Entrepreneurs: Understanding How Small Businesses Start and Grow. Washington, D.C., The National Commission on Entrepreneurship.

Neergaard, H. (2005). Networking Activities in Technology-based Entrepreneurial Teams. International Small Business Journal: Researching Entrepreneurship, 23(3), pp.257-278. Netherlands Bureau for Economic Policy Analysis Working Paper.

Network, T. (2016). TCI NETWORK. [online] Tci-network.org. available at: http://www.tci-network.org/ [accessed: 7th September 2016].

Neven, D. and C.L.M. Droge, (2000). A Diamond for the Poor? Assessing Porter's

Neven, D.J. and Gouyette, C. (1994). Regional convergence in the European Community, CEPR Discussion Paper Series 914.

Neville, C. (2007) Introduction to Research and Research Methods. University of Bradford, School of Management, [online] pp.1-46. available at: http://www.brad.ac.uk/management/media/management/els/Introduction-to-Research-and-Research-Methods.pdf [accessed 8 May 2014].

New Frontiers, (2016). New Frontiers | Entrepreneur Development Programme. [online] available at: http://www.newfrontiers.ie/ [accessed: 3rd March 2016].

New York, Basic Books.

Nielsen, M. (2013). EU MEMBER STATE VIEW ON CLUSTER MAPPING.

Nieman G, Hough J and Niewenhuizen. (2003). Entrepreneurship. A South African Perspective

Nigel Hemmington, (1998) "Barriers and resistance to change in hotel firms: an investigation at unit level", International Journal of Contemporary Hospitality Management, Vol. 10 Issue: 7, pp.283-288, https://doi.org/10.1108/095961198102

North, D. 1990. Institutions, Institutional Change and Economic Performance. Cambridge: Cambridge University Press.

North, D. and Smallbone, D. (2006). Developing entrepreneurship and enterprise in Europe's peripheral rural areas: Some issues facing policy-makers. European Planning Studies, 14(1), pp.41-60.

North, D., and Smallbone, D. (2000). The innovativeness and growth of rural SMEs during the 1990s. Regional Studies, 34(2), 145-157.

Nrn.ie, (2015). LEADER Funding « National Rural Network. [online] available at: http://www.nrn.ie/the-national-rural-network/making-an-application-for-leader-funding/ [accessed: 17th December 2015].

O' Leary, E. (2007). Regional policy and agglomeration economies in Ireland. Perspectives on Irish productivity: A selection of essays by Irish and international economists, pp.253-266.

O'Gorman, C. (2013). ENTREPRENEURSHIP IN IRELAND. 1st ed. [ebook] Dublin: REDI, pp.1-25. available at: http://www.agresearch.teagasc.ie/rerc/CEDRA/REDI_Chapter20.pdf [accessed: 27th February 2016].

O'Hara, P. (2014). What Future for the Regions?. 1st ed. [ebook] Dublin: socialjustice, pp.147-172. available at: http://www.socialjustice.ie/sites/default/files/file/Social%20Policy%20Conference/2014-01-17%20-%20P%20O%20Hara%20What%20Future%20for%20the%20Regions.pdf [accessed: 7th January 2016].

O'Reilly, Q. (2019). Shannon 2.0 - 'Our Story is one of constant reinvention'. The Sunday Business Post, p.3.

Oakey R. P., Kipling M., and Wildgust S. (2001). "Clustering among high technology small firms: the anatomy of the non-broadcast visual communications sector", Regional Studies, Vol. 35, No. 5.

Oakey, R. (1985), High technology industry and agglomeration economies in: Silicon landscapes, Edited by Hall, P. and Markusen, A., Boston: Allen and Unwin, 94-117.

Oakey, R. (2007) Problem with Regional Development Planning: The Case of Clustering. Lancs, p.25. available at:

http://www.lancs.ac.uk/ias/annualprogramme/regionalism/docs/Oakey_paper.pdf [accessed: 28th November 2015].

Oats, D. (1992). “Vision of Angels.” Director 45(11): 34.

OECD (1998) Fostering Entrepreneurship. Paris: OECD.

OECD (2000). Local Partnership, Clusters and SME Globalisation. Enhancing the Global Competitiveness of SMEs in the Global Economy: Strategies and Policies, Bologna, Italy 14-15 June, OECD.

OECD (2007), Competitive regional clusters: National policy approaches. Paris: OECD.

OECD (2007), Linking Regions and Central Governments: Contracts for Regional Development, OECD Publishing, Paris, doi: 10.1787/9789264008755-en.

OECD (2009). How regions grow: Trends and analysis Paris: OECD.

OECD (2010), Cluster Policies, Paris: OECD Publishing.

OECD (2011), OECD Regional Outlook 2011: Building resilient regions for stronger economies, OECD Publishing.

OECD (2012). Promoting Growth in all Regions Programme for Government 2011 http://www.taoiseach.gov.ie/eng/Publications/Publications_Archive/Publications_2011/Programme_for_Government_2011.pdf

OECD (2013). Innovation-driven Growth in Regions: The Role of Smart Specialisation. ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT. Paris: OECD Publications, pp.1-202.

OECD (2014), OECD Regional Outlook 2014: Regions and Cities: Where Policies and People Meet, OECD Publishing.

OECD. (2018). China, People's Republic of - OECD Data. [online] available at: https://data.oecd.org/china-people-s-republic-of.htm [accessed: 14th January 2019].

OECD.org, (2015). LEED Forum site - Organisation for Economic Co-operation and Development. [online] available at: http://www.oecd.org/leed-forum/ [accessed: 16th December 2015].

Oppenheim, A.N. (1996) "Questionnaire design, interviewing and attitude measurement [new edition]," Pinter, London.

O'Regan, E. (2019). Shannon 2.0 - 'Our Story is one of constant reinvention'. The Sunday Business Post, pp.1-16.

Owen-Smith, J. and Powell, W. W. (2004), 'Knowledge Networks as Channels and Conduits: The Effects of Spillovers in the Boston Biotechnology Community,' Organization Science, 15 (1): 5-21.

Oxford English Dictionary (2012), Vol. 2. 6th edition, Oxford: Oxford University Press, ISBN: 9780199640942.

Oxford Research AS (2008), 'Cluster policy in Europe - A brief summary of cluster in 31 European countries,' report of the Europe INNOVA Cluster Mapping project, January, 2008.

P. Holsapple, and K. Joshi (2002). Knowledge manipulation activities: results of a Delphi study Information & Management, 39 (6), pp. 477-490.

Paas, T. and Schlitte, P. (2007). Regional Income Inequality and Convergence Processes in the EU25. HWWI_Research_Paper: 1-11.

Palacios, J. (2005), 'Economic Agglomeration and Industrial Clustering in Developing Countries, The Case of the Mexican Silicon Valley,' in: Kuchiki S. J., Juan S. and Palacios, J. Joint Research Program Series, 137: 161- 271.

Palcic, D. and E. Reeves (2011) “The Future of Shannon Airport - An Assessment of Privatisation and PPP Options” Paper prepared for Shannon Airport Worker Directors, December.

Palcic, D. and Reeves, E. (2011). Privatisation, Employee Share Ownership and Governance: The Case of Eircom. Annals of Public and Cooperative Economics, 82(4), pp.437-454.

Pamminger, W. (2015). Business Upper Austria. In: 3rd International Cluster Conference. [online] Limerick: Innovate Limerick, pp.1-25. available at: http://innovatelimerick.ie/currentprojects/cluster-conf-presentations/ [accessed: 19th August 2016].

Parkinnovaare.ch. (2018). Cluster vs. ecosystem: How can we organize innovation today?. [online] Available at: https://www.parkinnovaare.ch/cluster-vs-ecosystem-how-can-we-organize-innovation-today [Accessed 13 Jan. 2020].

Patrick J. Murphy, J. Liao, and H. P. Welsch. "A conceptual history of entrepreneurial thought." Journal of Management History, 12.1 (2006): 12-35.

Patton, M. Q. (2002), Qualitative Research and Evaluation Methods, 3rd edition, Thousand Oaks, California: Sage.

Penttinen, R. (1994) Summary of the Critique on Porter’s Diamond Model: Porter’s Diamond Model Modified to Suit the Finnish Paper and Board Machine Industry, ETLA Discussion Paper No. 462. Helsinki: The Research Institute of the Finnish Economy.

Perroux, F. (1955) 'Note on the notion of growth pole', Applied Economics, 8, No 1 and 2.

Perry, M. (2005). Business Clusters in the South: A critical appraisal from Indonesian Evidence. Singapore J Trop Geo, 26(2), pp.227-243.

Pezzi, A. (2011). The importance of clusters as drivers of competitiveness and regional economic development.

Phan, P., Venkataraman, S. and Velamuri, S. (2008). Entrepreneurship in emerging regions around the world. Cheltenham, UK: Edward Elgar.

Pike, A., Rodríguez-Pose, A., and Tomaney, J. (2007). What kind of local and regional development and for whom? Regional Studies, 41(9), 1253-1269.

Pinoyme.com. (2011). The DSWD Convergence Framework | PinoyME Foundation. [online] available at: http://www.pinoyme.com/consortium/pinoyme-dswd-develop-public-private-partnership-pathway-out-of-poverty.html [accessed: 25th February 2019].

Piore, M I, and Sabel, CF. (1984) 'The Second Industrial Divide Possibilities for Prosperity,' New York. Basic Books

Pitelis, C., Sugden, R. and Wilson, J. R. (2006), Clusters and Globalisation : The Development of Urban and Regional Economies. Cheltenham, U. K.: Edward Elgar.

Pobal, (2016). Pobal - Funding Programmes. [online] available at: https://www.pobal.ie/FundingProgrammes/Pages/Current.aspx [accessed: 3rd March 2016].

Pobal.ie. (2012). Who We Are. [online] available at: https://www.pobal.ie/AboutUs/Pages/Who%20We%20Are.aspx [accessed: 20th December 2015].

Poole, R. (2010). A New Engine of Economic Development. Open Source Business Resource, [online] (November 2010). available at: http://timreview.ca/article/391 [accessed: 3rd January 2016].

Porter, M. E. (1998) Clusters and the New Economics of Competition. Harvard Business Review, pp. 77-90. available at:

http://www.academia.edu/2367432/Clusters_and_the_new_economics_of_competition [accessed: 28th February 2016].

Porter, M. E. (2000). The Economic Competitiveness Group - What Is a Cluster?. [online] Ecgroup.com. available at: http://www.ecgroup.com/methodology/cluster.htm [accessed: 18th February 2016].

Porter, M. E. (2003) The Economic Performance of Regions. hbs.edu, 1 (1), p.30. available at: http://www.isc.hbs.edu/pdf/Porter2003-The_Economic_Performance_of_Regions.pdf [accessed: 14th April 2016].

Porter, M. E. (1990), The Competitive Advantage of Nations, Macmillan, London.

Porter, M. E. (1990a). "The Competitive Advantage of Nations." Harvard Business Review March–April: 73–93. ——. (1990b). The Competitive Advantage of Nations. New York: Free Press. Explaining Geographic Cluster Success—The GEMS Model 213.

Porter, M. E. (1998a) 'Clusters and the New Economics of Competition,' Harvard Business Review 76 (6) 77-91.

Porter, M. E. (1998b) Competitive Advantage of Nations. London: Macmillan

Porter, M. E. (2000). "Location, competition, and economic development: Local clusters in a global economy." Economic Development Quarterly 14(1): 15-34.

Porter, M. E. (2000; 2008), 'Location, Competition, and Economic Development Local Clusters in a Global Economy,' Economic Development Quarterly 14(1) 15-20.

Porter, M. E. (2001). Clusters of Innovation: Regional Foundations of U.S. Competitiveness. Washington, DC., Council on Competitiveness.

Pouder, R. and St. John, C.H. (1996) Hot Spots and Blind Spots: Geographical Clusters of Firms and Innovation. Academy of Management Review 21, 1192-1225.

Powell, W. W. (1990), 'Neither market nor hierarchy: Network forms of organization,' Research in Organizational Behavior, 12: 295-336.

Powell, W. W., Koput, K. W. and Smith-Doerr, L. (1996), 'Interorganizational collaboration and the locus of innovation: networks of learning in biotechnology' Administrative Science Quarterly, 41: 106–45.

Powell, W. W., White, D. R., Koput, K. W. and Owen-Smith, J. (2005). Network dynamics and field evolution: The growth of interorganizational collaboration in the life sciences1. American journal of sociology, 110(4), 1132-1205 Research,vol.15, pp.395-404. ressources recherchées et les liens

Prezioso, M. (2009). Entrepreneurship and Local Development: how to build a cohesive model towards competitiveness. Princeton, New Jersey, Princeton University Press.

PRO-INNO Europe, (2008). CLUNET Cluster Policy Guidelines Report. Clunet. [online] Europe: PRO-INNO, pp.1-57. available at: http://www.rralur.si/sites/default/files/rralur/CLUNET_ClusterPolicyGuidelines_Report_JAN2008%5B1%5D.pdf [accessed: 21st August 2016].

ProProfs. (2019). What are the three kinds of Regions? - ProProfs. [online] available at: https://www.proprofs.com/discuss/q/700099/what-are-the-three-kinds-of-regions [accessed: 26th March 2019].

