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‘Looking to the Future’

Application of Mixed Methods Research in the Onshore Oil and Gas Drilling Environment

Mr Mark Stacey, Mark.Stacey@usq.edu.au

Dr Dev Raj Paudyal, DevRaj.Paudyal@usq.edu.au

Associate Professor Peter Gibbings, Peter.Gibbings@usq.edu.au

University of Southern Queensland, Australia

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Abstract:

There is significant variance in safety related behaviours between co-workers in a multinational oil and gas drilling operations functioning within South East Asia. Manifestations of this issue within this process driven high risk workplace included extensive variation in safe work performance stemming from individual and collective preparedness to engage in risk taking (Russo 2015).

Understanding the identified phenomenon involved the application of a sequential exploratory mixed method study incorporating both a qualitative element in the form of a semi-structured interview, and a quantitative element involving a widely distributed survey within the broader onshore oil and gas industry. Analysis of variances in risk tolerance achieved through the conduct of both methods, permitted an in-depth exploration of antecedents, variables and factors and their manifestation in desirable or undesirable workplace behaviours.

Because this research is concerned with longitudinal influences that on safe work performance within onshore oil and gas drilling operations, it is principally concerned with factors involving human behaviour. A multi-faceted data collection and analysis approach was supported by the selection of a pragmatic constructivism paradigm. Mixed methods are useful for practical minded researchers investigating the experience of a population in order to comprehend the situational realities within a professional environment. A sequential exploratory mixed methods research methodology was found to be appropriate in all of these circumstances.

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1. Background and Introduction

Within the oil and gas extraction industry, first instance qualitative investigations generated significant information regarding factors and variables affecting safety and the associated provisional cause-effect relationships between them. These aspects were further explored through the development and distribution of a quantitative survey amongst the wider population. To complete the research, collation and integration of the data confirmed the significance of discovered relationships which are yet to be reduced to a series of final conclusions and recommendations.

1.1. Research Method assistance in designing strategies for prevention of accidents in multi-cultural high risk work environments

Knowledge surrounding the relationships between safe work performance, the perception of safety and antecedent influence for onshore oil and gas industry workers in Southeast Asia is relatively unexplored. In this project a sequential exploratory mixed method approach provided the opportunity to examine these phenomena and conduct a preliminary thematic analysis which in turn informed the developed and distributed qualitative survey (Roberts et al. 2019).

Rich descriptions of the antecedent factors of the population were generated through the implementation of a semi-structured interview. A preliminary thematic analysis lead to extraction of sufficient information to understand the experiences of the sample population (Bashir 2019; Husband 2020). In the context of this study based on the researcher's and participants' prior working relationships, high levels of reciprocal trust existed allowing unguarded interactions to occur (Marshall & Rossman 2006). This level of respect and trust was evidenced by the generosity with which participants shared detailed information that may have otherwise remained undisclosed (Horn et al. 2011). Interview participants remained involved throughout the process through having the opportunity to review and correct the transcribed interviews. They verified the accuracy of the transcription and were afforded an opportunity to make corrections to information which was to be later used for analysis purposes (Denscombe 2015).

The true value of this research relates to understanding the relationship between individual demographics and formative experiences as they continue to influence safety behaviours in the workplace.

These previously unexplored factors have generated new understandings in relation to antecedents influences on risk taking behaviours across a multicultural workforce. Early analysis of the research identified that individual risk awareness and risk tolerance is influenced by activities conducted in formative years. Understanding these formative experiences and the proposed inherent characteristics generates opportunities to conduct targeted interventions particularly for early-stage career employees.

Overwhelmingly, participants raised in urban environments demonstrated higher levels of risk awareness and lower risk tolerance that were attributable to their formative experiences than their rural counterparts. Exploration of this phenomenon identified significant variances in terms of levels of adult supervision and associated intervention between the two cohorts. Activities frequently cited as being commonplace for those raised in rural settings included hunting, fishing and general manual or farm labour. These were found to be uncommon amongst those raised in urban settings.

Cultural influences were also determined to have had a significant impact on risk-based behaviours with extensive differences being identified between individuals raised in a developing or developed nation. Where a limited formal economy exists, a propensity to engage in higher risk activities particularly in early career employment settings has been found. Factors contributing to this risk-taking behaviour are primarily attributable to the perception of 'replicability' of workers, meaning they are easily replaced by others who are prepared to engage in higher risk activities without complaint.

