Do construction project managers need training in behavioural sciences to effectively manage project risk?
DO CONSTRUCTION PROJECT MANAGERS NEED TRAINING IN BEHAVIOURAL SCIENCES TO EFFECTIVELY MANAGE PROJECT RISK?

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ABSTRACT

The traditional function of the construction project management role is to integrate the technical variations between the different specialist roles involved in project delivery activities including risk management, to ensure integrative working practices devoid of cross purpose actions. Through the application of multiple case study design, the behavioural patterns of the construction specialist roles responsible for design development and project risk management drawn from two public sector and two private sector residential developments in the south eastern regions of England were examined. The findings revealed high incidence of intuitive decision making consistent with the prevailing theoretical evidence. The empirical evidence further confirmed intuitive decision processing practices differentiated along the lines of the dissimilarities in specialist roles. The ensuing analytical inference being, intuitive construction risk management decision processing may require involvement of wide range specialist roles with affective heuristics relevant to the project context, and also, constant harmonisation of both the technical and behavioural differences of the assembled specialist roles. And in order to achieve this, there may be the need for behaviour science training for construction project managers to equip them with appropriate competencies to identify and manage the differences in behavioural patterns, in addition to the technical variations.

Keywords: affective heuristics, behavioural patterns, decision making, personal perceptions, risk.

INTRODUCTION

Risk has always been a part of the human condition; both the activities that occur instinctively, and the structured events (Lock, 2003). The prevailing theoretical evidence traces the origin of the "risk" terminology from the French word risqué, which was first introduced in England around 1830, when it was used in the insurance industry (Smith et al, 2006). Loosemore, et al (2006) have however argued the existence of individual and public risk awareness before the formal conceptualisation of risk, as seen in the traditional approach of relying on taboos, superstitions, cultural beliefs and personal perceptions in the detection and treatment of events that threatens human persistence. Contemporary sociologists such as Ulrich Beck (2007) also believe that the modern society functions in risk, and that discounting risk from social discourse is likely to result in failures. Whilst acknowledging that the pursuit of a risk free system may be a “holy grail” (Beck, 2007; Lock, 2003; Loosemore et al, 2006; Arthur, 2017), an informed risk management system, nevertheless will greatly assist in the effective identification and treatment of threats and opportunities.
Loosemore et al, 2006 defines risk as an unpredictable event that might occur in the future whose exact likelihood and outcome is uncertain but could potentially affect interest or objective in some way (normally adversely). A major point to draw from the definition is the theoretical requirement to establish an impact relationship between a potential future threat or opportunity, and the interest or objective of a subject before classifying it as a risk event to the subject. Systems analytical thinking also suggest that the differences in objectives of main systems, coupled with the differentiations in micro-objectives of the subsiding subsystems will invariably result in differences in impact from a risk source and subsequently differences in the risk interpretation and responses (Carmichael, 2006; Walker, 2007; Arthur and Pryke, 2013). This can be illustrated hypothetically by analysing the impact of a potential London Underground tube strike, which will be classified as a risk event to the individuals whose travel plan involves the specific tube line, and therefore likely to experience a direct impact on their social and business interests. The population living outside London who do not use the specific tube line may not experience a direct impact from the strike action, and therefore unlikely to classify it as a risk.

The approaches to risk management broadly includes the traditional intuitive techniques, and cognitive rational procedures (Loosemore et al, 2006). Slovic et al, (2010) have also suggested a third approach termed politics, which combines the principles of rationality in the risk identification decision processing, and intuitive thinking in the subsequent analyses of the suitable risk response, based on the risk assessor's perception of stakeholder's expectation. Other recent studies have also identified the analytical processing of risk data defined in the form of fuzzy linguistic variables (Cox, 1999).

Intuitive risk management decision making uses instinctive and subjective methodologies to evaluate risk decision settings based on our environmental conditioning, which are also influenced by physio-cultural factors such as personal feeling, experiences, education, and cultural background (Slovic et al, 2010). Rational risk management decision making on the other hand relies on the application of cognitive calculative procedures in evaluating structured quantitative risk data (Kahneman, 2011). Risk management decision processing usually moves between the two systems. The intuitive decision vehicle which is constantly active usually commences decision processing (Kahneman, 2011), and is effective in providing guidance on risk events associated with emotions and reflex actions, but ineffective with logical risk events (Slovic et al, 2010). Risk management decision settings associated with reasoning are usually rolled on to the rational system for analytical evaluation. The rational risk management decision making system nevertheless is ineffective in processing emotional events (Kahneman, 2011). The inherent lapses of the rational and intuitive systems suggest that effective decision processing should incorporate both (Finucane et al, 2003; Arthur and Pryke, 2014). The prevailing evidence from construction management research publications however suggest that construction risk management decision making has been dominated by intuitive practices (Akintoye and Macleod, 1997; Lyons and Skitmore, 2004; Kululanga and Kuotcha, 2010).