Provadis-hochschule.de. (2020). Cluster Accelerator Programme. [online] available at: https://www.provadis-hochschule.de/angewandte-forschung/zentrum-fuer-industrie-und-

nachhaltigkeit-zin/nachhaltiges-unternehmertum/cluster-accelerator-programme.html [accessed: 8th January 2020].

Psrc.org, (2015). Regional Economic Strategy. [online] available at: http://www.psrc.org/econdev/res [accessed: 14th December 2015].

Publications Office. (2011). Thinking Big for Small Businesses What the EU does for SMEs. Publications Office, pp. 1-25. available at: http://ec.europa.eu/enterprise/newsroom/cf/_getdocument.cfm?doc_id=6643 [accessed: 7th December 2015].

Purkarthofer, E. and Humer, A. (2019). City-regional policies in the planning systems of Finland and Austria: National initiatives and European opportunities. Belgeo, (2), pp.1-19.

Putnam, R. (1993), Making democracy work: civic traditions in Modern Italy, Princeton, New Jersey: Princeton University Press.

Putting People First. (2012). 1st ed. [ebook] Dublin: STATIONERY OFFICE, pp.1-218. available at: http://www.environ.ie/en/PublicationsDocuments/FileDownLoad,31309,en.pdf [accessed 16th December 2015].

Quah, D. (1996). Twin Peaks: Growth and Convergence in Models of Distribution Dynamics. The Economic Journal, 106(437), p.1045.

Ragab, M., and Arisha, A. (2017) Research Methodology in Business: A Starter's Guide.Management and Organizational Studies Vol. 5, No. 1; 2018. doi.org/10.5430/mos.v5n1p1

Ragin C. (1987) The Comparative Method: Moving Beyond Qualitative and Quantitative Strategies. (Berkeley, Los Angeles, and London: University of California Press, xvii plus 185 pp.

Raines (2002). Cluster Development and Policy, EPRC Studies in European Policy, Aldershot: Ashgate.

Rajasekar, S., Philominathan, P. and Chinnathambi, V. (2013). RESEARCH METHODOLOGY. Cornell University Library, [online] 3, pp.1-53. available at: http://arxiv.org/pdf/physics/0601009.pdf [accessed: 8th May 2014].

Ramos Prieto, J. (2011), The financial collaboration relationships of the autonomous communities with local entities, Aragonese Yearbook of Local Government.

Ramsawak, R. (n.d.). Cluster Best Practices: Lessons from the Field. 1st ed. [ebook] Arthur Lok Jack Graduate School of Business, UWI: Cluster Initiatives, pp.1-14. available at: http://www.clusterpolisees3.eu/ClusterpoliSEEPortal/protected/2061/0/def/ref/DOC2062/ [accessed: 13th June 2016].

Rauch, A., van Doorn, R. and Hulsink, W. (2014). A Qualitative Approach to Evidence-Based Entrepreneurship: Theoretical Considerations and an Example Involving Business Clusters. Entrepreneurship Theory and Practice, 38(2), pp.333-368.

Read, S., and Sarasvathy, S. (2012) Co-Creating a Course Ahead from the Intersection of Service Dominant Logic and Effectuation. Marketing Theory. Vol. 12, Iss. 2; p. 225-229

Reference.com. (2019). In Geography, What Are the Three Types of Regions?. [online] available at: https://www.reference.com/geography/geography-three-types-regions-4d33cc90c5ac4c9 [accessed: 26th March 2019].

Regional Development Centre, (2015). About Us. [online] available at: http://www.rdc.ie/about-us [accessed: 16th December 2015].

Regional Innovation Scoreboard. (2019). Internal Market, Industry, Entrepreneurship and SMEs - European Commission. [online] available at:

https://ec.europa.eu/growth/industry/innovation/facts-figures/regional_en [accessed: 27th March 2019].

Regionaldevelopmentpartners.ie, (2015). Regional Development Partners – Services. [online] available at: http://regionaldevelopmentpartners.ie/services/ [accessed: 16th December 2015].

Remenyi, D., Williams, B., Money, A., and Swartz, E. (1998). Doing Research in Business and Management - An Introduction to Process and Method. London: Sage Publications. research in psychology, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Research.ibm.com, (2016). IBM University: Collaborative Innovation Centers. [online] available at: http://www.research.ibm.com/university/cic/index.shtml [accessed: 5th January 2016]. research: an applied orientation: Pearson Education Australia.

Rey, S.J. and Montouri, B.D. (1998). U.S. Regional Income Convergence: A Spatial Econometric Perspective. San Diego State University. Department of Geography. San Diego.

Reynolds, P. D. (1987). New firms: societal contribution versus survival potential. Journal of business venturing, 2(3), 231-246.

Reynolds, P. D. (1999). Creative destruction: Source or symptom of economic growth. In Z.

Richardson, I. (1999) Improving the Software Process in Small Indigenous Software Development Companies using a model based on Quality Function Deployment, Ph.D Thesis, University of Limerick.

Richter, C. E. (1969). The impact of industrial linkages on geographic association, in: Journal of Regional Science, vol. 9, no. 1, 19-28.

Riessman, C. K. (2005). Narrative analysis: University of Huddersfield.

Ring, J. (2017). Capital gains: how developing the regions would relieve Dublin and benefit the nation as a whole. [online] Independent.ie. available at: http://www.independent.ie/business/irish/capital-gains-how-developing-the-regions-would-relieve-dublin-and-benefit-the-nation-as-a-whole-35777554.html [accessed: 4th July 2017].

Roberts, B., Enright, M.J (2004) Industry Clusters in Australia: Recent Trends and Prospects. European Planning Studies, 12 (1), pp. 99-121.

Robin, B. (2017). The Meaning & Power of Words. [online] Medium. available at: https://artplusmarketing.com/the-meaning-power-of-words-d52982fac66e [accessed: 20th February 2020].

Robson, C. (1993). Real world research: A resource for social scientists and practitioners-researchers. Massachusetts: Blackwell Pushers.

Robson, C. (2002). Real world research: A resource for social scientists and practitioner-researchers (Vol. 2): Blackwell Oxford.

Rocha, H. (2004). Entrepreneurship and Development: The Role of Clusters. Small Business Economics Journal, [online] pp.1-60. available at: http://link.springer.com/article/10.1007/s11187-004-3991-8 [accessed: 14th August 2016].

Rocha, H. and Sternberg, R. (2005). Entrepreneurship: The Role of Clusters Theoretical Perspectives and Empirical Evidence from Germany. Small Bus Econ, 24(3), pp.267-292.

Roche, D. and Collins, J. (1982). Local government in Ireland. Dublin, Ireland: Institute of Public Administration, pp.1-391.

Rodríguez-Pose, A. (1999). Convergence or divergence? Types of regional responses to socioeconomic change in Western Europe. Magazine for economic and social geography

Rodriguez-Pose, A. and Storper, M. (2006), Better rules or stronger communities? On the social foundations of institutional change and its economic effects, Economic Geography, Vol. 82(1), pp. 1–25.

Rodríguez-Pose, Andrés (2000): Economic convergence and regional development strategies in Spain: The case of Galicia and Navarre, EIB Papers, ISSN 0257-7755, European Investment Bank (EIB), Luxembourg, Vol. 5, Iss. 1, pp. 88-115

Roelandt, T. and den Hertog, P. (1999), 'Cluster Analysis and Cluster- Based Policy Making in OECD Countries: An Introduction to the Theme,' in OECD (1999), Boosting Innovation: The Cluster Approach, Paris: OECD, pp. 9-23.

Roelandt, T., van der Hove, N. and Grosfeld, T. (1998), 'Clusters Specialisation Patterns and Innovation Styles,' Dutch Ministry of Economic Affairs, The Hague.

Rogers, R. H. (2018). Coding and writing analytic memos on qualitative data: A review of Johnny Saldaña's The Coding Manual for Qualitative Researchers. The Qualitative Report, 23(4), 889-892. Retrieved from https://nsuworks.nova.edu/tqr/vol23/iss4/12

Romanelli, E. (1989). Organization Birth and Population Variety: A Community Perspective on Origins, in. Research in Organizational Behaviour. L. L. Cummings, and Staw, B.M. (eds.). Greenwich CT, JAI Press. 11: 211-246.

Romanelli, E. and Khessina , O. M. (2005). Regional Industrial Identity: Cluster Configurations and Economic Development. Organisation Science, 16, 344-358.

Romanelli, E., and Schoonhoven, B. C. (2001). The local origins of new firms. Stanford, CA: Stanford University Press. Row.

Ropponen, T. (2008). The Nokia story of using action learning. Action Learning: Research & Practice, 5(2), 161-165. Business Source Complete database.

Rosenberg, N. (1963) ‘Technological change in the machine-tool industry, 1840–1910’, Journal of Economic History, Vol. 23, No. 4, pp.414–443.

Rosenfeld, S A. (1997) ‘Bringing Business Clusters into the Mainstream of Economic Development,’ European Planning Studies 5 (1) 3-21

Rosenfeld, S., A. (2002) ‘Creating Smart Systems A Guide to Cluster Strategies in Less Favoured Regions,’ Paper prepared for workshop on European Union Regional Innovation Strategies European Commission, Research Dictorate General Brussels, April 11th 2002.

Rosenthal, J. (2009). A Terrible Thing to Waste. [online] Nytimes.com. available at: http://www.nytimes.com/2009/08/02/magazine/02FOB-onlanguage-t.html [accessed: 10th January 2017].

Ross, S. (2018). What are the differences between divergence and convergence? [online] Investopedia. available at: https://www.investopedia.com/ask/answers/121714/what-are-differences-between-divergence-and-convergence.asp [accessed: 25th February 2019].

Roulston, K. (2001). Data analysis and 'theorizing as ideology'. Qualitative Research, 1(3), 279- 302.

Rouvinen, P. (ed.) (1996), Advantage Finland. The Future of Finnish Industries, ETLA-The Research Institute of the Finnish Economy, Helsinki.

Rowlands, B. H. (2005). Grounded in practice: Using interpretive research to build theory. The Electronic Journal of Business Research Methodology, 3(1), 81-92.

Roy, P. (2001). Business Clusters: Vital Strategy For Canadian Business In The Emerging Global Economy. The Competitiveness Institute, (1), pp.1-32.

RTE.ie, (2015). Irish economy seeing 'robust' recovery - OECD. [online] available at: http://www.rte.ie/news/business/2015/0915/727909-oecd-report-on-ireland/ [accessed: 29th December. 2015].

RTE.ie. (2009). 1,900 jobs lost at Dell in Limerick. [online] available at: http://www.rte.ie/news/2009/0108/112419-dell/ [accessed: 24th July 2016].

Rubin, H. J., and Rubin, I. S. (2005). Qualitative interviewing: The art of hearing data (2nd ed.). Thousand Oaks, CA: Sage.

Rudusa, I. (2010). The support policy for enterprise clusters in Latvia. Academic Journal, (3), pp.156-159.

Ruiz, P. (2019). Spain's Galicia region will once again grow more than the country as a whole in 2019. [online] Bbvaresearch.com. available at: https://www.bbvaresearch.com/wp-content/uploads/2018/12/PepRuiz_ElCorreoGallego_ENG.pdf [accessed: 6th December 2019].

Russell, C. (2019). Shannon 2.0 - 'Our Story is one of constant reinvention'. The Sunday Business Post, p.2.

S3platform.jrc.ec.europa.eu. (2019). Pohjois-Pohjanmaa title - Smart Specialisation Platform. [online] available at: https://s3platform.jrc.ec.europa.eu/regions/FI1D6/tags/FI1D6 [accessed: 5th December 2019].

Sachs, J. and Warner, A. (1995), 'Economic reform and the process of global integration,'Brookings Papers on Economic Activity, 1: 1–118.

Sadaria, P. (2014). Regional Development: Suggestions for a New Approach to Rural Development. [online] Slideshare.net. available at:

https://www.slideshare.net/parthsadaria/regional-development-suggestions-for-a-new-approach-to-rural-development [accessed: 24 June 2017].

Sadc.int, (2015). Southern African Development Community:: Regional Economic Integration Support Programme (REIS). [online] available at: http://www.sadc.int/sadc-secretariat/directorates/office-deputy-executive-secretary-regional-integration/trade-industry-finance-investment/regional-economic-integration-support-programme-reis/ [accessed: 16th December 2015].

Sakharov, A. (1968). Thoughts on progress, peaceful coexistence and intellectual freedom. New York Times, 22 June, available online at: http://users.physics.harvard.edu/~wilson/sakharovconference/76953998.pdf

Sakharov, A. (1980). A man of universal interests. Nature, 331(6158), (pp.671-672).

Sala-i-Martín, X. (1996). Regional cohesion. Evidence and theories of regional growth and convergence. European Economic Review 40, pp. 1325-1352.

Saldaña, J. (2016). The coding manual for qualitative researchers. 3rd ed. London: SAGE Publications Inc., pp.1-333.

Sale, J. and Brazil, K. (2004). A Strategy to Identify Critical Appraisal Criteria for Primary Mixed-Method Studies. Quality & Quantity, 38(4), pp.351-365.

Sandee, H. and ter Wengel, J. (2002) 'SME cluster development strategies in Indonesia', paper presented at JICA workshop on strengthening capacity of SME clusters in Indonesia, Jakarta, 5-6 March.

Sarantakos, S. (1994). Unmarried Cohabitation: Options, Limits and Possibilities. Australian Journal of Marriage and Family, 15(3), pp.148-160.

