2021

Management development in Small and Medium Sized Firms in The Republic of Ireland: An Investigation of Contingency Factors and Management Development Activities

Deirdre McQuillan
Technological University Dublin, deirdre.mcquillan@tudublin.ie

Thomas Garavan
University College Cork, Ireland, tgaravan@ucc.ie

Wael Rashwan
Technological University Dublin, wael.rashwan@tudublin.ie

See next page for additional authors

Recommended Citation

McQuillan, D., Garavan, T., Rashwan, W., Sweeney, L., Nolan, C. and Godwin-Osaghe, O. (2021) Management development in Small and Medium Sized Firms in The Republic of Ireland: An Investigation of Contingency Factors and Management Development Activities. Irish Academy of Management Conference, Waterford. (July) DOI: 10.21427/KK95-VA28

Funder: DG-REFORM of the European Commission

Title page

1. Paper title

Management development in Small and Medium Sized Firms in The Republic of Ireland: An Investigation of Contingency Factors and Management Development Activities

2. Full name of each author

Deirdre McQuillan, Technological University Dublin (deirdre.mcquillan@tudublin.ie)

Thomas Garavan, University of Limerick (thomas.garavan@ul.ie)

Wael Rashwan, Technological University Dublin (wael.rashwan@tudublin.ie)

Lorraine Sweeney, Technological University Dublin (lorraine.sweeney@tudublin.ie)

Ciara Nolan, Technological University Dublin (ciara.nolan@tudublin.ie)

Osa-Godwin Osaghae, Technological University Dublin (osa.godwinosaghae@tudublin.ie)

Management development in Small and Medium Sized Firms in The Republic of Ireland: An Investigation of Contingency Factors and Management Development Activities

Abstract

Purpose
The development of managerial skills is an important priority for small and medium sized firm globally yet we have few insights about the predictors and types of management development (MD) activities in SMEs. To date studies of MD have not sufficiently differentiated between small and medium sized firms. In this paper we investigate the impact of three sets of predictors (contextual, technology and innovation activities, behavioural and skill) on six dimensions of MD (formal internal development, formal internal with an external expert, formal external development, one-to-one MD activities, budget for MD and experiential focused MD).

Design/methodology/approach
Survey of 360 SMEs in Ireland involving 401 manager and owner managers in small and medium sized firms.

Findings
Our findings reveal that firm size is an important predictor of the six dimensions of MD investigated in this study. We also found that in terms of the different categories of predictors dimensions of the SME technological and innovation capacity explained differences between small and medium sized firm such as technologically improved product/service, changes existing products and services and process innovation. We also found the age of the firm, the existence of a clearly articulated business strategy and formal strategic planning approaches were significant.

Research / practical / policy implications
Overall our findings highlight significant differences between small and medium firms which have important research and policy implications. Management development is a government priority for supporting Irish SMEs. We address a fundamental problem providing insight into predictors of management development activities.

Originality/value
This is a large survey of SMEs in the Republic of Ireland. The findings have important theoretical and policy implications.

Keywords: Small and Medium Sized Firms, Management Development, Contingency Influences, Dimensions of Management Development.

Management development in Small and Medium Sized Firms in The Republic of Ireland: An Investigation of Contingency Factors and Management Development Activities

INTRODUCTION

The development of managerial skills within small and medium sized firms is an important area of research in addition to having significant policy and practice implications (e.g. Kempster and Parry, 2014; Harney and Alkalhaf, 2020). The development of the knowledge, skills and abilities of managers is also an important challenge for SMEs worldwide (Forth and Bryson, 2019; Broszeit et al., 2016). It is recognised that SMEs are less likely to invest in formal management development (Nolan and Garavan, 2016) and instead rely heavily on informal and experiential development approaches (Smith and Morse, 2005). To date research is relatively sparse on the factors that explain why SMEs invest in management development even though research in the HRM and high performance work practices areas highlights the significant role that SME contingency factors play (Sheehan and Garavan 2021; Harney el al 2020). Another tendency in the literature is to group small and medium sized firms together as one category (e.g. McClean and Collins, 2019, Klaas et al., 2012) with insufficient attention given to the differences between small and medium sized firms. There is increasing recognition that small firms (those defined as having between 10-49 employees) are not the same as medium sized firms (those defined as having between 50-250 employees). Firm size appears to matters for SMEs when it comes to HRM practices, leadership and management development and approaches to technology and innovation (Terilinck, 2017; Nooteboom et al., 2007; Ahuja and Lampert, 2001; Sheehan and Garavan 2021).

Management development is a contested term in both practitioner and academic literatures (Garavan, 2021) however most definitions give emphasis to a number of dimensions as follows. It is concerned with enhancing the effectiveness of managers to contribute to organisational performance; it is future oriented activity that is used to accelerate the growth of an organisational managerial expertise; it encompasses both formal and informal or experiential components and it is a process that continually shapes and is shaped by the context in which it is enacted. There is accumulated evidence that MD in SMEs can result in significant direct and indirect performance payoffs (Teo et al., 2011). It can improve the management of people (Schlosser, 2015), enhance manager human capital (Subramony, 2009) and develop

unique managerial resources that align with SME strategy (Polyhart, 2006). There is debate as to whether formal or informal approaches are better in the context of SMEs (Nolan et al 2020) with research highlighting that formal management development brings benefits to SMEs including firm survival, growth and productivity (Forth and Bryson, 2019). Scholars however argue that the characteristics of SMEs make the use of formalised practices inappropriate and maybe even be harmful (e.g., Kitching and Marlow, 2013). These studies suggest that SMEs provide greater opportunities for informal management development (Smith and Morse, 2005) including observational management development due to the closeness of the management team (Kempster and Parry, 2014).

The development of management skills in SMEs in the Republic of Ireland is an important national policy objective. Indeed, a review of the multiple management skills and competency frameworks and tools available to support SMEs (e.g. Skillnet, 2021; EU, 2003) confirms the wide-ranging skills and competencies required for the complex generalist type manager roles found in SMEs. To illustrate this, studies have highlighted the importance of interpersonal and networking skills in the context of developing external customer relationships and business opportunities (Gibb, 1997) and there are studies highlighting the value of MD in the context of innovation (Sheehan et al 2021). We have to date developed some insights on the types of MD practices that SMEs implement however there are a number of significant research gaps.

The first research gap concerns the lack of insights on the predictors or contingency factors that explain why SMEs invest in MD. We know for example that factors related to the role of the owner-manager is important (Garavan et al 2016), the importance of manager skill gaps in driving MD (Gray and Mabey, 2005) and that different MD issues arises as the firm grows (Messersmith and Guthrie, 2010; Perrin and Grant, 2001). However, we have to date relatively few insights on the impact of factors such as the role of business strategy, technology intensity, SME innovation processes, the role of sector characteristics and firm age. There is therefore significant scope to enhance our understanding of the full spectrum of contingency factors. The second research gap concerns our understanding of the impact of contingency factors on different dimensions of management development in SMEs. Scholars to date have tended to focus on the formal versus informal distinction but have not filly engaged with the multidimensional nature of formal MD in SMEs such as internal versus external MD activities, the budget allocation for MD and the role of one-to-one formal MD activities. In this study

we investigate the impact of contingency factors on six dimensions of MD including the budget allocation of MD, the use of formal internal MD, the use of internal formal MD using external consultants, investment in external MD activities the use of one-to-one formal MD and the use of informal MD. We therefore capture the full range of MD activities (Garavan et al 2020) thus providing a more detailed understanding of MD in SMEs. The third gap concerns the lack of insights concerning differences between small and medium sized firms when it comes to MD and its predictors. There is increasing recognition that small and medium sized firms differ when it comes to HRM practices (Harney et al 2020; Sheehan and Garavan, 2021) and that this is also the case for MD.