The psychological explanation for intuitive decision processing is that, the thought generation is inspired by personal perceptions (Slovic et al, 2010). Perceptions are also
formed from heuristics acquired through previous exposures (Benthin et al, 1993). The present theoretical evidence suggest that as we go through life activities, records of our social conditioning, education, training, and environmental influences are stored in our mental image library in formats associated with the human senses of smell; sight; touch; taste and hearing (Damasio, 2006). Attached to the mental records are behavioural stimulus associated with the feeling state experienced at the time of the exposure, which psychologist term as “affective heuristics” (Slovic et al, 2010). In the processes of intuitive decision processing, the human mental image library is consulted for evidence of available previous exposures similar to the prime attributes of the decision setting. Where the evidence is available, the psychological stimulus of the associated “affective heuristics” inspires the generation of decision patterns similar to the previous exposure (Benthin et al, 1993, Slovic et al, 2010; Kahneman, 2011). Figure 1 below is a conceptual model of the generating processes of personal perceptions.

Fig. 1: Generating processes of personal perceptions

The variability in personal exposures suggest corresponding variations in “affective heuristics” (Kahneman, 2011; Slovic et al, 2010). Systems analytical thinking also suggest that the different specialist roles, and organisations forming the construction project coalition can be viewed as different sub systems possessing different micro objectives (Carmichael, 2006; Arthur and Pryke, 2013). The dissimilarities in micro-objectives will result in variations in "affective heuristics", leading to differences in perceived impact on potential future risk events, and subsequently differences in risk perception generation (Loosemore et al 2006). The theoretical inference being, the adoption of separate risk management systems by the different construction specialist roles, and organisations may result in cross purpose strategies which could be injurious to project success (Pryke and Smyth, 2006). The previous theoretical discussions on the relationship between a "risk event" and its impact on an "interest"
or "objective" (Loosemore et al, 2006), also confirms that the effectiveness of an intuitive risk identification decision processing system will depend on the scope of the assembled "affective heuristics". The exclusion of a specialist role will likely result in the loss of associated "affective heuristics", leading to difficulty in perceiving potential impact of the related risk events, and subsequently failure in generating allied risk perceptions. Bringing all the above together, makes it worth researching into the psychology of intuitive construction risk management decision making system, and the wider implications for construction project management.

**RESEARCH METHOD**

Through the application of the case study qualitative research method, the behavioural patterns of the construction specialist roles responsible for design development and project risk management, drawn from two public sector and two private sector residential developments in the south eastern regions of England were examined. The housing sector was selected due to its comparatively smaller project sizes and scope, which makes it arguably the most representative of intuitive construction risk management practices (Akintoye and Macleod, 1997). The emphasis on design development was also due to the present theoretical evidence linking the bulk of construction project risk events to initial design failures (Lock, 2003).

The study participants comprised 25 professionals from the project management, contracts management, technical management, quantity surveying, architecture, engineering, and client project management specialist roles. The choice of multiple cases from the public and private sectors was to enable cross-case evaluation of the empirical findings from the individual cases and the different market sectors, to demonstrate methodological rigor and theoretical replication (Eisenhardt, 1989). Again to ensure theoretical sampling (Eisenhardt, 1989), the case study projects were selected from projects adopting identical contractual route (design and build), and also located within identical geographical and cultural setting (the south eastern regions of England).

The choice of the case study investigative approach was inspired by the research study’s philosophical stance of constructivism ontology, as seen in the study’s conceptualisation of risk as “socially constructed” (Zinn, 2008), and “subjectively biased” (Slovic et al, 2010). The study also adopted a postpositivism epistemology. And to ensure philosophical compatibility (Yin, 2014), multiple data collection approaches were adopted, using interview as the main approach with additional evidence collected through direct observations. The data analytical approach likewise explored theoretical replication (Eisenhardt, 1989, Yin 2014) using multiple methods including matching pattern, and cross-case synthesis.