Sato, Y. (2005). Linkage formations by small firms: The case of a rural cluster in Indonesia. Bulletin of Indonesian Economic Studies, 36(1), 137–166.

Saunders, M., Lewis, P. and Thornhill, A. (2016). Research Methods For Business Students. Harlow: Pearson Education.

Saunders, M., Lewis, P., and Thornhill, A. (2009). Research methods for business students: Prentice Hall.

Saxenian, A (1990) 'Regional Networks and the Resurgence of Silicon Valley', California Management Review 33 (1) 89-113

Saxenian, A (1994) 'Lessons from Silicon Valley', Technology Review 97 (5) 42-52

Saxenian, A. (1994), Regional advantage: Culture and competition in Silicon Valley and Route 128, Cambridge, MA: Harvard University Press.

Scheib (2003). Role stress in the professional life of the school music teacher: A collective case study. Journal of Research in Music Education, 51,124-136.

Schmiedeberg, C. (2010). Evaluation of cluster policy: a methodological overview. evaluation, 16(4), 389-412

Schmitz, H. (1995a) 'Collective efficiency: Growth path for small-scale industry', Journal of Development Studies, 31, 529- 66.

Schumpeter J. A. (1965). Economic Theory and Entrepreneurial History. In: Aitken HG (ed) Explorations in enterprise. Harvard University Press, Cambridge, MA

Schumpeter JA (1934) The Theory of Economic Development. In: Casson M (ed) (1990) Entrepreneurship. Edward Elgar, Hants, pp 105–34

Scitovsky, T. (1954), 'Two concepts of external economies' Journal of Political Economy, 62: 143-151.

Scott, A.J. (2005). The shoe industry of Marikina City, Philippines: A developing-country cluster in crisis. Philippine Journal of Third World Studies, 20(2), 76–99.

Scott, A.J. (1998), Regions and the World Economy. The Coming Shape of Global Production, Competition, and Political Order, Oxford; Oxford University Press

Seas1.co.za, (2012). Segakweng Enterprise and Strategy Consulting. [online] available at: http://www.seas1.co.za/services.html [accessed: 6th December 2015].

Seidl, I., Schelske, O., Joshi, J., and Jenny, M. (2003). Entrepreneurship in biodiversity conservation and regional development. Entrepreneurship and Regional Development, 15(4), 333-350.

Sengenberger, W., and Pyke, F. (1992) 'Industrial Districts and Local Economic Regeneration Research and Policy Issues' in Industrial Districts and Local Economic Regeneration.

Sexton, D., and R. Smilor, Eds. (1986). The Art and Science in Entrepreneurship. Cambridge, MA: Ballinger.

Sexton, M. (2003). A supple approach to exposing and challenging assumptions and PhD path conference, (accessed June 2005), Lisbon, available from: http://www.research.scpm.salford.ac.uk/bf2003/sexton_keynote.pdf

Sfi.ie. (2016). SFI - Science Foundation Ireland. [online] available at: http://www.sfi.ie/ [accessed: 7th September 2016].

Sfi.ie. (2017). SFI. [online] available at: http://www.sfi.ie/about/ [accessed: 29th June 2017].

Shane, S. (2003). A General Theory of Entrepreneurship: The Individual-Opportunity Nexus. Cheltenham: Edward Elgar.

Shane, S. (2012). “Reflections on the 2010 Amr Decade Award: Delivering on the Promise of Entrepreneurship as a Field of Research.” Academy of Management Review 37 (1): 10–20.

Shannon Airport. (2019). History of Shannon Airport. [online] available at: https://www.shannonairport.ie/corporate/about/history/ [accessed: 12th December 2019].

Shannon Development, (2014). Shannon Commercial Properties - Shannon Commercial Properties. [online] available at: http://www.shannondevelopment.ie/ [accessed: 4th January 2016].

Shannon Group. (2017). Shannon Group - Shannon Group. [online] available at: http://www.shannongroup.ie/ [accessed: 17th January 2017].

Shannon, L. (2016). Local and Regional Bodies in Ireland 2012-2016. Local Government Research Series. 12. Dublin: IPA, pp.1-27.

Share, B. (1992), Shannon Departures - A Study in Regional Initiatives. Dublin. Gill and MacMillan Ltd.

Shashkevich, A. (2020). The power of language: How words shape people, culture. [online] Stanford News. available at: https://news.stanford.edu/2019/08/22/the-power-of-language-how-words-shape-people-culture/ [accessed: 20th February 2020].

Sidc.ie, (2015). Shannon International Development Consultants. [online] available at: http://www.sidc.ie/index.html [accessed: 16th December 2015].

Sidc.ie. (2017). Ireland and the Shannon Experience | Shannon International Development Consultants. [online] available at: http://www.sidc.ie/about-us/ireland-and-the-shannon-experience [accessed: 24th July 2017].

Simmie, J. and Sennett, J. (2001), 'Innovation in the London metropolitan region', Working Paper 182, Oxford Brookes School of Planning.

Singh, J. (2005), 'Collaborative Networks as Determinants of Knowledge Diffusion Patterns', Management Science, 51 (5):756-770.

Sivitanidou, R. (1999). The location of knowledge-based activities: the case of computer software, in: Fischer, M. M., Suarez-Villa, L. and Steiner, M. (eds.), Innovation, networks and localities, Springer, Berlin, 109-154.

Skillnets.ie, (2014). About Skillnets | Skillnets. [online] available at: http://www.skillnets.ie/about-skillnets [accessed: 9th December 2015].

Skokan K. (2005). Financing cluster initiatives, MPRA Paper No. 12373.

Sleuwaegen, L. and Boiardi, P. (2012). Creative pillars of an innovative region - Leo Sleuwaegen and Priscil…. [online] Slideshare.net. available at: http://www.slideshare.net/researchvlerick/creative-pillars-of-an-innovative-region-leo-sleuwaegen-and-priscilla-boiardi [accessed: 25th February 2016].

Smallbone, D., Landström, H. and Jones-Evans, D. (2009). Entrepreneurship and growth in local, regional and national economies. 1st ed. Cheltenham, UK: Edward Elgar.

Smilor, R.W. (1986) Building Indigenous Companies: The Technology Venturing Approach, in Entrepreneurship, Intrapreneurship and Venture Capital ed. R.D. Hisrich.

Smircich, L. (1983). Concepts of culture and organisational analysis, Administrative Science Quarterly, Vol. 28, pp. 339-58 [accessed: 20th December 2015].

Smith-Peter, Susan (2018) Imagining Russian Regions: Subnational Identity and Civil Society in Nineteenth-Century Russia. Leiden: Brill, 2017.

Socialentrepreneurs.ie, (2016). SEI. [online] available at: http://socialentrepreneurs.ie/ [accessed: 3rd March 2016].

Sokoloff, K. and Engerman, S. (2000). History Lessons: Institutions, Factor Endowments, and Paths of Development in the New World. Journal of Economic Perspectives, 14(3), pp.217-232.

SOLAS.ie, (2016). Solas. [online] available at: http://www1.solas.ie/Pages/HomePage.aspx [accessed: 3rd March 2016].

Solow, R.M. (1956): A contribution to the theory of economic growth. Quarterly Journal of

Sölvell, Lindqvist, and Ketels, (2003) The Cluster Initiative Greenbook, report presented at the TCI 6th Global Conference: Innovative Clusters – A New Challenge, 17-19 September, Gothenburg, Sweden.

Sölvell, Ö. (2008), Clusters, Balancing Evolutionary and Constructive Forces, Ivory Tower Publishers, Stockholm, ISBN 978-91-974783-3-5.

Sölvell, O. (2009). Clusters. Stockholm: Ivory Tower.

Sölvell, Ö. and Protsiv, S. (2008), Cluster strengths and regional innovation, Stockholm: Stockholm School of Economics.

Sölvell, Ö., Lindqvist, G. and Ketels, C. (2003), The Cluster Initiative Greenbook, Stockholm: Ivory Tower AB.

Sorensen, P.B. – Whitta-Jacobsen, H.J. (2005): Introducing Advanced Macroeconomics: Growth and Business Cycles. University of Copenhagen, Copenhagen.

Soukiazis, E. and Cravo, T. (2008). Human Capital and the Convergence Process Among Countries. Review of Development Economics, 12(1), pp.124-142.

Southern Regional Assembly (2020). Regional Spatial & Economic Strategy for the Southern Region. Southern Regional Assembly. [online] Cork: Southern Regional Assembly, pp.1-382. available at: https://www.southernassembly.ie/uploads/general-files/Southern%20Regional%20Assembly%20RSES%202020%20FINAL%20Low%20Res.pdf [accessed: 3rd March 2020].

Southernassembly.ie, (2016). Southern Regional Assembly. [online] available at: http://www.southernassembly.ie/ [accessed: 3rd March 2016].

Spanish Ministry for Territorial Policy and Public Administration (2011), Report on collaboration agreements between autonomous communities signed during 2010.

Spencer, G., Vinodrai, T., Gertler, M. and Wolfe, D. (2009). Do Clusters Make a Difference? Defining and Assessing their Economic Performance. Regional Studies, 44(6), pp.697-715.

Spigel, B., and Harrison, R. (2018). Toward a process theory of entrepreneurial ecosystems. Strategic Entrepreneurship Journal, 12(1), 151-168.

Spilling, O.R. (1987) Cultural and Regional Development. Paper presented at the European Council Seminar, Sunne, Sweden.

Spilling, O.R. (1991) Entrepreneurship in a Cultural Perspective, Entrepreneurship and Regional Development, 3.

Spilling, O.R. and van der Ros, J. (1988) Culture and regional development. Ostland Research, Lillehammer.

Stake, R. E. (1995). The art of case study research. Thousand Oaks, CA: Sage.

Stathopoulou, S., Psaltopoulos, D., and Skuras, D. (2004). Rural entrepreneurship in Europe: a research framework and agenda. International Journal of Entrepreneurial Behaviour & Research, 10(6), 404-425.

Statistics Solutions. (2016). Conduct and Interpret a Cluster Analysis - Statistics Solutions. [online] available at: http://www.statisticssolutions.com/cluster-analysis-2/ [accessed: 22nd September 2016].

Steiner, M. (Ed.) (1997): Competence clusters. Workshop report. Graz and A1-Ring Austria, November 21-22, 1996. Leykam, Graz.

Stenberg, L. and Strandell, A-C. (1997), 'An overview of cluster-related studies and policies in Sweden,' paper presented at the OECD-workshop on cluster analysis and cluster based policy, Amsterdam, 10-11 October.

Stern, S. (2014). Clusters Mapping and Regional Economic Policy: Emerging Insights.

Sternad, D., Kennelly, J. and Bradley, F. (2016). Digging deeper: How Purpose-Driven Enterprises Create Real Value. 1st ed. Saltaire UK: Greenleaf Publishing, pp.1-271.

Sternberg, R. and Litzenberger, T. (2004). Regional clusters in Germany--their geography and their relevance for entrepreneurial activities. European Planning Studies, 12(6), pp.767-791.

Stevens Institute of Technology. (2016). Technology Clusters. [online] available at: https://www.stevens.edu/search/google/technology%20clusters [accessed: 22nd September 2016].

Stimson, R. J., Stough, R. R. and Roberts, B. H. (2002), Regional Economic Development: Analysis and Planning Strategy, Revised Edition, Springer: Berlin.

Stimson, R., Stough, R. and Roberts, B. (2006). Regional economic development. 1st ed. Berlin: Springer.

Stockdale, A. (2006). Migration: Pre-requisite for rural economic regeneration? Journal of rural studies, 22(3), 354-366.

Stoerring, D. (2007). Emergence and Growth of High Technology Clusters. PhD. Aalborg University.

Stoerring, D. and Christensen, J. L. (2008). Clusterpreneurs – promoting hightech clusters in low-tech regions. Working Paper Series, Aalborg University, Denmark. Last accessed 28 March, 2017, from http://www2.business.aau.dk/digitalAssets/52/52593_31.pdf

Stohr, W. (1986). 'Regional Innovation Complexes' in Papers of Regional Science Association, Regional Science Association, London.

Storey, D. J., and Johnson, S. (1987). Are small firms the answer to unemployment? : Employment Institute.

Storper, M. (1995), 'The Resurgence of Regional Economies, 10 Years Later', European Urban and Regional Studies, 2.3.

Strauss, A. L., and Corbin, J. M. (1990). Basics of qualitative research: grounded theory procedures and techniques. Thousand Oaks, CA: Sage.

Strauss, A. L., and Corbin, J. M. (1998). Basics of qualitative research: Grounded theory procedures and techniques (2nd ed.). Thousand Oaks, CA: Sage.

Strauss, A. L. and Corbett, K. (1998). Cross-gendered identifications and homosexual boyhood: Toward a more complex theory of gender. The American journal of orthopsychiatry. 68. 352-60. 10.1037/h0080344.

Streit, M. E. (1969). Spatial associations and economic linkages between industries. In: *Journal of Regional Science*, vol. 9, no. 2, pp. 177-188.

Structuralfunds.fi. (2019). Development priorities for North Ostrobothnia 2014–2020. [online] available at: https://www.rakennerahastot.fi/web/en/north-ostrobothnia [accessed: 5th December 2019].

Suárez-Villa, L. and Cuadrado-Roura, J.R. (1993). Thirty years of Spanish regional change: inter-regional dynamics and sectoral transformation. International Regional Science Review 15, pp. 121-56.