The study we report in this paper is theoretically informed by contingency theory (Harney et al., 2018; Delery and Doty, 1996) and we investigate three sets of potential predictors of MD in small and medium sized firms (contextual, technological and innovation and attitudinal and behavioural) on six dimensions of MD. We derived our data from 360 SMEs located in the Republic of Ireland with data derived from owner-managers and managers collected in 2020. Our overall findings reveal that contingencies related to innovation activities, firm sector and age and strategic characteristics were important in explaining differences between small and medium sized firms and the six dimensions of MD. We found that firm size was an important overall predictor of the six dimensions of MD. Our study findings have important research, policy and practice implications.

THEORETICAL CONTEXT

Managerial Roles and Management Development in SMEs

SMEs possess important distinguishing characteristics that have important implications for MD (McClean and Collins, 2019). Of particular salience in this context include the labour-intensive nature of SMEs, their inherent resource poverty, the influence of the owner-manager, the demand on the time and attention of the owner-manager and the informality of management and HR practices (Baron and Hannan, 2002; Klaas et al., 2012). Both researchers and pol icy makers have drawn attention to the impact of financial resource constraints and operational pressures when it comes to investment in formal MD (Padachi and Bhiwajee, 2016; Susosmith and Coetzer, 2015). The tighter span of control in SMEs might imply that some management practices are less viable or necessary in the SME (Brand and Bax, 2002) however there is a

general recognition amongst policy makers that the managerial skills levels in SMEs can be significantly enhanced. The paradox here is that while there are significant managerial skill gaps in SMEs they are also less likely to use formal management practices when compared to larger firms (Smith and Morse, 2005).

The nature of the managerial role in SMEs is an interesting and complex one. Research suggests that managers in SMEs perform both strategic and operational roles; however, they are likely to have variable competence and skill across such roles (Lubatkin et al., 2006. Managers are expected to multitask, to be both agile and flexible and are more likely to operate for a significant amount of a working day in reactive mode (Garavan et al 2016). There is also evidence that managers in SMEs may have limited awareness of their skill gaps and attach lower priority to the development of their competencies and skills (Sheehan and Garavan, 2021). For example, Gibb (2009) found that managers were time constrained and had fewer opportunities to undertake formal management development, while Chadwick et al. (2012) similarly argued that that owner-managers themselves have limited time to prioritize formal MD. SMEs typically lack formal management development practices; they are unlikely to have internal management development expertise (Smallbone et al., 2015; Thorpe et al., 2009) and they are more likely to management development programmes (Birdthistle and Fleming, 2007).

Research on MD in SME is both scarce and fragmented which is itself surprising. Scholars have from sometime have argued that the skills and competencies of managers should match the growth stage (Churchill and Lewis, 1983) and that investment these skills is vital for firm profitability and survival. In addition, the term 'management development' has lost some of its currency within the literature with scholars using the term 'leadership development' instead (Garavan et al., 2016). We argue that the concept of MD has particular resonances with the SME context because it gives primacy to the development of skills and competencies required by SME owner-managers and managers as they perform both strategic and operational roles effectively. Gibb (1997) noted that the skills associated with strategic management, business planning, relationship management, team building and marketing were important s for small business managers. He also highlighted the importance of the skills relating to networking, learning from experience, and the sourcing and ability to work with resources and expertise from outside the firm. Unlike leadership development, MD gives priority to the development of planning, organising, managing people, communication, and team working

skills (Armstrong and Sadler-Smith, 2008). Leadership development in contrast focused on the internal dimensions of the leader such as identity and self –confidence to lead these are aspects that may appear distant to managers in SMEs who are preoccupied with achieve g multiple tasks on a daily basis. In addition, leadership development places considerable emphasis on vision and strategy related activities yet in SMEs there may be an absence of such strategies with a focus on the here and now. For the purposes of this study we conceptualise MD as an activity that is driven by both the needs of the SME and the individual manager (Garavan 2021) however, we expect given the influence of the owner-manager there will be a strong unitarist underpinning to the competencies and skills that are developed. We view consistent with Rigg (20070 that MD is driven by a technocrat perspective in that is consists of a set of development activities that enhance managerial capabilities.

A Contingency Perspective on Management Development

Central to our arguments in this paper is the notion that the types of MD activities undertaken by SMEs are driven by a multiplicity of contingencies related to characteristics of SMEs and its managers. Contingency theory proposes that factors such as sector, firm size, business strategy, environmental and competitive intensity and the nature of the strategy (Delery and Doty, 1996) will influence MD in SMEs. There is a significant support for this theory in the broad HRM literature in the context of SMEs. For example, research highlights the important influence of sector (Garavan et al., 2020; Rauch and Hatak, 2016), attitudes (Coetzer, 2011) and technology (Schein, 2004; Kao, 1991). However, this literature lacks a sense of coherence and the categorisation of contingency influences and scholars have not sufficiently distinguished between small and medium firms (Garavan et al., 2020; Messersmith and Guthrie, 2010; Perrin and Grant, 2001).

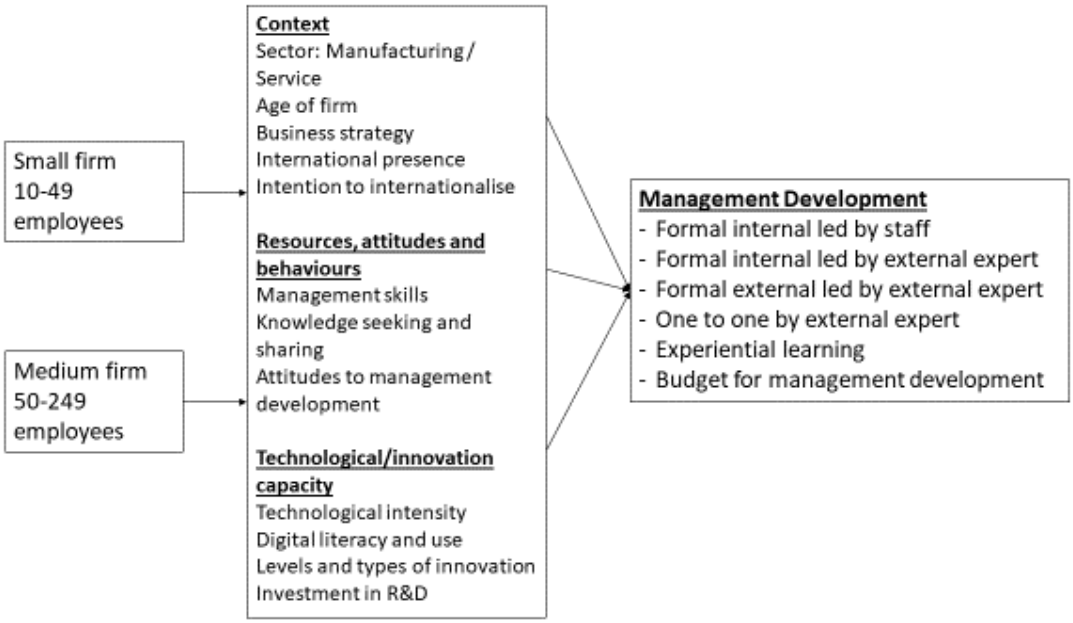
For the purposes of this paper we distinguish three different categories of contingencies. The first set of contingencies relate to the inherent characteristic of the SME and include it size, sector, technological intensity, its age and whether it is a domestic or international firm (Rauch and Hatak, 2016). Sectoral difference shave emerged as potentially important however the evidence is inconclusive (e.g. Saleh and Wang, 1993; Benner and Tushman, 2003). Manufacturing firms rely more on functional specialisations in order to improve their level of cost efficiency (Camison-Zornoza et al., 2004). Their emphasis on innovation and new product development may require a more organic approach but managers