The interview and direct observation methods were seen as most appropriate for the research emphasis on perceptions and behaviour patterns (Fellows and Liu, 2008). The interview questions were designed to solicit the study participants’ personal perceptions on the typical construction project risk events at the pre-construction, and construction delivery phases, and also under different hypothetical project settings comprising of brown, and green field residential developments. The study participants were allowed limited time to generate their responses so as to deliberately restrict activation of rational thinking, and thereby limit their decision processing within the
intuitive system. This was coupled with direct observation of their body language and mannerism, to verify calmness, and absence of physiological tensions, which further confirmed intuitive decision processing (Kahneman, 2011). The data was later examined using matching pattern and cross case analytical methods to observe the patterns of generated risk perceptions.

RESEARCH FINDINGS

a. Behavioural patterns of the study participants’ responses on the typical construction project risk events at the different project delivery phases

The empirical findings on the study participants’ perceptions on the typical risk events at the different construction delivery phases were categorised using a table of construction project risk events which was developed from the cumulative interview responses, and structured in a similar pattern to a previous classification by Perry and Hayes (1985). The data was collated in rankings corresponding to the order in which the study participants generated the risk categories. The highest score of 5 was assigned to the first generated risk category, 3 for the second generated risk category, and 1 for the third generated risk category. The combined scores of the individual risk categories within related specialist roles were subsequently organised into specialist groups’ cumulative rankings. The empirical evidence has been presented in Tables 1 and 2.

Table 1: Risk perception on the typical risk events at the pre-construction delivery phase

<table>
<thead>
<tr>
<th>Specialist Role</th>
<th>Case 1 (Private Sector)</th>
<th>Case 2 (Private Sector)</th>
<th>Case 3 (Public Sector)</th>
<th>Case 4 (Public Sector)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Builders</td>
<td>1st: Ground condition related; 2nd: Construction related; 3rd: Logistics and communication related</td>
<td>1st: Ground condition related; 2nd: Logistics and communication related; 3rd: Legal &amp; statutory approval related</td>
<td>1st: Legal &amp; statutory approval related; 2nd: Construction related; 3rd: Ground condition related</td>
<td>1st: Ground condition related; 2nd: Design and quality related; 3rd: Legal &amp; statutory approval related</td>
</tr>
<tr>
<td>Designers</td>
<td>1st: Ground condition related; 2nd: Design and quality related; 3rd: Construction related</td>
<td>1st: Design and quality related; 2nd: Financial and commercial related; 3rd: Legal &amp; statutory approval related</td>
<td>1st: Design and quality related; 2nd: Ground condition related; 3rd: Construction related</td>
<td>1st: Legal &amp; statutory approval; construction related; 2nd: Financial and commercial; logistics and commercial related; 3rd: Political; design and quality related</td>
</tr>
</tbody>
</table>
Table 2: Risk perception on the typical risk events at the actual construction delivery phase

<table>
<thead>
<tr>
<th>Specialist Role</th>
<th>Case 1 (Private Sector)</th>
<th>Case 2 (Private Sector)</th>
<th>Case 3 (Public Sector)</th>
<th>Case 4 (Public Sector)</th>
</tr>
</thead>
</table>
| Builders (Project Manager; Contracts Manager; Technical Manager) | 1st : Ground condition related;  
2nd : Construction related;  
3rd : Legal and statutory approval related | 1st : Construction condition related;  
2nd : Ground condition related;  
3rd : Financial and commercial related | 1st : Ground condition related;  
2nd : Legal and statutory approval related;  
3rd : Financial and commercial related | 1st : Financial and commercial related;  
2nd : Legal & statutory approval related;  
3rd : Design and quality related |
| Designers (Engineer; architect) | 1st : Design and quality related;  
2nd : Design and quality related;  
3rd : Construction related | 1st : Design and quality related;  
2nd : Financial and commercial related;  
3rd : Construction related | 1st : Financial and commercial related;  
2nd : Ground condition and construction related;  
3rd : Design and quality related | 1st : Design and quality related;  
2nd : Construction related |
| Quantity Surveyor | 1st : Construction related;  
2nd : Financial and commercial related; | 1st : Financial and commercial related;  
2nd : Force majeure related;  
3rd : Design and quality related | 1st : Financial and commercial related;  
2nd : Construction related;  
3rd : Ground condition related | 1st : Financial and commercial related;  
2nd : Design and quality related |
| Client Development Manager | All the generated risks events were construction related (the client previously was a site manager). | All the generated risks events were construction related (the client previously was a site manager). | 1st : Design and quality related;  
2nd : Construction related |

b. Behavioural patterns of the study participants’ responses on the typical construction project risk events under different project settings