Swann, G. M. P. (1998) Towards a model of clustering in high technology industries, in: Swann, G.M.P., Prevezer, M. and Stout, D. (eds.), 1998, The dynamics of industrial clustering: international comparisons in computing and biotechnology, Oxford: Oxford University Press.

Swann, G. M. P., and Prevezer, M. (1996) A comparison of the dynamics of industrial clustering in computing and biotechnology, Research Policy 25, 1139-1157.

Swann, P., (1998), "Clusters in the US Computing Industry," in Swann, P., M. Prevezer and D. Stout (eds.), 1998, The Dynamics of Industrial Clustering: International Comparisons in Computing and Biotechnology, Oxford: Oxford University Press, pp. 76-105.

Sweeney, S. H. and Feser, E. J. (1997), 'Plant Size and Clustering of Manufacturing Activity, University of North Carolina,' Geographical Analysis, 30 (1), 45-64.

Sweeny, G. (1987) The Entrepreneurial Firm as a Learning System in the Information Economy, The Information Society.

Sweeny, G. (1990) Indigenous Development Strategies in Peripheral Regions: The Example of Ireland, in Innovation and Regional Development ed. H. Ewers and J. Allesch.

SWRA, (2009). Cluster Benchmarking Report. ATClusters Project. Atlantic Area: INTERREG IVB, pp.1-86.

Tallman, S. and Phene, A. (2007), 'Leveraging knowledge across geographic boundaries, Organization Science 18:, 252–260.

Tarpley, B. (2015). "Incubator-Induced Business Clusters: A Case Study", Honors College Theses. Paper 150. [online] available at: http://digitalcommons.pace.edu/honorscollege_theses/150. [accessed: 28th July 2016].

Taylor, C. (2015). Ireland's economic recovery: are you feeling it?. [online] The Irish Times. available at: http://www.irishtimes.com/business/economy/ireland-s-economic-recovery-are-you-feeling-it-1.2188061 [accessed: 29th December. 2015].

Taylor, C. (2018). IDA to fund new cybersecurity cluster to put Ireland on global map. [online] The Irish Times. available at: https://www.irishtimes.com/business/technology/ida-to-fund-new-cybersecurity-cluster-to-put-ireland-on-global-map-1.3728777 [accessed: 24th April 2019].

Taylor, J. (2006). What makes a region entrepreneurial? 1st ed. [ebook] Cleveland: Center for Economic Development, pp.1-23. available at: http://cua6.urban.csuohio.edu/publications/center/center_for_economic_development/entrep_region0906.pdf [accessed: 19th December 2015].

Telesis Consultancy Group (1982) A Review of Industrial Policy Report No 64, Dublin National Economic and Social Council.

Ter Wal, A. and Boschma, R. (2009). Applying Social Network Analysis in Economic Geography: Framing Some Key Analytic Issues. Annals of Regional Science, 43: 739-756.

The Industrial Policy Review Group.(1992). A Time for Change: Industrial Policy for the 1990s, (known as "The Culliton Report"), Dublin: Stationery Office.

The Irish Times (2012) A cluster of great people in one location is key to the next Google. [online] available at:

http://www.irishtimes.com/newspaper/finance/2012/1022/1224325540868.html [accessed: 28th November 2015].

The Irish Times, (2015). A strong but uneven economic recovery in Ireland. [online] available at: http://www.irishtimes.com/opinion/editorial/a-strong-but-uneven-economic-recovery-in-ireland-1.2335247 [accessed: 29th December. 2015].

This is Oulu. (2019). Oulu Capital of Northern Scandinavia, pp.1-76.

Thomas A.S. and Mueller S.L. (2000), A Case for Comparative Entrepreneurship: Assessing the Relevance of Culture. J Int Bus Stud Second Quarter 31(2), 287–299

Thurik, R. (2003). Entrepreneurship and unemployment in the UK. Scottish Journal of Political Economy, 50(3), 264-290.

Tiernan, S.D. (1995) From bureaucratic to network organisations: Organisational Changes and the Outcomes at Team Aer Lingus, Ph.D Thesis, University of Limerick.

Todeva, E. (2006). In pursuit of a long-term research agenda.

Todeva, E. (2011). Cluster and Network Research. [online] University of Surrey. available at: http://www.surrey.ac.uk/sbs/sar/centres/bcned/databank/map/index.htm [accessed: 17th August 2016].

Tödtling, F., Pike, A., Rodriguez-Pose, A., and Tomaney, J. (2011). Endogenous approaches to local and regional development policy. In A. Pike, A. Rodriguez-Pose & J. Tomaney (Eds.), Handbook of local and regional development (pp. 333-344). Abingdon: Routledge.

Tönnies, F. (1957). Community and society (C. P. Loomis, Trans.). New York: Harper &

Triplehelix.stanford.edu, (2011). The Triple Helix concept | Triple Helix Research Group. [online] available at: http://triplehelix.stanford.edu/3helix_concept [accessed: 2nd January. 2016].

Trochim, W. M., and Donnelly, J. P. (2008). Research methods knowledge base (3rd Ed ed.). Mason, OH: Atomic Dog/Cengage Learning.

Tsionas. E. G. (2000). Regional growth and convergence: evidence from the United States. – Regional Studies. 34: 231–238.

Udaras.ie, (2016). Údarás na Gaeltachta. [online] available at: http://www.udaras.ie/ [accessed: 3rd March 2016].

URENIO Watch, (2005). Selected Projects. [online] available at: http://www.urenio.org/projects/ [accessed: 5th January 2016].

Vaillant, Y., and Lafuente, E. (2007). Do different institutional frameworks condition the influence of local fear of failure and entrepreneurial examples over entrepreneurial activity? Entrepreneurship and Regional Development, 19(4), 313-337.

Valdenebro, P., Fernández, D. and Renders, A. (2020). TCI Network Webinar: How to support strong clusters with a well-built cluster strategy and policy. [online] Clustercollaboration.eu. available at: https://www.clustercollaboration.eu/event-calendar/tci-network-webinar-how-support-strong-clusters-well-built [accessed: 26th Februrary 2020].

van de Ven, A. H. (1976). On the Nature, Formation, and Maintenance of Relations.

Van den Berg, L., Braun, E. and van Winden, W. (2001), 'Growth Clusters in European Cities: An Integral Approach,' Urban Studies, 38 (1): 186-206.

van der Bijl, D. (2007). Exloring successful regional innovation systems in Europe. Netherlands: The Technopolicy Network, pp.1-63.

Van Dijk, M. P., and Sverrisson, A. (2003) 'Enterprise clusters in developing countries: Mechanisms of transition and stagnation', Entrepreneurship and Regional Development, 15: 183–206.

Van Dijk, M.P. and Rabellotti, R. (1997) Enterprise Clusters and Networks in Developing Countries. London: Frank Cass.

van Egeraat, C., and Doyle, E. (2018). Rethinking Irish cluster policy. Administration, 66(1), 107-128 http://doras.dcu.ie/20622/1/EnterpriseChapter.pdf

van Egeraat, C., Morgenroth, E., Kroes, R., Curran, D. and Gleeson, J. (2015), 'A Measure for identifying substantial geographic Concentrations,' MPRA Paper 65954, University Library of Munich, Germany.

van Stel, A., and Suddle, K. (2008). The impact of new firm formation on regional development in the Netherlands. Small Business Economics, 30(1), 31-47.

Venables, A.J. (1996), 'Equilibrium Locations of Vertically Linked Industries,' International Economic Review, 37 (2): 341-360.

Villaverde, J. (1999). Regional differences in Spain and the European Monetary Union. Madrid: Pyramid.

Vines, M. (2009). SHANNON - THE 51ST STATE | AvBuyer. [online] Avbuyer.com. available at: https://www.avbuyer.com/articles/business-aviation-interviews-case-studies/shannon-the-51st-state-20368 [accessed: 24th July 2017].

Visan, G. (2011). Accumulation of economic disparities: divergences and convergences. [online] Civitas Politics. available at: http://civitaspolitics.org/2011/03/17/acumularea-decalajelor-economice-divergente-si-convergente/ [accessed: 6th January 2016].

Vlasceanu C., Vorovenci I. (2012) The Role of Clusters and Cluster Development Tools in the European Union in Regional Economic Development, in the context of post-crisis economy and globalisation. Studies in Business Economics Vol 91/9114.

Vom Hofe, R. and Chen, K. (2006) "Whither Or Not Industrial Cluster: Conclusions Or Confusions?", Industrial Geographer, vol. 4, no. 1, pp. 2-28.

Von Hippel, E. (1988), Sources of Innovation, New York: Oxford University Press.

Vuori, S. (1997), 'Technology Sources and Competitiveness - An analysis of Finnish industries,' The Research Institute of the Finnish Economy ETLA, Helsinki.

Walker, R., and Greenstreet, D. (1990). "The Effect of Government Incentives and Assistance on Location and Job Growth in Manufacturing." Regional Studies 25(1): 13-30.

Walshok, M. (2009). It's Time for Feds to Promote Cluster Initiatives. San Diego Business

Wdc.ie, (2016). Western Development Commission | Donegal, Sligo, Leitrim, Galway, Mayo, Roscommon and Clare. [online] available at: http://www.wdc.ie/ [accessed: 5th January 2016].

Weawer, B. (2007) 'Research proposal: industry convergence: driving forces, factors and consequences', Nordic Academy of Management Conference, pp.1–20, Bergen, Norway.

Weber, A. (2019). Alfred Weber's Theory Of The Location Of Industries. Forgotten Books.

Weiss, J.W. (1988) Regional Cultures, Managerial Behaviour, and Entrepreneurship. An International Perspective. New York: Quorum Books.

Wenger, E. (2004). Communities of practice and social learning systems: The career of a concept. In C. Blackmore (Ed.), Social Learning Systems and Communities of Practice (pp. 179–198). London: Springer. doi:10.1007/978-1-84996-133-2.

Westlund, H., and Bolton, R. (2003). Local social capital and entrepreneurship. Small Business Economics, 21(2), 77-113.

Whitaker, TK. (1955) “Capital Formation, Saving and Economic Progress.” Journal of the Statistical and Social Inquiry Society of Ireland 19: pp.184-210

Whitaker, TK. (1986). Economic Development, 1958-1985 in KA Kennedy ed. Ireland in Transition: Economic and Social Change Since 1960. Dublin: Mercier Press: pp.10- 19

Whittington, K. B., Owen-Smith, J. and Powell, W. W. (2009). ‘Networks, propinquity and innovation in knowledge-intensive industries.’ Administrative Science Quarterly, 54: 90–122.

Wicks, D. (2017). The Coding Manual for Qualitative Researchers (3rd edition) The Coding Manual for Qualitative Researchers (3rd edition) Johnny Saldaña Sage 2015 ISBN-13: 978-1473902497. Qualitative Research in Organizations and Management: An International Journal, 12(2), pp.169-170.

Williamson, J.G. (1965) Regional inequality and the process of national development: A description of the patterns. Economic and Cultural Change 13: pp. 1–84.

WineFrog.com. (2019). What is Region of Origin? - Definition from WineFrog. [online] available at: https://www.winefrog.com/definition/1801/region-of-origin [accessed: 26th March 2019].

Winston, K. (2019). Convergence Theory: Definition & Examples - Video & Lesson Transcript | Study.com. [online] Study.com. available at: https://study.com/academy/lesson/convergence-theory-definition-examples-lesson.html [accessed: 14th January 2019].

Wired65, (2009). Why Do Regions Matter? [online] available at: https://wired65.wordpress.com/2009/10/28/why-do-regions-matter/ [accessed: 10th December 2015].

Wolcott, H. (2009). Writing up qualitative research. 3rd ed. Newbury Park, Calif.: Sage Publications.

Wolfe, D. (2009), 'Introduction: Embedded Clusters in the Global Economy,' European Planning Studies, 17 (2): 179-187.

Wolman, H. and Hincapie, D. (2014). Clusters and Cluster-Based Development Policy. Economic Development Quarterly, 29(2), pp.135-149.

Wolman, H. and Hincapie, D. (2015), 'Clusters and Cluster-Based Development Policy.' Economic Development Quarterly, 29 (2): 135-149.

World Bank (2009), 'Clusters for Competitiveness: A Practical Guide and Policy Implications for Developing Cluster Initiatives.' International Trade Department, The World Bank.

Wortman, M. S. (1990). Rural entrepreneurship research: An integration into the entrepreneurship field. Agribusiness, 6(4), 329-345.

Wynn, M.L. (1989) Blueprint 2000: An Action Plan for the Future of Wichita / Sedgwick County. Economic Development Review, Autumn.

Xunta de Galicia (2015). Smart Specialisation Strategy in Galicia. Santiago de Compostela: Xunta de Galicia, pp.1-168.

Yin, R. K. (2003). Case study research: Design and methods (3rd ed.). Thousand Oaks., CA: Sage.

Yin, R. K. (2009). Case Study Research: Design and Methods (4th ed.). Thousand Oaks, CA: Sage Publications.

Yin, R.K. (1989) Case Study Research: Design and Methods. Sage, Beverly Hills: CA.

Yin, R.K. (2008) Case Study Research: Design and Methods: (5th ed.). (Applied Social Research Methods). Sage, UK.

Young, R. C., and Francis, J.D. (1989). "Who Helps Small Manufacturing Firms Get Started?" Rural Development Perspectives 6(1): 21-25.