still need the skills to take advantage of efficiencies that relies on more functional specialisations (Camison-Zornoza et al., 2004). Additional contextual elements include owner-manager perceptions about strategic planning and the types of strategic planning processes in place. SMEs with formal business strategies perform better than those without such strategies (O'Regan et al., 2005) and a good HRM-strategy fit is also important (Garavan et al., 2015). However, SMEs typically have informal strategies, largely driven by their owner managers which contrasts with large organizations, which generally have separate strategic-planning units (Hudson et. al., 2001). Kraus et al., (2009:112) found that 'formal planning is often regarded as limited to large enterprises and thus not transferable to the requirements of the fast-moving and flexibly structured SMEs'. There is some evidence that as firms grow they are likely to become more formal in their approach to strategic planning (Nolan et al 2020).

Our second category of contingencies concern technology and innovation dimensions of SMEs. The technological characteristics of SMEs include the extent of technological intensity of the firm including its use of technology to develop products to deliver services (Garavan et al 2020). Slow technological uptake by small firms may also explain why their owner-managers tend to delay engagement in management development to develop the skills required to exploit technological innovations (Webster et al, 2004). Qian and Li (2003) found that manufacturing SMEs are typically established around a single breakthrough technological capability and tend to direct most of their resources toward commercializing their technology. The innovation dimension focuses on innovation processes in SMEs and the extent of product/service and process innovation. SMEs tend to be creative, aggressive in exploiting opportunities and they produce more products compared to their competitors (Ngah and Ibrahim, 2009) however when it comes to innovation the resists are inconclusive (Massa and Testa 2008) For example, Acs et al. (2003) found that smaller firms are more innovative compared to large firms, while Hausman (2005) found that limited resources and capabilities for conducting in-house R&D activities limit SMEs' innovative capabilities. Abdullah et al. (2010) found that in the face of limited resources, SME owner managers tend to avoid management development, opting for immediate measures to promote innovation through recruitment of innovative employees. In addition, studies reveal that the innovation activities of SMEs may act as stimulus for MD. Innovation requires SMEs to develop radical new skills, knowledge and information or innovations (Schein, 2004; Kao, 1991). This requires a reflective learning process and manager development. Ngah and Ibrahim (2009) for example found that SMEs investing in management development has a positive effect on the innovation activities and organizational performance.

The third set of contingencies focuses on resource, attitude and behavioural dimensions. Resource dimensions' focus on the lack of skills amongst managers and significant skill gaps within the SME (Garavan et al 2016). The owner- manager is a central attitudinal dimension. For example, there may be negative perceptions amongst SME owner-managers concerning the benefits of MD (Barret, 2015; Gold and Thorpe, 2010), doubts about the value of MD to meet the unique skill needs of the SME (Fuller-Love, 2006) and scepticism about external providers (Bishop, 2008). Coetzer et al. (2011) found that a high regard and orientation for learning by owner-managers combined with a high regard for task resolution and reflective learning were important in explaining MD in SMEs. Overall, studies highlight the central role of owner-manager attitudes in the context of training and development (Harney and Alkhalaf, 2020; Garavan et al 2016). However, there is a paucity of research on other behavioural dimensions such as internal knowledge sharing, knowledge seeking behaviours, and use of information from external sources. We propose however that these behaviours within SMEs may be conducive to management development activities. Figure 1 presents our conceptual framework.

Figure 1: Conceptual Framework explaining the predictors of Management Development in SMEs



METHODOLOGY

Research Context

The context of the study is the Republic of Ireland. There are over 271,000 SMEs in Ireland of which 93% are categorised as micro firms employing less than 10 people (CSO, 2019). Accounting for 99.8% of total enterprises in Ireland and 68% of total employment, SMEs are critical to the sustainability of the Irish economy. SMEs and entrepreneurship are central to ROIs challenge of generating a broad based growth and prosperity that builds on and extends its successes in attracting high quality foreign direct investment. A study by the OECD on SME and Entrepreneurship policy in Ireland in 2019 identifies a number of challenges for SMEs in Ireland including increasing productivity growth in SMEs (OECD, 2019). Meanwhile, the Leading the Way report on management development in Irish SMEs (EGFSN, 2020) makes a number of important recommendations for the sector including the need to prioritise management development, the importance of learning from external sources, and using available data to improve productivity. Ireland overall has a strong policy focus on management development in SMEs. The National Skills Strategy 2025 states that "improving management practices in SMEs will improve productivity, innovation and use of skills in the economy." Meanwhile, Enterprise 2025 commits to "deliver a demonstrable uplift in leadership and management capability across the enterprise base". While government agencies and industry support bodies are prioritising management development for Irish SMEs, there is limited up to date knowledge on the factors shaping the adoption of management and leadership development in SMEs. The body of evidence has been described as fragmented, disjointed and of mixed quality. Data pertaining to Irish organisations is particularly scant and this is accentuated in the context of SMEs.

Sample, Instrumentation and Data Collection

This sample was drawn from a mix of randomly selected SMEs provided by the Companies Registration Office and the promotion of the survey through various government and industry support agencies The data reported in this study is based on a structured survey comprised of 46 questions. These questions investigated a variety of contingency factors including SME contextual characteristics, owner-manager attitudes to MD, and data on decision making, knowledge seeking and sharing, innovation and innovation outcomes, strategizing, operational practices, managing people, digital and financial literacy. The survey was administered using a combined face to face, telephone and online approach. A pilot to test

the survey was carried out in advance involving 31 SME owner / owner-managers. Overall 280 surveys were collected by telephone, face to face formats before launch of the survey online where 195 additional surveys were incorporated into the dataset including micro firms of between 5-9 employees. In total 453 usable surveys were collected from SME owner managers and managers across 401 SMEs. For this study we excluded micro firms from the sample because of the small number of respondents (39). We also excluded a small number of firms that were less than one year established. Respondents included manufacturing (26%) and service (74%) firms and crossed a broad spectrum of industries.

Data analysis

We conducted data analysis using SPSS, Statistical Product and Service Solutions (originally Statistical Package for the Social Sciences). The data were analysed using descriptive statistics including mean and standard deviation to describe individual variables. Relationships between variables has been analysed using cross tabulations (with chi square and layered chi square to measure independence) and correlation analysis. Layered chi square measured dichotomous variables related to management development type when considering firm size. Hayes (2015) process Model 1 bootstrap was integrated into SPSS to test size as a moderating variable on ordinal Likert scale predictors.

STUDY FINDINGS

Table 1 presents the means, standard deviations and significance levels for the variables included in the study.

The Salience of Firm Size. We first of all investigated whether firm size predicted the six dimensions of MD included in our study. We found that firm size predicted experiential MD activities ($p = 0.031$), formal internal MD ($p = 0.003$), formal internal MD with an external expert ($p = 0.013$), formal external MD ($p = 0.002$), one to one MD ($p = 0.008$) and the budget for MD ($p = 0.030$). Overall, firm size is significant in explaining all dimensions of MD.

