

2019

Visual Inspection Better For Identifying Hazards Than Checklists

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Recommended Citation

Curran, D. & Hrymak, V. (2019). Visual inspection better for identifying hazards than checklists. *Health and Safety Review*, January/February 2019, pg. 24-25. doi:10.21427/P4T1-V651

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Visual inspection better for identifying hazards than checklists

Derrick Curran and Victor Hrymak explain DIT research showing that visual inspection can be significantly superior to checklists for identifying workplace hazards.

Railway maintenance presents many workplace hazards that need to be identified and controlled. Safety tours consisting of checklists are first choice methods for identifying workplace hazards in railway maintenance depots. But despite their ubiquity, the empirical ability of checklists to adequately observe hazards in workplaces has been questioned⁽¹⁾.

Furthermore, recent research from DIT has demonstrated that the fundamental human sensory-perceptual and cognitive processes involved in visual search can profoundly affect the number of hazards observed by environmental health and safety (EHS) professionals⁽²⁾. Simply put, some workplace inspection methods are better than others for observing hazards.

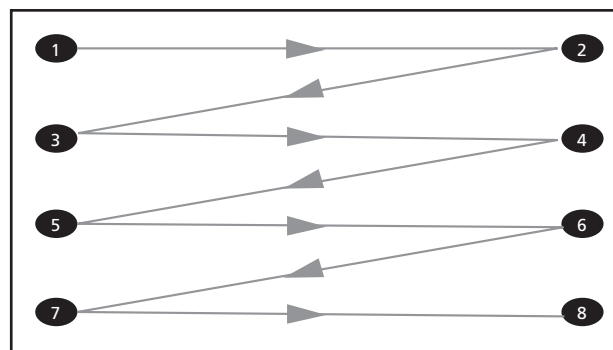
The aim of this study was to compare the effectiveness of checklists, against a novel visual search behavioural algorithm developed at DIT and designed to improve current visual inspection performance. This comparison was achieved by applying both methods to 11 Irish railway engineering depots and comparing how many hazards were identified by each method.

Method

Checklists were firstly used to identify the number of hazards observed at each of the 11 railway engineering depots. Each depot was then visually inspected by the authors using the novel method called systematic visual search. This method works by very precisely proceduralising visual search behaviour during workplace inspections.

It requires the observer to iteratively select specific areas for visual search such as the floor or a particular wall. These selected elements are then subjected to a consistent, meticulous and exhaustive visual search by using a set eye scanning pattern as seen in Fig 1 below. In effect, systematic visual search is a step by step process for ensuring all areas under analysis are adequately searched and no areas are left unobserved by the EHS professional conducting the workplace inspection.

FIGURE 1: Systematic Visual Search Eye Scanning Pattern

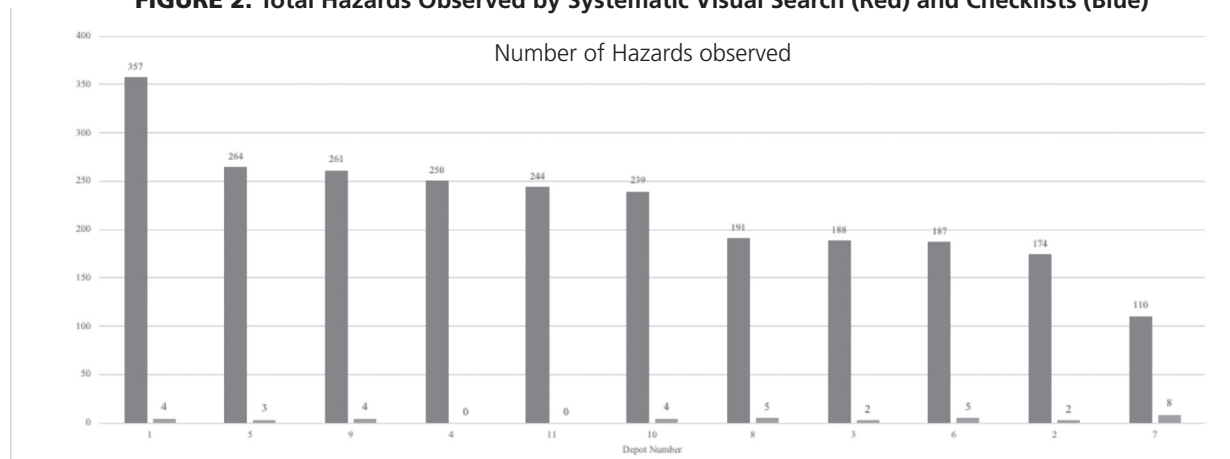


Results

The results were unequivocal. Systematic visual search demonstrated the observation of 2,465 hazards across the 11 railway maintenance depots. In addition, 329 of these observable hazards were considered high risk.

In sharp contrast, the checklist method identified less than 50 hazards across all depots, none of which were categorised as high risk. The bar chart in Fig 2 below graphically demonstrates this finding.

FIGURE 2: Total Hazards Observed by Systematic Visual Search (Red) and Checklists (Blue)



These results clearly demonstrate the limitations of checklists as a method of hazard identification, when compared to systematic visual search.

Discussion & Conclusion

The visual psycho-physics and risk analysis literature can in large part explain why checklists performed below expectation compared to systematic visual search in this study. Although useful, checklists possess a number of inbuilt limitations that will preclude all observable hazards being observed. These include scope, brevity and visual accuracy factors.

Furthermore, as humans we all possess sensory-perceptual and cognitive limitations that negatively affect our visual search accuracy⁽³⁾. These observational limitations are further compounded when checklists are used for visual inspections.