Bibliography

Griffin, J. (1996). *An Examination of Entrepreneurship in the Arts and their Role in Local Development*. Master of Business Studies. University of Limerick, pp.1-193.

Kotey, B. (2006). Entrepreneurship and Regional Development: A Theoretical Framework. *Small Enterprise Research*, 14(2), pp.20-45.

Müller, S. (2013). *Entrepreneruship and regional development: On the interplay between agency and context*. Ph.D. Aarhus University.

Appendices

Appendix A – Oakey's (2007) Extended Approach to the Typology of Clusters

New Industry Clusters (Unassisted):	These can be described as neutral clusters, for instance, Air transport, which develops rapidly from being a small identity on and around airport locations. This is developing spontaneously as it is a necessity for the daily operations of airports.
New Industry Clusters (Assisted):	This is related to bioscience, a technology of the future which is the foundation for a number of new cluster developments. Biosciences offer a lot of perspective in the medium to long term but the heavy investment is needed in areas like infrastructure. There is much forceful involvement required due to it being such a long process.
Mature Industry Cluster:	In the North West of the UK, production is specifically focussed in a few areas within a region which mean when jobs are lost, it hits local areas most severe. This also means that the cluster is more functional than geographically connected.
Rationalising:	This is the focus on specific niche products in a particular sector to improve the cluster and companies' output. The problem here is that some areas of businesses need to be withdrawn to let others flourish.

Source: Adapted from Literature Review by Author

Appendix B: National and International Regional Public Programmes and Associations

National Regional Public Programmes and Associations

Limerick City and County Council:

- Innovate Limerick
- Cluster Initiatives – Cluster Conference
- MWASP Strategy and Integrating Limerick
- Local Agenda 21 Environmental Partnership Fund and Tourism, Diaspora Grants

Dublin City and County Council

- Community and Social Development
- Lets Walk and Talk and Age Friendly City Project
- Dublin City Public Participation Network (PNN)
- Community Grants and National Plan Day
- Dublin City Local Community Development Committee (LCDC)
- Children's Services Unit and Play & Youth Recreation

Local Enterprise Offices (LEO's)

- Secondary Schools' Entrepreneurs' Business Bootcamp
- Local Enterprise Village
- €5 million Community Enterprise Initiatives Fund
- Competitive Fund for LEO's
- Ireland's Best Young Entrepreneur (IBYE)
- National Enterprise Awards and Enterprise Education
- National Women's Enterprise Day
- Region Enterprise Start Workshops and Regional Growth Fund

Shannon Development - Shannon International Development Consultants (SIDC)

- Enterprise in the Shannon Region
- Aerospace augmentation
- Ireland's Shannon Free Zone
- Free Zone and Special Economic Zone Development
- Industrial and Business Park Development
- Foreign Direct Investment/ Investment Promotion
- SME Development
- Regional, Rural and Tourism Development and Planning

LEADER and DAFM (Department of Agriculture, Food and the Marine)

- Ireland's Rural Development Programme 2014-2020
- Promote rural resources to improve the region
- Diversification into non-agricultural activities
- Support for the creation and development of micro-enterprises
- Encouragement of tourism activities and Basic services for the rural economy and population

- Village renewal and development and Upgrading of Rural Heritage
- Training and Skills

DJEI (Department of Jobs, Enterprise and Innovation)

- Action Plan for Jobs
- Regional and Economic Reports
- National and Regional Spatial Strategies

DECLG (*Department of the Environment, Community and Local Government*

- Putting People First

Regional Development Centre, Dundalk Institute of Technology (DKIT)

- Research & Development and Technology Transfer
- Entrepreneurial Development Programmes
- Incubation Facilities for Knowledge and Technology-Based Enterprises
- Applied Research
- Sectoral & Regional Development Initiatives
- Spearheading and Supporting EU and Cross-Border Development Initiatives
- Networking with Agencies and Organisations at Regional, National and International Level

Regional Development Partners Ireland (RDP)

- National, Regional and Local Economic Development
- Industrial Development and Foreign Investment
- Export Processing and Duty Free Zones
- Enterprise, SME Development and Innovation
- Business and Investment
- Sustainable local and regional enterprise
- Rural and Urban Regeneration
- Organisational planning, change development for economic progress
- Tourism and Heritage planning and development
- Curriculum Development and Validation

(Source: Putting People First, 2012; Sidc.ie, 2015; Regional Development Centre, 2015; Ireland's Rural Development Programme 2014-2020, 2014; Regionaldevelopmentpartners.ie, 2015; Nrn.ie, 2015; Action Plan for Jobs: Mid-West Region 2015 - 2017, 2015; Mid-West Area Strategic Plan 2012-2030, 2012; Morris, 2010; Limerick.ie, 2015; DublinCity.ie, 2016; LocalEnterprise.ie, 2016).

International Regional Public Programmes and Associations

European Union (EU) Commission

- EU Structural Funds
- European Regional Development Fund
- Creating jobs and growth
- Investing in people
- Supporting enterprises
- Strengthening research and innovation
- Improving the environment
- Modernising transport

The OECD (Organisation for Economic Co-Operation and Development) and LEED Programme (Local Economic and Employment Development)

- Education
- Employment
- Environment
- R&D and Innovation
- Skills
- Social Inclusion
- Transport
- Tourism
- Youth

Spark Programme – China

- Technical projects that use rural resources, provide small amounts of investment
- Supports areas that have quick benefits and advanced and appropriate in technology
- Train rural technicians, managerial talents and farmer entrepreneurs
- Promote existing resources

PSRC (Puget Sound Regional Council) Economic Development

- Washington Aerospace Manufacturing Community
- WA Aerospace and Defence Partnership
- Smart Buildings
- International Benchmarking
- Cultural Access Fund
- Performance First
- WA Global Health Alliance

Donor Committee for Enterprise Development (DCED)

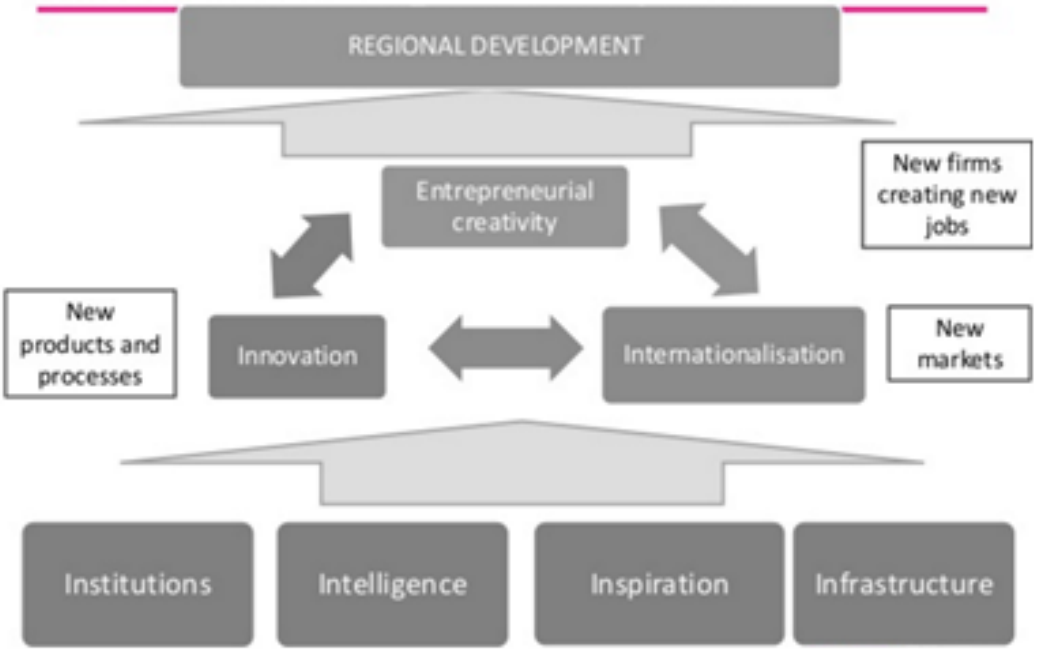
- Cluster promotion
- Empirical research

REIS (Regional Economic Integration Support Programme – South Africa)

- Support *economic growth* - in order to attract both *regional* and Foreign Direct Investment (FDI)

(Source: Psrc.org, 2015; Das and Heinrich, 2015, Ec.europa.eu, 2015; Ie.china-embassy.org, 2015; OECD.org, 2015; Sadc.int, 2015).

Appendix C: A Model of Creative Regional Development



(Sleuwaegen and Boiardi, 2012)

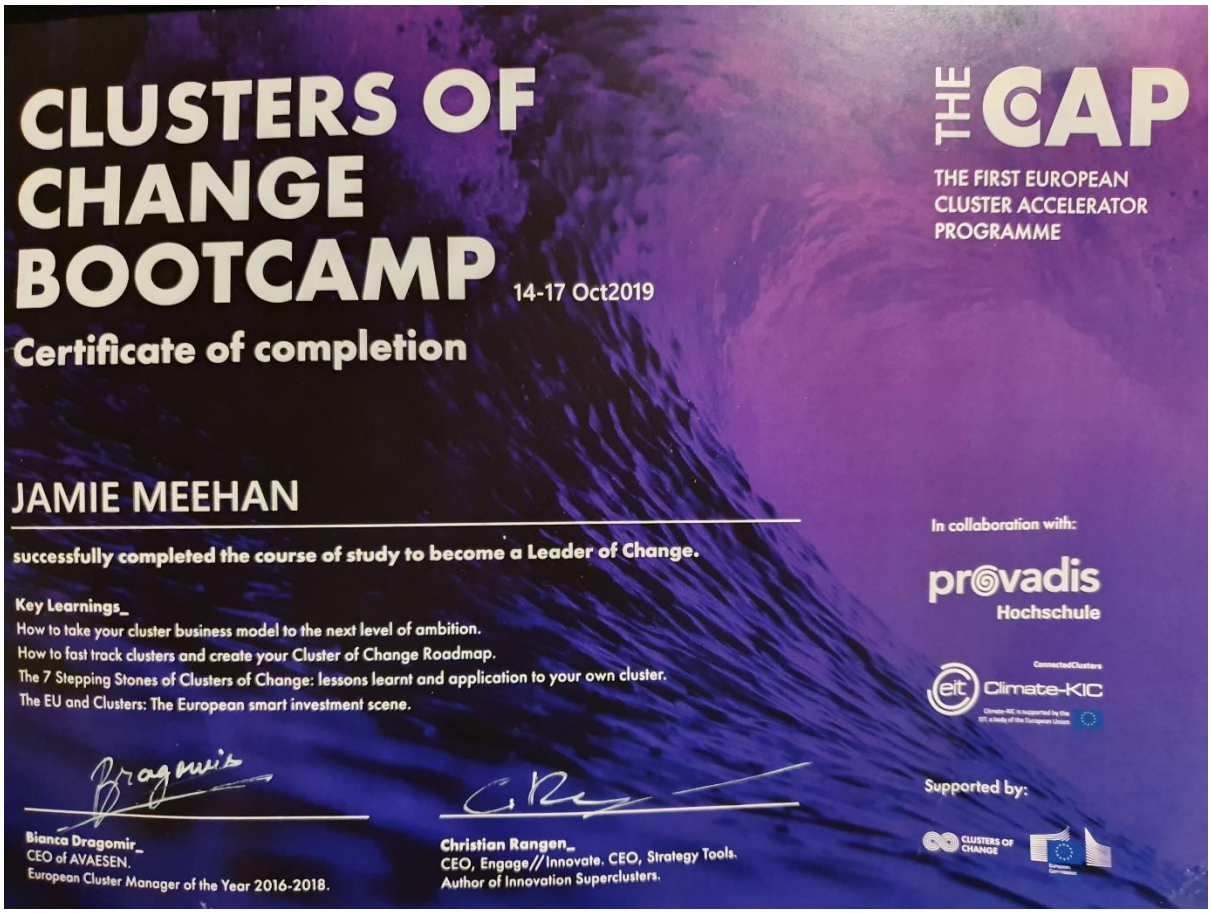
Appendix D: Ireland's Regional Framework

Ireland

Population and territory	• 4.3 million inhabitants (2007), 93 028 km^2.
Administrative structure	• Unitary country. • Two-tiered sub-national system: ❖ TL2: 2 Groups of Regional Authority Regions. ❖ TL3: 8 *Regional Authority* Regions, among which one predominantly urban region (Dublin, 28% of total population, –0.8 pp over the past two decades) and 7 predominantly rural regions (72%, +0.8pp). Dublin has a unique status as a regional authority, a county council and a city. ❖ 114 local governments or councils, further subdivided into two sub-levels (29 county councils and 5 city councils at the upper level; 80 town authorities at the lower level, including 75 town councils and 5 borough councils).
Share of sub-national government in total spending/revenues	• Spending: 16.7% (2009). • Revenues: 10.4% (2009).
Concentration and inequalities	• Economic concentration in Ireland among its TL3 regions resembles the OECD average according to the index of geographic concentration. Although concentration in GDP has increased over the past decade, the increase was lower than the average increase in 27 OECD countries. • Inequality in GDP per capita among Ireland's two TL2 regions has increased from 1980 to 2007. With the exception of the period 2002-03, inequality has been steadily increasing over the 27-year period. • The increase in inequality in Ireland is driven by a gain of its leading region Southern and Eastern (*e.g.* the region with above average GDP per capita levels) and a decline of its lagging region Border Midlands and Western (*e.g.* the region with below average GDP per capita levels) with respect to the national average over the period 1980-2007. Southern and Eastern increased its 1980 GDP per capita value from 6% over the national value to 11% in 2007, and Border Midlands and Western decreased its 1980 GDP per capita from 17% below the national average to 31% below the average in 2007. • Despite the increasing gap between Ireland's two TL2 regions, both regions recorded buoyant growth rates and rank among the fastest growing OECD TL2 regions during the period 1995-2005, with annual average GDP per capita growth rates of 6.2% in Border Midlands and Western and 6.8% in Southern and Eastern. Due to Southern and Eastern's larger economy (in GDP share), it has contributed to the bulk (81.3%) of Ireland's overall GDP growth during the past decade, while the remainder is attributed to Border Midlands and Western.
Key challenges	• Persisting regional disparities and urban-rural disparities.
Objectives of regional policy	• Ensure that designated gateway regions maximise their potential for socio-economic development. • Achieve a better balance between regions. • Foster enhanced co-ordination in the development of gateways and their regions (in terms of polycentric territorial structure).
Legal/institutional framework for regional policy[1]	• National Development Plan (NDP). • National Spatial Strategy (NSS).
Urban policy framework	–
Rural policy framework[2]	–
Major regional policy tools	• Gateway Innovation Fund (currently suspended).
Policy co-ordination at central level	• Inter-departmental committee regarding NSS. • NDP by the Department of Finance. • NSS by the Department for Environment, Heritage and Local Government.
Multi-level governance between national and sub-national levels	–
Policy co-ordination at regional level (cross-sectoral)	–
Policy co-ordination at regional level (geographic)	–
Evaluation and monitoring	• Annual reporting on NDP to Parliament.
Future orientations of regional policy	• Merger of regional agencies, reduction of local authorities.