The impact of Resource, Attitudinal and Behavioural Contingencies on MD in Small and Medium Sized Firms. Table 1 reveals that when it came to resource, attitudinal and behavioural contingencies these were generally not significant in explaining differences between small and medium sized firms and the six dimensions of MD. Overall, we found that there very few differences between these dimensions within the two firm size categories.

However, we did find that knowledge sharing behaviour explained differences in the greater use of experiential development (p = 0.031), formal internal development (p = 0.001), and formal internal development with external experts (p = 0.020) in small firms. It also explained attitudes to MD differed by size One to One MD (p = 0.043). It was also significant in explaining the existence of a budget for MD in small firms ((p = 0.009).

The impact of Technological and Innovation Contingencies on MD in Small and Medium Sized Firms. Table I reveals that when it came to technological and innovation contingencies we found that the extent of digital intensity was the only dimension that was significant by size within experiential learning (p = 0.035) and one to one MD (p = 0.035). We found that innovation related contingencies were significant for two dimensions of MD. for example technologically improved product or services predicted greater use of experiential MD in medium sized firms ((p = 0.013). In addition, the extent of breakthrough innovations was also significant in explaining greater use of experiential development in small firms (p = 0.037) and the existence of a budget for MD in small firms (p = 0.041). The development of a new product/service range was also significant in explaining the existence of a budget for MD in small firms ((p = 0.007).

The impact of Contextual Contingencies on MD inn Small and Medium Sized Firms. Table I reveals that when it came to contextual contingencies a number of contingencies were particularly salient. The age of the firm was significant in explaining the greater use of experiential development in ((p = 0.000) with firms 10+ years having more experiential development activities in both small and medium firms. firm age also explained differences in formal internal development (p = 0.004), internal MD with external support (p = 0.015), formal external development (p = 0.002) and a formal budget for MD in both small and medium firms ((p = 0.000). The existence of clearly articulated business strategy was significant in explaining the greeter use of experiential development (p = 0.050) in medium firms, the use of one-to-one development (p = 0.027) and the existence of formal MD budget (p = 0.0260 in medium sized firms. The use of formal strategic planning processes was significant contingency in explaining the formal internal development ((p = 0.018), the use of formal internal development with external support ((p = 0.050), one-to one MD (p = 0.048), and the existence of budget for MD (p = 0.038) in medium sized firms. The existence of international sales was a significant predictor in explaining differences between small and medium sized firms for five of the six MD dimensions in medium sized firms. the relevant significances were as follows: experiential

MD (p = 0.001), formal internal development (p = 0.002), formal inter al development with external support (p = 0.000), formal external development (p = 0.001) and one-to one-development (p = 0.009).

DISCUSSION

This study set out investigate MD in small and medium sized firms and whether contextual, resource, attitudinal and resource contingencies and technological and innovation contingencies where relevant in explaining differences between small and medium firms. this is an important question to investigate given that we know relatively little on what factors are important in predicting MD. Unlike previous studies we investigated the full range of MD practices and activities. Consistent with our theoretical approach we found support for a number of important contingencies.

Our study therefore responds to an important gap in the literature on MD in SMEs. Academics have called for better insight understanding the predictors of management development in SMEs (Garavan et 2020; Rauch and Hatak, 2016) while training providers and policy makers are frustrated by persistently poor take up on such supports and training initiatives (e.g. EGFSN, 2020). Investigation of predictors of MD in SMEs is a worthy research endeavour given that industry and government support agencies have developed rich frameworks to help map and categorise the wide range of skills needed based on SME competence requirements (e.g. Skillnet, 2021; EU, 2003). The problem of poor SMEs engagement in management development however is pervasive and recognised internationally (Nolan and Garavan, 2016; Hubner and Baum, 2018; Smallbone et al., 2015) despite well recognised benefits (e.g. Lai et al, 2013, Lubatkin et al., 2006).

We found that firm size is a very important predictor of the six dimensions of MD included in our study. It is well recognised that small firms and medium firms are not the same (Terilinck, 2017; Nooteboom et al., 2007; Ahuja and Lampert, 2001). In addition, we also found support that thee three categories of contingencies may operate differently depending on whether the firm is a small or a medium one. a number of very salient findings emerged: (1) The existence of knowledge sharing practices and behaviours was significant in small firms in

explaining experiential and both categories of formal internal MD. (2) Dimensions of innovation including technologically improved products and services and breakthrough innovations were important in explaining experiential development and a budget for MD in small firms. (3) Firm age was particularly significant with firms 10+ years having higher levels of experiential development, more formal internal and internal with externally supported MD and the existence of a budget for MD. (4) the existence of a clearly articulated business strategy was a significant predictor in explaining the existence of more experiential development, one-to-one MD and the existence of a budget for MD in medium sized firms. (5) Internationalisation in the form of international sales emerged as particularly significant to five of the six dimensions of MD with the exception of a budget for formal MD. what emerges with particular clarity is that contextual dimensions are the most significant including strategy, strategic plaining processes and internationalisation.

Overall, the study highlights important policy and practice implications. Chief amongst these is a somewhat different approach to MD in small versus medium forms and the need to develop supports that target specific contingencies in a more focused manner. The findings are also suggestive that were policy makers help firms with strategic planning and internationalisation this will likely result in more investment in MD. Finally, the findings point to the need to give particular focus and supports to yonder firms in order for them to gain some of the advantages that accrue to older firms.

References

Abdullah, N. H., Wahab, E., & Shamsuddin, A. (2010). Human resource management practices as predictors of innovation among Johor SMEs. Paper presented at the 872-877. https://doi.org/10.1109/CSSR.2010.5773910.

Acs, Z. J., Morck, R., Shaver, J. M.& Yeung, B. (2003). The Internationalization of Small and Medium-Sized Enterprises: A Policy Perspective. In D. V. Audretch (Ed.), SMEs in the Age of Globalization. Northampton, MA: An Elgar Reference Collection.

Admiraal, W., and Lockhorst, D. (2009), 'E-learning in small and medium-sized enterprises across Europe: attitudes towards technology, learning and training', International Small Business Journal, Vol 27, No 6, pp 743–767.

Ahuja, G. and Lampert C.M. (2001) Entrepreneurship in the large corporation: A longitudinal study of how established firms create breakthrough inventions. Strategic Management Journal, 22, pp. 521-543.

Armstrong, S. J., & Sadler-Smith, E. (2008). Learning on demand, at your own pace, in rapid bite-sized chunks: The future shape of management development? Academy of Management Learning & Education, 7(4), 571-586. https://doi.org/10.5465/AMLE.2008.35882197

Baron, J. N., & Hannan, M. T. (2002). Organizational blueprints for success in high-tech start-ups: Lessons from the Stanford project on emerging companies. California Management Review, 44(3), 8–36

Barrett, R. (2015) Small Firm Training: Just Meeting the Day-To-Day Needs of the Business. Employee Relations, 37 (5): 547–567.

Benner MJ, Tushman ML. 2003. Exploitation, exploration, and process management: the productivity dilemma revisited. Academy of Management Review 28(2): 238– 256.

Birdthistle, N., & Fleming, P. (2007). Under the microscope: A profile of the family business in Ireland. Irish Journal of Management, 28(2), 135.