In summary, there are two headline findings from this study. The first finding raises concerns over the ubiquitous nature of checklists and their questionable ability in competently observing workplace hazards. The second finding demonstrates empirical evidence for using systematic visual search during visual inspections conducted for workplace safety.

A debate now needs to begin on just how much reliance can be placed on checklists, given their limitations. This is

especially so, given that systematic visual search has now generated robust empirical evidence for its own utility and can be considered a credible alternative to checklists.

(Derrick Curran is a railway engineering manager. He has 27 years' experience within the railway sector on engineering and passenger safety. He recently graduated with a First Class Honours from the MSc Environmental Health and Safety programme in the Dublin Institute of Technology. Dr Victor Hrymak is Course Tutor for the MSc programme and was supervisor for this thesis.)

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Farm risk assessment documents provide valuable assistance

Risk assessment documents can be useful in increasing health and safety implementation among farmers, but are most effective when accompanied by training and provided to farmers that already have a record of implementing OHS measures.

These are among the findings on farm risk assessment that formed part of the PhD thesis of Dr John McNamara, a health and safety extension specialist with Teagasc and an adjunct associate professor at School of Agriculture and Food Science, UCD.

Farming worldwide is a hazardous occupation and seeking strategies to assist farmers to effectively manage farm health and safety is a high priority, both in Ireland and internationally.

This has been the focus of a Prevention Initiative (PI) between the HSA and Teagasc (Agriculture and Food Development Authority) since the enactment of the SHWW Act 2005. Farms worldwide are predominantly small-scale and accordingly influencing farmers' health and safety management is crucial for progress.

The purpose of the PI was to devise the statutory Code of Practice (CoP) and Risk Assessment document (RAD), which was permitted under the 2005 Act, and then to evaluate advisory and training approaches on a pilot basis, including circulating the documents and providing training and advice, to assist farmers to comply with the statutory requirements.

The initial pilot phase of the PI was then followed by provision of the statutory documents to farmers nationally and the making available of advice and training to assist

farmers, both to complete the documents and to implement associated measures.

Use of risk assessment aids

The evaluation phase of the PI involved a PhD study by the author which, in particular, examined use of the RAD document and associated training activities by farmers. The following is a summary of the study findings:

- Farmers principally identified physical-type controls (92.4%) for action rather than behavioural ones. Attendance at training increased the level of controls identified for implementation by 40%, suggesting that using the RAD at a training course has more utility than individually completing the document.
- The level of implementation of RAD controls identified as requiring action was limited, with 45.3% using the controls they specified. Implementation was positively associated with both farmer attitude and greater farm size. This finding, in particular, indicates that having knowledge is not the limiting factor to OHS adoption, as the RAD controls were identified by individual farmers.
- The study assessed OHS implementation at farm level and found that 23.4% of farms had unsatisfactory standards when compared to the legal requirements. Farmers who implemented the controls they specified in the RAD had a higher percentage of satisfactory OHS farms (92.4%), compared to those who did not implement the controls (56.5%). This indicates that implementation of controls on an ongoing basis is the crucial dimension to OHS management.
- An unsatisfactory farm OHS assessment was negatively associated with the following: dairy farm enterprise, high work time requirement and farms run by middle-aged farmers. A high proportion of farmers who did not implement the controls they specified also sought tutorial assistance for RAD completion, suggesting that OHS management limitations has several dimensions.
- Overall, the study found that the RAD approach has utility with assisting farmers with a prior record of OHS adoption to implement controls, but less so with non-adopting farmers. The study's conclusions suggest that use of participatory farmer discussion groups as

an advisory approach may have further potential to increase the level of OHS adoption. A discussion group involves a meeting of farmers (circa 12-20) about monthly to consider current farm management issues in association with a facilitator (advisor or consultant).

Since the evaluation of the pilot phase of the PI, the CoP and the RAD it has been made available nationally to farmers. In 2017 these documents were revised and can be found at: https://www.hsa.ie/eng/Your_Industry/Agriculture_Forestry/Overview/Agriculture_Code_of_Practice/.

'Converting' law into practice

They are required to be used by farmers by 1st January/February 2019. These documents provide a means of 'converting' the legal requirements of the 2005 Act into documents in which farmers can practically conceptualise the standards and practices required. While of itself they does not lead to complete success in OHS adoption, they can increase OHS adoption when used in conjunction with other approaches, such as training and discussion groups.

Completion of the RAD is now a requirement for participation in Irish Food Assurance schemes. Also, completion of a half-day training course on the RAD is also a requirement to obtain an infrastructure grant from the current Department of Agriculture and Marine (DAFM) Targeted Agricultural Modernisation Scheme (TAMS11).

Further, the DAFM Knowledge Transfer programme, which incentivises farmers to participate in a Knowledge Transfer group (discussion group) also has OHS dimensions included in the programme. Thus, incentives are now in place to support farmers with OHS adoption.

(John McNamara is Health and Safety Extension Specialist with TEAGASC – The Irish State Agriculture and Food Development Authority. He is also an Adjunct Associate Professor in Extension in farm OHS at the School of Agriculture and Food Science, University College Dublin, and Vice Chair of the EU COST Action SACURIMA, aimed at developing and exchanging knowledge on enhancing OHS Culture in Agriculture. He is particularly interested in both researching and applying the Research-Extension Knowledge Transfer Model to improve OHS Culture in Agriculture. His research can be found at: https://www.researchgate.net/profile/John_Mcnamara3)