These causal factors were discovered through the in-depth interview process and were relied upon to establish the questioning for the second stage survey of the wider population. Development, validity checking and distribution of a quantitative survey has been implemented to assist with convergence of findings (Creswell & Creswell 2018). The quantitative survey has been closed with final stages of quantitative analysis to be concluded to provide triangulation with initial findings in order to satisfactorily answer the research questions.

Multi-national companies seeking to modernise their workplaces in South East Asia will benefit from this research particularly in relation to understanding the latent causal factors individuals carry with them from their formative years that influence risk taking behaviour and therefore safe work performance. Organisations can mitigate the potential of incident through effective workforce

engagement to develop interventions based on the predominant demographics of their workforce. Establishing the link between these background experiential or attitudinal factors that contribute to individual behaviours is key to identifying educational opportunities that would not have existed prior to the conduct of this research.

2. Literature and theory informing the design of this research

The workplace problem identified for research occurred through individual observations made within the workplace over several years. Sequential mixed methods as appropriate to investigate phenomenon involving individual experiences complemented by quantitative methodologies to confirm the causality, generalisability or magnitude of effect.

Marshall & Rossman (2006) confirm that delving deep into specific topics can be successfully achieved through phenomenological interview whereby lived experiences are examined and dialogue assists to explore the influence on the individual's world view. Defining the problem as a workplace issue and understanding that the behaviours observed were unlikely to be explained statistically led to the conduct of an extensive literature review of different methods and methodologies. The key influences for adopting mixed methods research to gain an understanding of the phenomenon were produced by Creswell in association with numerous co-authors. Creswell and Creswell (2018) expressed that a mixed methods approach provides the flexibility to gather both types of data through methods that were ultimately informed by the desired outcome allowing the researcher to implement the techniques best suited to gathering the required data (2018, pp. 39-40; 51-52). Interviews provided the opportunity to conduct investigations with current employees and delve deeper into particular areas identified throughout the allocated time. Using this information to develop a survey instrument then allowed key ideas to be tested through analysis of the survey responses leading to a position of either confirming or refuting these relationships.

Exploration of relationships outside of quantitative methods was appealing based on the necessity to investigate individual perspectives. These were only achievable through the conduct of in-depth interviews allowing identification of issues and factors that have influenced their behaviours. When distribution of a survey to a wider population generates convergence of the data, this assists significantly in giving credibility to research findings (Rooshenas et al. 2019).

Exploration of the human condition and the interplay of complex human issues and relationships is more fully achievable where the story is examined using the most appropriate tools. Emphasis being placed on the on consequence on the research, not solely the method employed to generate the knowledge supports the use of mixed methods research to seek an understanding of the behaviours observed in the workplace (Sekaran & Bougie 2016).

Exploratory sequential mixed methods research provided the best opportunity to achieve the objectives of understanding the rationale behind risk perception and the subsequent impact on safe work performance (Reeves & Oh 2016). The availability of qualitative investigative tools combined with the quantitative factor analysis achieves the required convergence as discussed by Creswell and Creswell (2018) and correlation as required by Sharplin (2014) to generate truly enhanced outcomes.

3. Discussion and forward direction

Lessons learned from the application of this mixed method research delivers knowledge that organisations are able to harness to generate a risk profile of the workforce and therefore develop and implement safe work interventions.

At a site level, this understanding has direct implications for supervisors who may otherwise have been unaware of inherent characteristics of themselves or others. Knowledge that certain antecedents have the potential to manifest the preparedness to engage in higher levels of risk-taking behaviour allows supervisors closely monitor and mentor personnel who possess these antecedents.

3.1 Application of lessons learned in the wider industry

This research could be considered as a first step in understanding the factors that may affect individual safe work behaviours including the correlation between management commitment to safety and individual antecedents which were defined as outside of the scope of the research project.

Further investigations into the relationships between the individuals, their formative experiences and interactions with commitment to organisational culture and commitments would generate further understandings on how these factors are interrelated and the affect they have on commitment to working safely and safety behaviours.

4. Conclusion

Use of mixed methods and the associated learning has uncovered links between previously unexamined individual factors extending the depth of knowledge beyond that of traditional organisational culture. This research was confined to a very specific population engaged in oil and gas drilling operations; it is proposed however that the application of the principles identified through this study have application to other industries particularly where there is a multicultural workforce involved in a high-risk setting.

Further findings are anticipated to be generated from this research. Qualitative analysis of causal factors based on the high percentage of the workforce who self-identified as having been involved in workplace incidents leading to a permanent debilitating impact on them has occurred however quantitative convergence is yet to have been conducted on the factors that were identified to have contributed to these events.

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