Bishop, D. (2008), 'The small enterprise in the training market', Education & Training, Vol 50, No 8/9, pp 661–673.

Boumediene Ramdani, Siddhartha Raja & Marina Kayumova (2021): Digital innovation in SMEs: a systematic review, synthesis and research agenda, Information Technology for Development, DOI: 10.1080/02681102.2021.1893148.

Brand, M., & Bax, E. (2002). Strategic HRM for SMES: Implications for firms and policy. Education and Training, 44(8/9), 451–463.

Broszeit, S., Fritsch, U., Gorg, H., & Laible, M. (2016). Management practices and productivity in Germany. Kiel Institute for World Economy.

Camison-Zornoza C, Lapiedra-Alcami R, Segarra-Ciprés M, Boronat-Navarro M. 2004. A meta-analysis of innovation and organizational size. Organization Studies 25(3): 331– 361.

Centre for Enterprise (2001), Management and Leadership Development in the East Midlands: Is Supply Meeting Demand, Centre for Enterprise, Leicester.

Chadwick, C, Way, SA, Kerr, G. (2012) Boundary conditions of the high-investment human resource systems-small-firm labour productivity relationship. Personnel Psychology 66(2): 311–343.

Churchill, N. and Lewis, V. (1983), "The five stages of small business growth", Harvard Business Review, Vol. 83 No. 3, pp. 3-12.

Coetzer, A., Battisti, M., Jurado, T., and Massey, C. (2011), 'The reality of management development in SMEs', Journal of Management and Organisation, Vol 17, No 3, pp 290–306.

Curran, J., Blackburn, R.A., Kitching, J. and North, J. (1996), Establishing Small Firms' Training Practices, Needs Difficulties and Use of Industry Training Organisations, DfEE Research Study, RS17, London.

Deakins, D., Battisti, M., Coetzer, A., & Roxas, H. (2012). Predicting management development and learning behaviour in New Zealand SMEs. International Journal of Entrepreneurship and Innovation, 13(1), 11-24. https://doi.org/10.5367/ijei.2012.0060

Deakins, D., & Freel, M. (1998). Entrepreneurial learning and the growth process in SMEs. The Learning Organization, 5(3), 144-155. https://doi.org/10.1108/09696479810223428.

Delery, J. E., & Doty, D. H. (1996). Modes of theorizing in strategic human resource management: Tests of universalistic, contingency, and configurational performance predictions. Academy of Management Journal, 39(4), 802-835. https://doi.org/10.2307/256713.

Dragoni, L., Tesluk, P.E., Russell, J.E.A. and Oh, I. (2009), "*Understanding managerial development: integrating developmental assignments, learning orientation, and access to developmental opportunities in predicting managerial competencies*", Academy of Management Journal, Vol. 52, pp. 731-743.

EGFSN (2020), Leading the Way: Investing in management development for SME productivity and growth. Department of Enterprise, Trade and Employment. Available at: https://www.gov.ie/en/publication/b70e4-leading-the-way/.

EU (2003). Competence development in SMEs. European Commission, Enterprise DG, Information and Communication Unit, Documentation Centre. Available at: https://ec.europa.eu/docsroom/documents/3216/attachments/1/translations/en/renditions/pdf.

Forth, J., & Bryson, A. (2019). Management practices and SME performance. Scottish Journal of Political Economy, 66(4), 527-558.

Fuller-Love, N. (2006), 'Management development in small firms', International Journal of Management Reviews, Vol 8, No 3, pp 175–190.

Garavan, T. N., McGuire, D., & Lee, M. (2015). Reclaiming the "D" in HRD: A typology of development conceptualizations, antecedents, and outcomes. Human Resource Development Review, 14(4), 359-388. https://doi.org/10.1177/1534484315607053.

Garavan, T., Watson, S., Carbery, R., & O'Brien, F. (2016). The antecedents of leadership development practices in SMEs: The influence of HRM strategy and practice. International Small Business Journal, 34(6), 870-890. https://doi.org/10.1177/0266242615594215.

Garavan, T. N., Heneghan, S., O'Brien, F., Gubbins, C., Lai, Y., Carbery, R., Duggan, J., Lannon, R., Sheehan, M., & Grant, K. (2020;2019;). L&D professionals in organisations: Much ambition, unfilled promise. European Journal of Training and Development, 44(1), 1-86. https://doi.org/10.1108/EJTD-09-2019-0166

Gibb, A (2009) Meeting the development needs of owner managed small enterprise: A discussion of the centrality of action learning. Action Learning: Research and Practice 6: 209–227.

Gibb, A.A. (1997), "Small firms' training and competitiveness. building upon the small business as a learning organisation", International Small Business Journal, Vol. 15 No. 3, pp. 13-29.

Gold, J. and Thorpe, R. (2010) Leadership and Management Development in Small and Medium-Sized Enterprises: SME Worlds. In Gold, J., Thorpe, R. and Mumford, A. (eds.), Gower Handbook of Leadership and Management Development (5th ed.). Farnham: Gower Publishing, pp.133-150.

Government of Ireland, Enterprise 2025 Renewed

Gulati, R., & Nohria, N. a. W., F. 2010. Roaring Out of Recession. Harvard Business Review.

Harney, B., Fu, N., & Freeney, Y. (2018). Balancing tensions: Buffering the impact of organisational restructuring and downsizing on employee well-being. Human Resource Management Journal, 28(2), 235-254. https://doi.org/10.1111/1748-8583.12175.

Harney, B., & Alkhalaf, H. (2021;2020;). A quarter-century review of HRM in small and medium-sized enterprises: Capturing what we know, exploring where we need to go. *Human Resource Management, 60*(1), 5-29. https://doi.org/10.1002/hrm.22010

Hausman, A. (2005). Innovativeness among Small Businesses: Theory and Propositions for Future Research. Industrial Marketing Management, 34, pp. 773-782.

Hayes, A. F. (2015). An index and test of linear moderated mediation. Multivariate Behavioral Research, 50(1), 1-22. https://doi.org/10.1080/00273171.2014.962683.

Hubner, S. V., & Baum, M. (2018). Entrepreneurs' human resources development. Human Resource Development Quarterly, 29(4), 357-381

Hudson MA, Smart A, Bourne M. 2001. Theory and practice in SME performance measurement systems. International Journal of Operations & Production Management 21(8): 1096– 1115.

Jayawarna, Dilani; Macpherson, Allan; Wilson, Alison. Education & Training; London Vol. 48, Iss. 8/9, (2006): 666-681. DOI:10.1108/00400910610710083.

Kao, J. J. (1991). The Entrepreneurial Organization. New Jersey: Prentice-Hall Inc.

Kempster, S, Parry, K (2014) Exploring observational learning in leadership development for managers. Journal of Management Development 33(3): 164–181.

Kitching J and Marlow S (2013) "HR practice and small firm growth: balancing informality and formality", in Saridakis G and Cooper C (eds) How Can HR Drive Growth? Cheltenham: Edward Elgar

Kitching, J. and Blackburn, R. (2002), The Nature of Training and Motivation to Train in Small Firms, Small Business Research Centre, Kingston University, London.

Klaas, B. S., Semadeni, M., Klimchak, M., & Ward, A. K. (2012). High-performance work system implementation in small and medium enter-prises: A knowledge-creation perspective. Human Resource Management, 51(4), 487–510

Kraus S, Reiche BS, Reschke CH. 2009. Implications of strategic planning in SMEs for internal entrepreneurship research and practice. In Energizing Management through Innovation and Entrepreneurship: European Research and Practice (Routledge Studies in Innovation, Organization and Technology), M Terziovski (ed). Routledge: Abingdon, UK; 110– 127.