(OECD, 2011)

Appendix E: Cluster Acceleration Bootcamp Certification



Appendix F: Participant Interview Consent Form

Researcher's Name	Please use block capitals Mr. JAMIE MEEHAN
Academic Unit	Please indicate School/College/Centre etc. School of Marketing
Title of Study	How Does Convergence Influence Cluster-Based Economic Growth in Regions?

The following section should be completed by the research participant

	Yes	No
Have you been fully informed of the nature of this study by the researcher? (Note that this would typically include use of a participant information sheet.)	☐	☐
Have you had an opportunity to ask questions about this research?	☐	☐
Have you received satisfactory answers to all your questions?	☐	☐
Have you received sufficient information about the potential health and/or safety implications of this research?	☐	☐
Have you been fully informed of your ability to withdraw participation and/or data from the research?	☐	☐
Have you been fully informed of what will happen to data generated by your participation in the study and how it will be kept safe?	☐	☐
Do you agree to take part in this study, the results of which may be disseminated in scientific publications, books or conference proceedings?	☐	☐
Have you been informed that this consent form shall be kept securely and in confidence by the researcher?	☐	☐
I agree for this interview to be tape-recorded. I understand that the audio recording made of this interview will be used only for analysis and that extracts from the interview, from which I would not be personally identified, may be used in any conference presentation, report or journal article developed as a	☐	☐

result of the research. I understand that no other use will be made of the recording without my written permission, and that no one outside the research team will be allowed access to the original recording.		
I agree that my anonymised data will be kept for future research purposes such as publications related to this study after the completion of the study.	☐	☐
I agree to take part in this interview.	☐	☐

Name of Participant	Please use block capitals		
Signature of Participant		**Date**	
Signature of Researcher		**Date**	

DESCRIPTION: You are invited to participate in a doctoral research study on 'How Does Convergence Influence Cluster-Based Economic Growth in Regions'. From the information collected in this study, the researcher aims to explore the presence of convergence in economies and across economies.

PROCEDURES: With your permission, we would like to collect information about your professional experiences to date and work that can influence the aim of this research study. This research will be transcribed by the researcher only.

RISKS AND BENEFITS: Your responses will be kept confidential. The investigator will guard against such a risk of any breach in confidentiality by removing identifying information from the data collected and keeping all information in locked storage and password-protected computers.

TIME INVOLVEMENT: Your participation in this study will require approximately one hour as the interview will take about 30-60 minutes. Withdrawal from this research is open until the submission.

PAYMENTS: You will not be paid to participate in this study.

PARTICIPANT'S RIGHTS: Your decision whether or not to participate in this study will not affect your statutory status. If you have read this form and have decided to participate in this project, please understand your participation is voluntary and you have the right to withdraw your consent or discontinue participation at any time without penalty or loss of benefits to which you are otherwise entitled.

WITHDRAWAL: You can withdraw from this research study at any point up until the submission just please inform the researcher who is carrying out this study and your participation will be withdrawn with immediate effect. Participants have the right to withdraw from (i.e., discontinue participation in) this research at any time and if a participant decides to withdraw from all components of this research study, the researcher must

discontinue involving that participant's contribution. A record of the data collected from each participant will be kept in a word file to identify to whom it belongs but will not be publicly available to adhere with the anonymisation protocol. This data will be removed and officially deleted from the researcher's locked storage, password-protected computer and the research study itself unless stated otherwise by the participant.

CONTACT INFORMATION FOR THE RESEARCHER CARRYING OUT THE RESEARCH:

Researcher: Mr. Jamie Meehan (PhD Researcher)

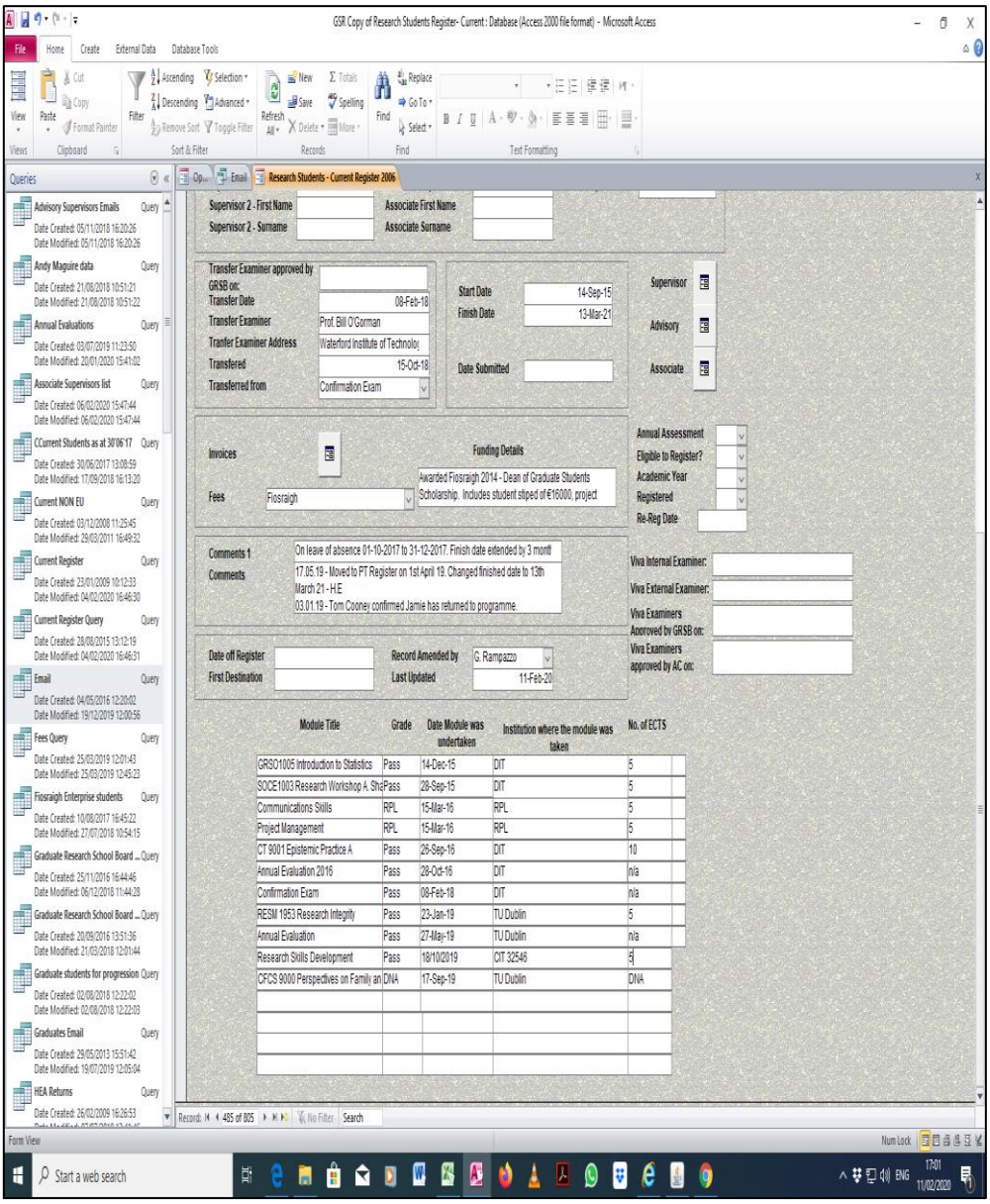
Email address: d15124001@mytudublin.ie

Appendix G: Participant Interview Guide and Semi-Structured Questions

Theme Sheet Areas
Context/Actors: **Q. In your own words, how has this region evolved over the years?** How important do you believe the triple-helix environment has been to this region?
Components **Q. What are your thoughts on economic development in this region?** How do you think it might be improved? Who do you think should lead the actions that need to be taken?
Policies **Q. Given your own opinion, what are the key policies that influence this region?** How do you think these could be improved?
Indicators/Enablers **Q. What do you believe are the main factors that influence the growth of this region?**

What do you believe is needed to enhance the growth of this region?
Outcomes **Q. What are your thoughts on cluster development in this region?** How do you believe clusters have been developed within this region? What are your thoughts on the future of economic growth in this region?

Appendix H: PhD Structured Modules Completed - Employability Skills and Discipline Specific Skills Training



Appendix I: Research Visits

Appendix J: Ethical Approval

Research Ethics and Integrity Committee,
Technological University Dublin - City Campus
Dublin 8.

18/03/2020

Dear Jamie,

The Research Ethics and Integrity Committee of the Dublin Institute of Technology has reviewed your application entitled How Does Convergence Influence Cluster-Based Economic Growth in Regions?, our reference REC-18-237.

Your application has been approved. If there are any changes in the research as described in your submission (REC-18-237) you must contact the REIC.

The committee would like to wish you the best of luck with your work.

Yours sincerely,

Steve Meaney, PhD
Chair - Research Ethics and Integrity Committee, Technological University Dublin - City Campus

Appendix K: Shannon Region

One of the key advocates for the region's development and particularly the airport, was a pioneering aviator, Charles Lindberg. Lindberg visited the site in the late 1930s and endorsed the airport's selection (Sidc.ie, 2017). Consequently, the runway at Shannon Airport was completed in 1940 and the first flights began in 1942. The first transatlantic flight through Shannon took place in October 1945, and since then the volume of transatlantic flights grew exponentially. It has been reported by Sidc.ie (2017) that approximately 50% of the aircraft traffic flying the Atlantic geographical area used Shannon Airport for tech stops (refuelling) in the 1950s. Therefore, it was identified as one of the most utilised enablers and drivers for the region's economic growth position.

Considering the airport's attractiveness for tech stops, a Russian alliance was created, and the Soviet Union inaugurated the world's first-ever *duty-free shop* establishment in Shannon airport in 1947 (Shannon Airport, 2019). As a result of the activity which took place in Shannon, its potential gained national and international attention. Without the development of employment opportunities, it can be said that regions would find it difficult to develop and grow. Due to the upsurge in development and interest in the Shannon region, two thousand jobs were created directly at the airport and another five thousand jobs both in the region and elsewhere in the country (Buckley, 2016).

Over the last 60 years, the Shannon region experienced continuous growth and development which can be aligned to other parts of the country, even when compared with more urbanised areas as described in Section 3.2 (Burton, 2015; OECD, 2009). The Shannon region in Ireland overall, has been moving to a post-industrial state, which can be aligned to what the rest of the country is experiencing (Burton, 2015). It can be argued that unfortunately, the rapid growth of the free zone concept has now moved to stage six, which is the decline stage of the cluster

lifecycle (see Section 2.3.1). This study will try to outline how this region can once again achieve the heights of economic growth it once did, through the integration of business cluster convergence. It has been recommended that the current task for this region *"is to create conditions (transport and communications facilities) to attract investors in the research and advanced international service activity sectors,"* (Sidc.ie, 2017).

According to Sidc.ie (2017), the SFADC was identified as an immediate and dramatic success in attracting global firms such as: (a) De Beers Corporation; (b) Jonathan Logan; (c) Standard Pressed Steel; and (d) General Electric. It can be said that the free zone initiative, aligned with the airport, can be described as one of the major influencing facets of Shannon's REG. In the 1960s, Shannon Development led the way in terms of promoting international financial IT and one might say enabled the development of the 'Dublin International Financial Service Centre' in 1987 which generated over 60,000 jobs (Sidc.ie, 2017). Shannon quickly became a major training base for international airlines (Atlantic Aviation Group, Shannon Aerospace and Lufthansa) and tourist attractions such as Bunratty Castle which is just on the outskirts of the airport. It therefore rapidly established an international status. The Irish Government began to recognise the region's potential and in 1968 extended the Shannon Development's directive to cover development in the wider Shannon region (Edmond, 2015).