Lai, Y., Saridakis, G., Blackburn, R., & Johnston, S. 2016. Are the HR responses of small firms different from large firms in times of recession? Journal of Business Venturing, 31: 113-131.

Lubatkin, M, Simsek, Z, Ling, Y. (2006) Ambidexterity and performance on small- to medium-sized firms: The pivotal role of TMT behavioural Integration. Journal of Management 32: 646–672.

Massa, S., and Testaa, S. (2008) Innovation and SMEs: Misaligned perspectives and goals among entrepreneurs, academics, and policy makers. Technovation, 28 (7), 393-407.

Maurer, T., Dimotakis, N., Hardt, G., & Corner, A. J. (2021;2020;). Toward better understanding developmental reflection differences for use in management development research and practice. *The Journal of Management Development, 40*(1), 52-73. https://doi.org/10.1108/JMD-11-2020-0349

McClean, E., & Collins, C. J. (2019). Expanding the concept of fit in strategic human resource management: An examination of the relationship between human resource practices and charismatic leadership on organizational outcomes. Human Resource Management, 58(2),187–202

McGuire, D., Garavan, T., O'Donnell, D., Saha, S., and Cseh, M. (2008), 'Managers' personal values as predictors of importance attached to training and development: a cross-country exploratory study', Human Resource Development International, Vol 11, No 4, pp 335–350.

Messersmith, JG, Guthrie, JP (2010) High performance work systems in emergent organisations: Implications for firm performance. Human Resource Management 49: 241–264.

Morgan, A., Mayes, S. and Smith, E. (2002), The Age of Business, its Potential to Learn and the need for Support, Report for the Small Business Service by Trends Business Research, Newcastle Upon Tyne.

Government of Ireland (2021). Ireland's National Skills Strategy 2025. Available at: https://www.gov.ie/en/publication/69fd2-irelands-national-skills-strategy-2025-irelands-future/.

Narayanan VK. 2001. Managing Technology and Innovation for Competitive Advantage. Prentice-Hall: Upper Saddle River, NJ.

Ngah, R. And Ibrahim, A.R. (2009). The Relationship of Intellectual Capital, Innovation and Organizational Performance: a Preliminary Study in Malaysian SMEs. International Journal of Management Innovation Systems, 1 (1).

Nolan, C. T., & Garavan, T. N. (2016). Human resource development in SMEs: A systematic review of the literature. International Journal of Management Reviews, 18(1), 85-107.

Nooteboom, B., Vanhaverbeke, W., Duysters, D., Gilsing, V. van den Oord A. (2007) Optimal cognitive distance and absorptive capacity. Research Policy, 36 (2007), pp. 1016-1034.

OECD, (2019): SME and Entrepreneurship Policy in Ireland

O'Regan N, Ghobadian A, Gallear G. 2005. In search of the drivers of high growth in manufacturing SMEs. Technovation 26(1): 30– 41.

Padachi, K., & Lukea Bhiwajee, S. (2016). Barriers to employee training in small and medium sized enterprises: Insights and evidences from mauritius. European Journal of Training and Development, 40(4), 232-247. https://doi.org/10.1108/EJTD-02-2014-0018.

Perren, L. and Grant, P. (2001), Management and Leadership in UK SMEs: Witness Testimonies from the World of Entrepreneurs and SME Managers, The Council for Excellence in Management and Leadership, London.

Polyhart, RE (2006) Staffing in the 21st century: new challenges and strategic opportunities. Journal of Management 32: 868–897.

OECD (2019) SME and Entrepreneurship Policy in Ireland. Organistion for Economic Development. Doi. https://doi.org/10.1787/20780990.

Qian G, Li L. 2003. Profitability of small- and medium-sized enterprises in high-tech industries: the case of the biotechnology industry. Strategic Management Journal 24(9): 881–887.

Quinton, S., Canhoto, A., Molinillo, S. R Pera & Budhathoki, T. (2018) Conceptualising a digital orientation: antecedents of supporting SME performance in the digital economy, Journal of Strategic Marketing, 26:5, 427-439, DOI: 10.1080/0965254X.2016.1258004.

Rauch, A., & Hatak, I. (2016). A meta-analysis of different HR-enhancing practices and performance of small and medium sized firms. Journal of Business Venturing, 31(5), 485-504. https://doi.org/10.1016/j.jbusvent.2016.05.005

Saleh SD, Wang CK. 1993. The management of innovation: strategy, structure, and organizational climate. Engineering Management 40(1): 14– 21.

Samson D, Terziovski M. 1999. The relationship between total quality management practices and operational performance. Journal of Operations Management 17(3): 393– 409.

Schein, E. (2004). Organizational culture and leadership (3rd Ed. ed.). San Francisco: Jossey-Bass.

Schlosser, F (2015) Identifying and differentiating key employees from owners and other employees in SMEs. Journal of Small Business Management 53: 37–53.

Scott, P., Jones, B., Bramley, A. and Bolton, B. (1996), "Enhancing technology and skills in small and medium sized manufacturing firms: problems and prospects", International Small Business Journal, Vol. 14 No. 3, pp. 85-100.

Short, H. J., & Gray, D. E. (2018). HRD in SMEs: A research agenda whose time has come. Human Resource Development Quarterly, 29(1), 7-13.

Skillnet (2021). New ‘MentorsWork’ online competency tool allows SMEs to identify key skills gaps. Available online: https://www.skillnetireland.ie/new-mentorswork-online-competency-tool-smes-identify-key-skills-gaps/.

Smallbone, D, Kitching, J, Blackburn, R. (2015) Anchor Institutions and Small Firms in the UK: A Review of the Literature on Anchor Institutions and Their Role in Developing Management and Leadership Skills in Small Firms. Yorkshire: Commission for Employment and Skills.

Smith, A. and Whittaker, J. (1999), "Management development in SMEs: what needs to be done?", Journal of Small Business and Enterprise Development, Vol. 5 No. 2, pp. 176-85.

Smith, B, Morse, E (2005) Entrepreneurship Competencies: Literature Review and Best Practices. Ottawa, ON, Canada: Small Business Policy Branch, Industry Canada.

Storey, D.J. (2004), "Exploring the link, among small firms, between management training and firm performance: a comparison between the UK and other OECD countries", International Journal of Human Resource Management, Vol. 15 No. 1, pp. 112-30.

Subramony, M (2009) A meta-analytic investigation of the relationship between HRM bundles and firm performance. Human Resource Management 48: 745–768.

Susomrith, P., & Coetzer, A. (2015). Employees' perceptions of barriers to participation in training and development in small engineering businesses. The Journal of Workplace Learning, 27(7), 561-578. https://doi.org/10.1108/JWL-10-2014-0074.

Teirlinck, P. (2017). Configurations of strategic R&D decisions and financial performance in small-sized and medium-sized firms. Journal of Business Research, 74, 55-65. https://doi.org/10.1016/j.jbusres.2017.01.008

Teo, STT, Le Clerc, M, Galang, MC (2011) Human capital enhancing HRM systems and frontline employees in Australian manufacturing SMEs. International Journal of Human Resource Management 22(12): 2522–2538.

Thorpe, R, Cope, J, Ram, M. (2009) Leadership development in small and medium sized enterprises: The case for action learning. Action Learning: Research and Practice 6(3): 201–208.

van Dyck, C., Frese, M., Baer, M. and Sonnentag, S. (2005), "*Organizational error management culture and its impact on performance: a two-study replication*", Journal of Applied Psychology, Vol. 90, pp. 1228-1240.

Verreynne, M. L., Parker, P., & Wilson, M. (2012). Employment systems in small firms: A multilevel analysis. International Small Business Journal,31(4), 405–431

Webster, B., Walker, B.N., and Dorney, B. (2004), 'Training and improving productivity in the small business sector', Proceedings of the 17th Annual SEAANZ Conference 2004, Entrepreneurship as the Way of the Future, 26–29 September, Brisbane, Queensland.

Table 1: Means, standard deviations and significance measures of predictor variables for the sample of small sized and medium sized firms

	Experiential learning					Formal internal staff					Formal internal external expert					Formal external					One to one MD					Budget for MD				
Small firm respond - n = 247	(N = 170)		(N = 128)			(N = 113)		(N = 99)			(N = 85)		(N = 76)			(N = 135)		(N = 113)			(N = 69)		(N = 66)			(N = 106)		(N = 94)		
Medium firm resond - n = 163	Small		Medium			Small		Medium			Small		Medium			Small		Medium			Small		Medium			Small		Medium		
Number of SMEs - n=360	Mean	sd.	Mean	sd.	p	Mean	sd.	Mean	sd.	p	Mean	sd.	Mean	sd.	p	Mean	sd.	Mean	sd.	p	Mean	sd.	Mean	sd.	p	Mean	sd.	Mean	sd.	p
Size as predictor of management development					0.031					0.003					0.013					0.002					0.008					0.030
Behaviours and attitude																														
Management skills	3.67	0.80	3.80	0.71	0.158	3.79	0.77	3.87	0.74	0.437	3.79	0.76	3.91	0.66	0.285	3.82	0.77	3.88	0.69	0.504	3.58	0.69	3.79	0.62	0.068	3.90	0.78	3.91	0.68	0.811
Attitude towards management development	3.80	0.64	3.88	0.60	0.279	3.90	0.58	3.95	0.61	0.562	3.97	0.55	3.98	0.63	0.968	3.91	0.58	3.92	0.58	0.894	3.87	0.50	3.99	0.58	0.043	3.98	0.57	3.98	0.56	0.958
Knowledge seeking behaviour	3.95	0.73	3.88	0.68	0.427	4.08	0.66	3.96	0.68	0.200	4.04	0.63	3.94	0.66	0.310	4.05	0.71	3.91	0.70	0.112	4.01	0.60	3.93	0.69	0.515	4.18	0.64	3.93	0.69	0.009
Knowledge sharing behaviour	4.03	0.68	3.85	0.74	0.031	4.19	0.61	3.87	0.75	0.001	4.14	0.58	3.90	0.74	0.020	4.03	0.71	3.94	0.67	0.290	3.96	0.71	3.95	0.68	0.937	4.12	0.66	3.95	0.70	0.088
Use of information from external sources	3.63	1.03	3.63	0.97	0.968	3.75	0.97	3.73	0.93	0.935	3.76	0.91	3.76	0.92	0.977	3.77	0.91	3.68	0.98	0.452	3.69	1.00	3.72	0.96	0.831	3.78	1.01	3.83	0.89	0.592
Internal knowledge sharing approaches for decision making	3.83	0.95	3.99	0.75	0.101	3.99	0.88	4.10	0.66	0.287	3.97	0.85	4.10	0.63	0.282	3.97	0.91	4.06	0.73	0.412	4.03	0.72	4.09	0.56	0.620	4.17	0.90	4.14	0.76	0.929
Technological/innovation capacity																														
Technological intensity	3.32	1.20	3.46	1.18	0.327	3.58	1.12	3.61	1.27	0.847	3.55	1.12	3.65	1.25	0.592	3.54	1.20	3.53	1.21	0.946	3.38	1.27	3.63	1.07	0.212	3.72	1.08	3.83	1.01	0.497
Frequency of use of data sources	2.51	0.83	2.64	0.85	0.202	2.61	0.74	2.69	0.90	0.518	2.57	0.72	2.70	0.85	0.311	2.66	0.81	2.70	0.81	0.682	2.69	0.80	2.77	0.76	0.526	2.82	0.76	2.82	0.83	0.891
Digital intensity	3.14	1.08	3.38	1.07	0.047	3.45	1.01	3.61	1.01	0.256	3.39	0.94	3.61	0.99	0.139	3.36	1.08	3.45	1.04	0.486	3.16	1.06	3.54	0.96	0.035	3.73	1.05	3.69	0.99	0.896
Digital literacy	3.96	0.98	3.98	1.04	0.918	3.92	1.00	4.00	1.02	0.615	3.92	1.01	3.98	1.07	0.749	3.87	0.99	4.04	1.04	0.273	3.80	0.95	4.08	1.02	0.223	4.04	0.97	4.13	0.98	0.444
Innovations over last 3 years:	%		%			%		%			%		%			%		%			%		%			%		%		
New product/service	53%		60%		0.213	56%		62%		0.359	58%		66%		0.303	57%		64%		0.263	60%		63%		0.690	69%		68%		0.941
Technologically improved product/service	53%		84%		0.013	59%		82%		0.384	61%		88%		0.133	60%		86%		0.111	61%		83%		0.554	66%		83%		0.606
Extension of product/service line	81%		82%		0.573	81%		80%		0.795	81%		83%		0.222	85%		83%		0.888	88%		85%		0.375	85%		84%		0.732
Changes to existing	75%		67%		0.144	75%		65%		0.389	79%		72%		0.490	77%		70%		0.207	85%		66%		0.941	86%		69%		0.764
Development of new product/service range	75%		70%		0.357	78%		72%		0.319	84%		74%		0.127	75%		74%		0.851	76%		72%		0.582	87%		71%		0.007
Breakthrough innovations	28%		17%		0.037	31%		24%		0.303	30%		24%		0.386	29%		19%		0.068	34%		25%		0.221	36%		22%		0.041
Major technological advance in product/service	30%		30%		0.968	36%		33%		0.645	36%		34%		0.765	34%		35%		0.976	37%		27%		0.21	34%		35%		0.860
Major functional improvement in product/service	47%		57%		0.086	53%		57%		0.563	58%		59%		0.841	54%		61%		0.246	62%		57%		0.57	61%		65%		0.566
Process innovation	66%		74%		0.152	69%		72%		0.558	69%		74%		0.549	67%		76%		0.131	78%		80%		0.81	81%		76%		0.336
Investment in R&D	60%		65%		0.400	70%		68%		0.842	73%		70%		0.653	63%		70%		0.250	65%		71%		0.49	77%		71%		0.325
Context																														
Sector:					0.197					0.178					0.828					0.398					0.825					0.677
Manufacturing	22%		29%			20%		28%			24%		25%			24%		29%			29%		27%			29%		27%		
Service	78%		71%			80%		72%			76%		75%			76%		71%			71%		73%			71%		73%		
Firm Age:					0.000					0.004					0.015					0.002					0.103					0.000
Age of firm + 10 years	77%		92%			76%		91%			76%		91%			80%		94%			81%		91%			74%		93%		
Age of firm 1-9 years	23%		8%			24%		9%			24%		9%			20%		6%			19%		9%			26%		7%		
Clearly articulated business	79%		87%		0.051	86%		92%		0.217	87%		92%		0.286	82%		88%		0.231	81%		94%		0.027	87%		96%		0.026
Formal strategic planning	34%		44%		0.090	35%		52%		0.018	41%		57%		0.051	40%		47%		0.274	41%		58%		0.048	40%		54%		0.038
International sales	41%		62%		0.001	26%		47%		0.002	19%		37%		0.000	33%		54%		0.001	16%		32%		0.009	30%		46%		0.093
Intention to internationalise	68%		73%		0.330	63%		44%		0.125	23%		36%		0.146	38%		53%		0.375	22%		29%		0.455	32%		45%		0.787