The Shannon Group plc formed in September 2014 and now owns Shannon Airport, Shannon Commercial Properties, Shannon Heritage and the International Aviation Services Centre (IASC) and is the promoter of the Shannon Aerospace cluster (Edmond, 2015).

In addition, the IASC has developed a model which encompassed education and skillsets such as the development of an Aerospace and Aviation Institute which is in the planning phase. Research and innovation are also essential along with, business incubation (Tarpley, 2015; Maher, 2014; van de Ven, 1976) and industry, which can be related to the models in Table 2.5

in Section 2.4 (Field, 2016; Clusterdevelopment.com, 2016; Kamath et al., 2012; Sölvell, 2008; Etzkowitz, 2002; Ketels, 2000; Kuah, 1998; Porter, 1990; Ramsawak, n.d).

This IASC model and the aviation cluster example which is proposed by Edmond (2015) can be described as a business cluster which is in the formation or slow cluster development stage (see Section 2.3.1). It is striving for continued growth (Malakauskaitė and Navickas, 2011) and improvement which can epitomise the national cluster landscape in the Republic of Ireland (Doyle, 2015; Doyle and Fanning, 2007). An Enterprise-ireland.com (2013) report stated that €375k in new funding is to be unveiled to support the aviation sector in the Republic of Ireland which would help to enhance this cluster. Rodríguez-Pose (2000) suggests that convergence is important for regional economic growth. This is due to the key regional stakeholders working together, examining the potential of existing resources, and operating more collaboratively can be an important example of nurturing the development of a region. This Spanish convergence perspective can serve an example for the Shannon region and its key stakeholders to adopt.

Appendix L: Research Methodology

A European Commission report (2013) argued that when selecting a methodological approach for the examination of clusters, 'cluster mapping' needs to be incorporated which encompasses a statistical and qualitative approach (Todeva, 2011). Cluster methods can be broadly grouped into *qualitative* and *quantitative* approaches. (quantitative methods represent a top-down approach, whereas qualitative can represent a bottom-up (see Chapter One Section 1.4) perspective (European Union, 2010; Todeva, 2006).

Rocha (2004) and Rosenfeld (1997) further suggested that a mixed-method approach (SWRA, 2009) can be effective. Yet, uniting both quantitative and qualitative methods faces several blockages which can complicate the comparison of convergence and business cluster studies. From a qualitative perspective, the rich reality encompassed in the concept of clusters can make it difficult to reach an agreement on the descriptors of the cluster concept, whereas from a quantitative viewpoint, *"existing official national and international data sources for cluster analyses are limited by conventions on official classification systems of economic activities and industries,"* (Roelandt and Hertog, 1999). However, examples of an effective mixed method approach that have included cluster studies are in The United States of America, Canada and Denmark. These have detailed input-output tables (Roelandt and Hertog, 1999). Muro and Katz (2010) also argued a choice must be made between quantitative, qualitative or some combination of both.

As discussed in Section 1.4, two perspectives with which to examine cluster analyses techniques, are referred to by Brown (2000) as the, *"two principal routes to cluster selection".* These are the 'Top-down' and 'Bottom-up' approaches (see Table 5.2) (Bergman and Feser, 1999; Cortright, 2006). Cortright (2006) argued that a top-down approach usually depends on quantitative data to comprehend the industrial structure of a regional or national economy.

Whereas, a bottom-up approach typically relies on qualitative data exploring the inner workings and inter-firm relations of a particular cluster or locality. Furthermore, the bottom-up approach may examine the relationships and co-operation among the actors (see Figure 3.9) in a sector to identify linkages with similar and non-similar industries (Bergman and Feser, 1999).

Bailey (2008) suggested that as a data collection method, interviews can be beneficial in terms of proposing broad in-depth information, new understandings, and a higher response rate since they are typically planned (Bell, 2005; Denscombe, 2003). They also support the researcher in discovering new concerns which may arise, seek further explanation, and eradicate any confusions in the concepts conversed with the interviewee (DiCicco-Bloom and Crabtree, 2006). However, there are some disadvantages to interviews which must be considered. Bailey (2008) posited that data collection, transcription, and analysis of interviews commonly need a significant amount of time, particularly if interviewees are based in different geographical locations.

Appendix M: Sample of Transcripts

Shannon Region Sample: Participant 2

Context/Actors

Q. In your own words, how has this region evolved over the years? How important do you believe the triple-helix environment has been to this region?

First city economic spatial plan - Job creation - Limerick should not be paired with Ennis and Shannon - Crisis - Dell Manufacturing issue - City and council amalgamation - Shannon Development competitive leadership - Big Egos - organisation egos not personal - 2030 Limerick Spatial plan - regional level coming together - Transformation and Job Creation- Hinterland - Focus on the city needed - 1950s Airport - 1970s - UL - 2000s County Now Private sector - Problem - Shannon Development being self-funded - Finance is a big issue - Troy studios public driven - Leadership is key - regional entity confusions - Core - region - city model - Limerick held back by Shannon and Ennis planning - Team - Actors working together needed Leaders - Brendan O Regan - Ed Walsh - Liam Skelly- String core, strong region -

Components

Q. What are your thoughts on economic development in this region? How do you think it might be improved? Who do you think should lead the actions that need to be taken?

Limerick economic forum - Saturday meetings - marketing of the location is key - Direct access - Job creation - Limerick as an investment location - Strong eco-system - Limerick.ie - Limerick ecosystem of networks - Clusters - sport - aviation - med-tech - finance - film - vision and leaders - resources for triple-helix model needed - listening is key - risk was important - public space entrepreneurial is key - entrepreneurial gene was important - competitive funds - EI - Action plan for jobs sports tech - next cluster - Austin Texas startup location model - UBER FDI First investment really into the city - People are key -

Policies

Q. Given your own opinion, what are the key policies that influence this region? How do you think these could be improved?

Limerick spatial plan 2030 - Limerick 2030 company - Innovate limerick - support indigenous (innovation campus) - National development plan - Action plan for jobs needs to be funded by local authorities - Core vision - build on it, not linear, create jobs is the number one goal - limerick economic forum meetings - capital of culture 2014 - Horizon 2020 Grant -

Indicators/Enablers

Q. What do you believe are the main factors that influence the growth of this region? What do you believe is needed to enhance the growth of this region?

Trust is critical - Limerick key players in a meeting on Saturday morning - Limerick economic forum - has to have a purpose and needs to be assessed - Trust with purpose - purpose-driven convergence is key - how long is the length of the purpose though - is it opportunity led? - Direct Action - Success equals jobs - investment - regional viewpoints - location for investment - physical infrastructure (space) - key executives needed - job creation - perception and image changed in Limerick - vision and leadership - resources

(infrastructure) - entrepreneurship - entrepreneurial behaviour and risk - People - ready for risk - cost-effective location - Talent - Building on success - Decision making- People to help - Core region - Innovation - Innovation centre - Stand out investment location for Limerick - 2030 Economic & Spatial plan - critical economic element

Outcomes

Q. What are your thoughts on cluster development in this region? How do you believe clusters have been developed within this region? What are your thoughts on the future of economic growth in this region?

Are knowledge/talent the cluster in this region? - Sports tech Ireland - Limerick city and county council talk about everyone not just their clients- more of networks really - Aviation - Finance - Med-tech - Sports - Film - Good clusters come from network s- Natural sports cluster - sports gene - Cluster/project manager for the cluster is needed to develop the cluster - EI Investment needed - Designated person needed - then investment - then Triple-helix coming together - Marketing is key though - Housing is a key issue - Cluster person in EI & IDA- Innovation and dynamism are key - Limerick directly elected mayor - regional plans - direct action needed - preparing for jobs in the future - co-locate - fast infrastructure - vision - bodies / people

Asturias Region Sample: Participant 29

Context/Actors

Q. In your own words, how has this region evolved over the years? How important do you believe the triple-helix environment has been to this region?

ClusterTIC is the ICT Cluster and a non for profit organisation. 15 years in the market with 85 members with 3.7% of GDP of Asturias and 7,000 jobs in the sector. Digital transformation. At National level, Asturias is losing economic performance – Madrid, Barcelona, Basque, Valencia are more advanced. Growth is true and infrastructure is better but lower rate than Spanish economy. Steel sector is important and car in other regions. Industries are not really redeveloped and capacity is poor. Not very high added value products. Abandoned coal mining and shipbuilding are closed because cannot compete globally due to development issues.

Growth by state owned industry in steel, aluminium and coal and the industry becoming private and more competitive. Private sector is less developed on the triple-helix and public. Triple-helix is not really happening. Industry and administration work together traditionally. Triple-helix is not really understood but it is important. Universities and business are improving with IDONIAL (regional technology centre) being important.

Components

Q. What are your thoughts on economic development in this region? How do you think it might be improved? Who do you think should lead the actions that need to be taken?

Asturias must support R&D policies and investment in the region over the next 5 years. 0.8% of GDP being spent in R&D and Spain is asking for 2%. EY asking for 3% so lagging behind. Value added products are key. SMEs losing competitiveness and lagging behind so need to do R&D and digital transformation in production and management, Abandonment of the rural economy needs improving.

Public and private collaboration is key. Public give funds and private do their part. Collaborate – administration does the awareness. SMEs become more aware.

Policies

Q. Given your own opinion, what are the key policies that influence this region? How do you think these could be improved?

EU Funds to change economic model and public money. Internal coverage is needed to stay ahead. Room for improvement within the triple-helix. Policy to improve quality of life in rural environment.

1. Energy cost – Electro intensive region – eat electricity in Asturias and it is not green with fossil fuels Coal and Gas. Very high cost of energy.
2. Environmental policies – changing thinking and transport of mobility – MNE from China influencing this problem.
3. Tariff policies need to improve or lose competitiveness with lack of industrial policy in EU form Asturias.
4. Infrasture policy – Transport policy connect to rail better, maritime lines with harbour and EU hubs, connectivity to the airport must improve. Transport to main cities – Madrid travel time is an issue. Companies are not competitive because of this.
5. Smart specialisation strategy.

Indicators/Enablers

Q. What do you believe are the main factors that influence the growth of this region? What do you believe is needed to enhance the growth of this region?

More proactive needed. Infrastructure. Quality of life. Connecting flights to Asturias – direct flights. International Companies. Two risks – 1. Ageing population 2. EU region with lowest birth rate. Rish for the growth of the region.

ICT need more workers/people. 95% of the cost are the workers. Losing competitiveness taking rival employees. Talent – economic growth must move from low value products to digital.

Outcomes

Q. What are your thoughts on cluster development in this region? How do you believe clusters have been developed within this region? What are your thoughts on the future of economic growth in this region?

Business corporation and business firms not really collaborating and cooperating. Last decade, generational and culture change.

Cluster are modifying culture behaviour. Collaboration and cooperation are together not silos.

Bottom-up model must be created by the industrial sector. Top-down model created by the administration (in fashion so the government did it). ICT ClusterTIC is a top-down cluster and the only one that still exists out of the 10 clusters in Asturias. Others have disappeared. Rural tourism and Metal Industry are other examples.

Future: Industrial sector – 20% of GDP – the only region in Spain keeping this figure. The EU average. Industrial policy in Asturias is key, Spain does not really have it.

Digital transformation with IN4.0 to increase the added value of products produced in Asturias. Have a culture (industry) of know-how and talent. Tourism sector needs

improving and is changing – DTA model (Smart Toruits Destination Policy). ICT sector improving – 3% per year and continuous growth.
Smart specialisation strategy for Asturias works with EU support – sustainable material in Health and need to increase speed to the average level of EU region – good expectation.

Galicia Region Sample: Participant 17

Context/Actors

Q. In your own words, how has this region evolved over the years? How important do you believe the triple-helix environment has been to this region?

Rural region with Vigo industrial area. Vigo one century ago fishing was key. 20th Century PSA Car Factory has grown here. Free Trade Zone has been key to Citroen and Peugeot coming here. Big port is key as the last 100 years the port does not close. Very tranquil quiet port but good. Development of Vigo is important as the first industrial city of Galicia was Vigo.
3 free zones in Spain – 1. Barcelona, 2. South Spain and Vigo. Brazil came here to help develop the free zone and industry are paying rent to be here. The free zone acts as the public institution and local economic development agency. Job creations are key to develop the area and the north-west of Galicia. Resources such as land and rent bring 11/12 million per year. Statistics give part of the tax to Free Zone from the industries that pay rent.
Lines of action – Internationalisation, land and equipment for business and entrepreneurship, information and innovation.
Triple-Helix – Accelerators are an example of collaboration. ViaGalicia, ViaExterior work all together to develop the accelerators and in its 6th edition now. Inaugurated by Free Zone with one company and now with regional government partner sin these accelerators with Gian and IGAPE. Need to promote more sectoral accelerators.

Components

Q. What are your thoughts on economic development in this region? How do you think it might be improved? Who do you think should lead the actions that need to be taken?

Big ships coming in and the car industry are so important. 500,000 cars are developed per year here with Citroen, the biggest in the world.
1 Component at least coming from Vigo. Ports have been key to job creation.
Xunta de Galicia and Port Authority of Vigo collaboration have been important to improvement and growth. Rail and highway infrastructure are crucial too.
Impact- businesses installed and jobs created. Companies with value are key. Free Zone providing land and infrastructure opportunities for triple-helix. National government and the head of Free Zone decide the improvement.