*% = Chi-square test (layering) - p <0.05

**Independent samples t-test on ordinal variables - p <0.05 (cross checked against Kruskal-Wallis ANOVA for non parametric data - p <0.05)

Table 2: Correlations among predictor variables

	Medium sized firms																							
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Sector (Manuf/Serv)		-0.050	-0.083	-0.015	-0.015	-0.044	0.031	0.046	-.179*	-.297**	-0.082	0.008	-0.120	0.027	-.187*	-0.087	-0.131	-.329**	-0.044	0.056	0.073	0.131	0.052	0.000
Est (+/- 10 yrs)	-0.036		-0.144	-0.131	0.015	0.149	-0.005	0.055	-0.004	-0.121	0.043	0.092	0.006	-0.151	0.003	0.066	-0.048	0.049	0.012	0.012	-0.028	0.014	-0.062	-0.029
Technological intensity	-0.049	-0.023		.400**	0.044	0.105	0.094	0.126	.247**	.320**	0.082	0.078	0.071	0.125	.166*	.230**	0.132	.162*	.206**	0.127	.364**	0.096	.301**	.228**
Management skills	-0.099	.130*	.364**		0.030	0.138	.333**	.335**	0.079	0.139	0.083	.155*	0.056	.246**	0.153	.165*	.164*	0.087	.246**	0.053	.195*	.329**	.344**	.315**
Attitude towards MD	-0.093	-0.048	.163*	0.112		0.079	0.117	.289**	0.143	-0.013	-0.006	0.032	0.127	0.024	0.123	.241**	.164*	0.072	.194*	.174*	-0.035	0.106	.204**	0.085
Sources of data and frequency of use	-0.098	.144*	.300**	.308**	.189**		.197*	0.072	0.132	0.030	-0.037	0.060	0.083	0.103	0.130	0.120	0.010	0.007	.168*	0.064	.269**	.232**	.286**	.191*
Knowledge seeking behaviour	0.012	0.002	.233**	.307**	.329**	.257**		.521**	0.150	0.106	.167*	.202*	.279**	0.151	0.048	0.101	0.141	.226**	0.056	0.142	0.106	.310**	.239**	.457**
Knowledge sharing behaviour	0.029	-0.001	.163*	.280**	.228**	0.036	.641**		.184*	0.138	.168*	.361**	.295**	0.140	0.130	.212**	.219**	.262**	.169*	0.143	0.016	.299**	.297**	.383**
New product/service	-.156*	-.149*	.314**	0.077	-0.074	0.077	0.063	-0.034		.670**	.280**	.275**	.479**	.220**	.295**	.257**	.380**	.270**	.181*	0.142	0.053	0.089	.206**	.175*
Technologically improved product/service	-.170**	-0.099	.315**	0.046	-0.075	0.105	.143*	0.014	.716**		.366**	.293**	.351**	.182*	.318**	.211**	.330**	.288**	.221**	0.089	0.032	0.012	.187*	0.145
Extension of product/service line	-.127*	0.029	0.071	0.028	0.070	0.046	0.087	0.076	.167**	.207**		.494**	.343**	0.139	0.066	.274**	.378**	.184*	0.074	0.095	0.127	0.010	.198*	0.146
Changes to existing products/services	-0.055	0.029	0.062	.154*	0.088	0.057	0.121	.165*	0.070	0.067	.277**		.349**	.190*	.257**	.332**	.269**	0.084	0.145	0.051	0.009	0.141	.222**	0.135
Development of new range of products/ services	-0.026	-0.058	0.080	0.100	0.057	0.027	-0.026	0.032	.160*	0.079	.235**	.394**		.242**	.265**	.231**	.290**	.322**	0.151	0.021	-0.111	0.106	.243**	.212**
Breakthrough innovations	-.145*	-.210**	.196**	.172**	-0.012	0.061	0.077	0.062	.422**	.344**	0.096	0.075	.143*		.418**	.318**	.156*	0.115	0.138	-0.019	0.042	0.145	.274**	.166*
Major technological advance in product/service	-.163*	-.214**	.251**	.167**	-0.004	0.024	0.059	0.073	.381**	.358**	0.094	0.034	0.096	.490**		.396**	.242**	0.090	0.142	-0.103	0.150	0.151	.193*	.202*
Major functional improvement in product/service	-0.057	0.035	.251**	.243**	.151*	0.094	.177**	.205**	.204**	.250**	.171**	.352**	.207**	.236**	.426**		.356**	0.079	.261**	0.032	0.034	0.141	.348**	0.139
Procss innovation	-0.096	-0.037	.143*	.134*	0.097	0.094	0.088	.130*	0.089	.147*	.209**	.281**	.148*	.244**	0.118	.317**		.253**	0.124	.158*	0.012	0.007	.228**	.179*
Investment in R&D	-0.097	-.131*	.262**	0.097	0.043	0.100	.279**	.178**	.188**	.276**	.246**	.176**	.187**	.242**	.223**	.264**	.375**		0.139	0.148	-0.107	0.136	.166*	.304**
Clearly articulated business strategy	0.018	-0.095	.193**	.360**	.145*	.177**	.228**	.187**	.140*	0.107	0.032	0.067	0.116	.175**	.158*	.165*	.140*	0.063		0.091	-0.028	.237**	0.155	0.144
Formal strategic planning approaches	-0.075	-0.076	.167**	.178**	0.083	.147*	0.075	0.089	0.117	.137*	0.080	.182**	0.091	0.096	.147*	.294**	.159*	.196**	.234**		0.118	-0.026	0.086	0.065
Digital literacy	0.014	-0.083	.246**	0.150	0.019	0.112	.168*	0.071	0.096	0.135	.221**	0.019	0.078	0.130	.228**	0.079	0.094	0.148	0.152	.167*		-0.084	0.182	-0.016
Use of external information sources	0.029	0.058	.178**	.226**	0.099	.161*	.222**	.261**	0.037	0.018	0.004	0.112	-0.032	0.069	0.057	.208**	0.054	0.000	.183**	0.107	0.038		.395**	.333**
Digital intensity	-0.034	-0.055	.361**	.350**	.233**	.405**	.320**	.279**	.151*	.223**	0.072	0.080	.185**	.224**	.205**	.189**	.205**	.145*	.307**	0.087	.288**	.352**		.373**
Internal knowledge sharing approaches	-0.115	0.029	.327**	.165*	.194**	.280**	.465**	.398**	.134*	.146*	0.096	0.094	0.061	.172**	0.116	.230**	0.115	.282**	.153*	0.103	.180*	.236**	.322**	
	Small sized firms																							

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Note. *p , :05; **p , :01; †small sized firm sample below diagonal, medium sized firm sample above diagonal

Note also: 1,2,9,10,11,12,13,14,15,16,17,18,19,20 are binary variables.