Policies

Q. Given your own opinion, what are the key policies that influence this region? How do you think these could be improved?

Free Zone was a medium to change the economic of the area and be different. Sectorial public of Spain promoted 3 free zones across Spain which have been key to change the area. Free Zone in the 1990s is the regional and local development agency. Vigo maintains its success because of this as the Free Zone is an instrument for activity.

Indicators/Enablers

Q. What do you believe are the main factors that influence the growth of this region? What do you believe is needed to enhance the growth of this region?

Connectivity with rail and road. Capital is a pubic and best accelerator in Spain was considered as the public incubator. Entrepreneurship. Accelerators. Trust is totally important. Close connection between University of Vigo, Council Government, regional government and the union are important. R&D investment. Port and exit to the sea. Support Universities And technical degrees.

Need good connectivity by train in the future and engineers are key.

Outcomes

Q. What are your thoughts on cluster development in this region? How do you believe clusters have been developed within this region? What are your thoughts on the future of economic growth in this region?

Leader- Car cluster of which Xunta de Galicia are partners.

Important – goods can not be moved by road, better train connectivity is needed and IN4.0 is necessary.

Clusters – car cluster Galicia is the most important in Galicia and Spain. PSA Factory developed the cluster and now is aligned to government and academia.

New world car centre is needed and high technology incubators are crucial. Put together all the actors more.

Northern Ostrobothnia Region Sample: Participant 23

Context/Actors

Q. In your own words, how has this region evolved over the years? How important do you believe the triple-helix environment has been to this region?

The evolution from Butterfly Ventures expected started in 2012 as there was structural change with Nokia downsizing so there was a venture capitalists opportunity due to this rupture.

Good engineering talent as they were 10-15 years with Nokia – Gap in between doing Nokia. Start-ups starting after the Nokia collapse and rise of entrepreneurial talents after Nokia collapse and this was good for Butterfly Ventures. Challenge for society – City of Oulu – larger vindicated and employment levels are the same as before Nokia times. City of Oulu involvements promoting Fund LP – Butterfly active in VC and VC funding has been quite big in Oulu. Early stage companies and big companies working together but recently there has been a lack of start-up formation and there are more big companies coming in.

Issue: Talent competition has been a major challenge currently and need to attract more foreign talent. Good collaboration in Oulu – Oulu had start up fund and applied science and University of Oulu – good research collaboration. Main driver- big enough city and good engineering talent.

Components

Q. What are your thoughts on economic development in this region? How do you think it might be improved? Who do you think should lead the actions that need to be taken?

Economic development has been challenging as there has not been enough start-ups coming in. The importance of Oulu city and in Nordic nations has gone down due to the focus on other areas. Too small to maintain the flow of businesses and the big Nokia irruption. Oulu is not the capital region either – people are being sucked into the big cities and people are leaving which is a key factor. People are moving out so attracting talent and outside labour is needed. The city is easy to get around.
Improved – City of Oulu to maintain their involvement in the venture industry and keep a close eye on what is happening. There are enough positives to study and attract foreign students. Culture integration – regional must connect with the rest of the world.
Lead: Increasing the amount of inter-connectivity with the rest of the world. Open society. Regional government, University of Oulu and local government such as the City of Oulu need to introduce action to create interconnect with the rest of the world. Connections and connectivity are key.
People that have the networks and people living here and moving here are important. Environmental issue is a challenge so high speed trains between Helsinki and Oulu are needed.

Policies

Q. Given your own opinion, what are the key policies that influence this region? How do you think these could be improved?

City organisation hire business professionals and hire the right talents. Purpose? Nokia collapse bringing them in to help the region. Tax reduction cut is a major thing. Service attitude of business and city attitudes – interconnectivity that makes this easier.
Environmental issue is a challenge.
Good service attitude form Venture capitalists and City of Oulu and good relationship due to individuals. LP Start-up funds from the city of Oulu are important. More risk taking and service attitude from the city of Oulu are needed and National government is a bit more difficult. EU legislation – Finnish people talk about the worst not the success which is a Finnish trait and a cultural issue. Focus on solving the problems.

Indicators/Enablers

Q. What do you believe are the main factors that influence the growth of this region? What do you believe is needed to enhance the growth of this region?

Culture, Relationships, Individuals, Interconnectivity, Entrepreneurs, Venture capitalists, Connections, Start-ups, Personal connections. Amount of capital inflows and venture capitalist is the riskiest and quickest is crucial. Need sufficient scale and speed – variety of VC investment is important. Enable collaboration. Increased syndicate of investments. Working together.
Trust is by default. Trust is a key factor for start-ups and venture capitalist. Must not worry about government officials working against you. Finland excels due to its small society and must focus requirement of trust. Trust is there and open communication between city officials. Attract talent and entrepreneurial talent. Risk taking and attitude.

Outcomes

Q. What are your thoughts on cluster development in this region? How do you believe clusters have been developed within this region? What are your thoughts on the future of economic growth in this region?

Cluster Development – Fluid environments needed and embracing market economics. Self-driven clusters are better.
Systematic way to steer themselves – self-steer capability makes things easier.
Slight reservation of government policy leading cluster development as this is a self-induced loop. Resources need to be spent in the right matters as there can be a bit of friction and overheads.
Finland do not understand clusters that well. Local government need to make it easier to get here and live here.
Challenge: People come for business purposes not really tourism as the city is not that attractive. Forestry needs changes as consumption has to go down. Lower added value industry sectors are having an issue. People are leaving but inflows have been good too but more is needed. Attract more people – (1) not easy to do and (2) Afraid of foreigners. People from Oulu are afraid of emigrants from developing regions.
Future: High tech industry can excel. Culture diversity will attract things. Urgency needed to develop the critical mass. Why would people want to come here?
Challenges: Fact that being here requires extra travel and it is going to become more difficult to travel in the future with environmental issues.
Must get to critical mass in this region quickly enough. Population and interconnectivity
(1) Must stop charging foreign students to come here for University.
Local government and Universities must make Oulu more attractive for people to come here.

TheCAP Sample: Participant 12

Context/Actors

Q. In your own words, how has this region evolved over the years? How important do you believe the triple-helix environment has been to this region?

Things have evolved over the years as there is more autonomy and leadership. Smart specialisation strategies are part of the evolution of regions and EU funds.
The triple-helix his important with the systematic innovation connected to it to create change creating economic growth.

Components

Q. What are your thoughts on economic development in this region? How do you think it might be improved? Who do you think should lead the actions that need to be taken?

Regions are not connected to the market. There are several layers – speed and innovation with clear challenges and specialisation. Regions are sleeping and stuck but there is an opportunity to take leadership with energy transition.
ERDF Funding has been important for regional entrepreneurship and talent. Self-consumption of renewables, the Valencia region is doing this not the government. National government are too big with too many layers. Regional resilience needs top-down and bottom-up to create change and multiply impact. Gap in EU region and clusters to work together.

Policies

Q. Given your own opinion, what are the key policies that influence this region? How do you think these could be improved?

EU – Smart specialisation strategy – speed and critical mass. Transforming the regions and get regions to think about what matters?

Improved – working jointly with clusters and stakeholders. Connect with the market in a meaningful way. New politicians need to build on smart specialisation strategies in the past by doing interviews. Continuity is needed and there is a lack of ownership. Bottom-up critical mass of stakeholders is required.

Indicators/Enablers

Q. What do you believe are the main factors that influence the growth of this region? What do you believe is needed to enhance the growth of this region?

Trust is crucial to build within regions and the triple-helix stakeholders. Without trust, you can not create change. Number of products to market and commercialisation. Investment and clear idea of growth with people building. Jobs. Speed, scale and synergy with people. Good synergy with other people to create change. Bottom-up growth. CleanTech innovation ecosystem in Valencia 2 cities within Valencia joined together. Region came at the end naturally.

Weakness: No trust within and between the region is closely connected.

Outcomes

Q. What are your thoughts on cluster development in this region? How do you believe clusters have been developed within this region? What are your thoughts on the future of economic growth in this region?

Need to clearly define what is needed and what is possible. 3,000 EU clusters regional clusters mostly and need to bring value. Need clusters of change, not usual. Big critical mass of clusters – clusters need to be champions and become superclusters e.g Canada. Strategic partnerships are key. European regional innovation ecosystem needs instruments as platforms are not working – ECCP S3 Thematic platform – need speed – leverage huge amounts of money and scale up champions.

Cluster development with subsidies. There is ego of 2,3,4 businesses and this formula does not work and does not create critical mass. Build strategically regional focus and push them to evolve. Leave behind the fear of failure and kill or scale it.

Future: Totally systematic innovation approach with speed and change. Interconnected global wide and break silos. Globalised regional innovation ecosystem needed with clusters creating the interconnection.

List of Publications, Conference Papers and Presentations

Hendrys, C., Geier, B., Utikal, H., Taskinen, P., Ciarmatori, F., Meehan, J., Bocci, V., Maslinskaite, J., Dragomir, B., Rangen, C. and de Jong, P. (2020). *Creating Clusters of Change - How cluster managers drive innovation and increase impact - European Commission.* Frankfurt: Provadis School of International Management and Technology AG, (pp.1-23).

Meehan, J., and Cooney, T. (2019). How Does Convergence Influence Cluster-Based Economic Growth in Regions? In *"Embracing uncertainty: Entrepreneurship as a key capability for the 21st century."* (pp. 1-3). Berlin: RENT.

Meehan, J., and Hobbs, J. (2019). IN 4.0 Connecting Clusters: Convergence Approach. In: "*Strategic Clusters for Sustainable Growth New Trends and Practices."* (pp. 1). Antwerp: TCI Network.

Meehan, J. (2019). Limerick 2030 Economic & Spatial Strategy. POLICIES AND MEASURES TO SUPPORT LOCAL AND REGIONAL INNOVATION ECOSYSTEMS. [online] Kainuu: Interreg Europe - European Union, pp.1-4. available at: https://atlanticcities.eu/prueba1/wp-content/uploads/2019/12/Ecoris-3-N-ben10-1.pdf [accessed: 2nd October 2019].

Meehan, J. (2019). *International Colleagues Cluster In Cork*. [online] Interreg Europe. available at: https://www.interregeurope.eu/ecoris3/news/news-article/5705/international-colleagues-cluster-in-cork/ [accessed: 6th August 2019].

Meehan, J. (2019). *ERASMUS+ ICM – Visit To Cork 15Th - 24Th May 2019*. [online] Cork Institute of Technology. available at: https://www.cit.ie/currentnews?id=1427 [accessed: 17th June 2019].

Meehan, J. (2017). *MSCA-RISE-2014: Marie Skłodowska-Curie Research and Innovation Staff Exchange (RISE) - DiasporaLink D4.2 – D10 Case Reports*. 1st ed. European Union: European Commission - Horizon 2020, (pp.1-300).

Meehan, J. (2017). How Can Regional Economic Growth be Enhanced through Business Cluster Convergence in the Shannon Region? In: "*Annual Symposium Poster*." Dublin: DIT.

Meehan, J. (2017). How Can Regional Economic Growth be Enhanced through Business Cluster Convergence in the Shannon Region? In: "*Institute for Small Business and Entrepreneurship.2* (1, pp.1-2).

Meehan, J. (2017). How Can Regional Economic Growth be Enhanced through Business Cluster Convergence in the Shannon Region? *Irish Academy of Management 2017*, p.1.

Meehan, J. (2017). Why Use a Mixed-Method Research Approach when Examining How Regional Economic Growth (REG) can be Enhanced through Business Cluster Convergence in the Shannon Region? *European Conference on Research Methodology*, (p.1).

Meehan, J., Osaghae, O. and Njoku, K. (2016). DIT's Entrepreneurial Cube and PhD Structure: What is the Process? UDD, Santiago, Chile.

Meehan, J. (2016). What Models of Business Clusters (BC's) and Business Incubators (BI's) can be Combined to Improve Regional Economic Strategy (RES)? In: *'Plotting the next 100 years – growing Ireland's postgraduate community'*. Limerick: LPRC, (p.1).

Meehan, J. and Osaghae, O. (2016). How Can Clusters of Immigrant Entrepreneurs Help Drive Regional Entrepreneurial Activity? In: *'Plotting the next 100 years – growing Ireland's postgraduate community'*. Limerick: LPRC, (p.1).

Best Poster Award

Jamie Meehan	International Award – First prize in the poster competition at the European Conference on Research Methodology (ECRM). https://www.dit.ie/business/research/researchdegrees/

RENT Conference Certification

NETWORKING SINCE 1971
EUROPEAN INSTITUTE FOR ADVANCED STUDIES IN MANAGEMENT

CERTIFICATE OF ATTENDANCE

This is to certify that

JAMIE MEEHAN

- Has participated in the RENT 2019 - RESEARCH IN ENTREPRENEURSHIP AND SMALL BUSINESS, held in ESCP EUROPE - BERLIN, GERMANY, NOVEMBER (27) 28-29, 2019

Graziella Michelante
CONFERENCE MANAGER

PASSAGE DU NORD 19, 1000 BRUSSELS BELGIUM, Tel: +32 2 226 66 62 Fax: (+32) 2 512 19 29
Website www.eiasm.org