The empirical data on the study participants’ responses on the typical construction project risk events under different hypothetical project settings (brown, and green field developments) were analysed using a bespoke matching pattern analytical tool developed as part of the research study, termed “The differentiated matrix”. The analysis involved initial scoring of the responses from the different project settings, followed by a consistency test. Risk categories displaying consistency scores above average were further analysed for differentiation to observe if there was evidence of coagulation within specific specialist roles. Analysis of the empirical evidence revealed the following cross case findings:

- The builders’ specialist role generated ground condition, and legal and statutory approval related events.
- The designer specialist roles also generated design and quality related, and legal and statutory approval related risk events.
- The risk perceptions generated by the quantity surveying specialist role were financial and commercial, logistics and communication, and ground condition related risk events.
- The client development managers from the two public sector projects also generated varied risk perceptions comprising operational, design and quality, legal and statutory approval, and logistics and communication related risk events.

Analysis of the study participants' responses against the cumulative cross case responses using the reverse of the "differentiated matrix" analytical tool also revealed the following totally missed risk perceptions for the different specialist roles:

- The builders' specialist role missed operational related risk events.
- The designers missed force majeure, and operation related risk events.
- The quantity surveyors missed force majeure; operational; and political related risk events.
- The client development managers missed financial and commercial; political; and construction related risk events.

DISCUSSION

Against the background of the above empirical findings, the ensuing discussions will evaluate the patterns of intuitive construction risk management decision processing, and the wider theoretical implications for construction project management.

Behavioural Patterns of Construction Risk Management Decision Processing

The study's empirical findings have discovered dissimilarities in the study participants’ personal perceptions on the typical construction project risk events at both the pre-construction, and actual construction phases, and also under the different hypothetical project settings. The pattern of responses reflected the structure of the differentiation in specialist roles, which in effect confirms sensitivity of the professional experiences acquired through the different specialist roles, in influencing variations in intuitive construction risk management decision processing (Benthin et al, 1993; Slovic et al, 2010). Apart from ground condition related risk being common in the responses on the typical pre-construction phase risk events, which may have been precipitated by a corresponding dominant industrial experience “affective heuristics” (Finucane et al, 2003; Slovic et al, 2010), and the incidental evidence of dominant project experience “affective heuristics” in the case 4 (public sector project) quantity surveyor’s responses on the typical pre-construction phase risk events, the remaining empirical findings demonstrated reasonable correlation between the study participants’ specialist backgrounds and their generated risk perceptions. The coagulation of identical risk perceptions within related specialist roles has provided empirical substantiation for intuitive construction decision making reflecting the structure of the differentiated specialist roles (Walker, 2007). The realisation of consistent empirical support across the different assessment settings, cases, and market sectors has reinforced the theoretical validation. Notwithstanding, the empirical
evidence of incidental dominate industry and project "affective heuristics" influencing risk perception generation, confirms the benefit for further empirical investigations on the sensitivity of the other sources of construction system differentiation including, the differences in organisational culture, project experience and personal experiences (Walker, 2007), in influencing differentiation in intuitive construction risk management decision making.

The empirical evidence also revealed missed risk events by the different specialist roles. The responses confirmed the client development manager's specialist role to have solely generated operational related risk perceptions. The implication being; exclusion of the client development managers may have affected the robustness of the risk management decision making processes, assuming the risk associated with the particular operational related events to be real. This in effect reinforces the need for involvement of wide range specialist roles in intuitive construction risk management decision processing.

**Wider Theoretical Implications for Construction Project Management**

The empirical evidence of intuitive decision making practices structured along the lines of the differences in the specialist roles confirms the need to carefully select and manage project team members with appropriate “affective heuristics” and technical competencies suitable for a project setting. In order to achieve this, it would be helpful to conduct further empirical investigations to critically define the heuristics boundaries of the different specialist roles, and also to design tools for identifying the heuristics pointers for different construction project contexts, to ensure compatibility between the affective heuristics of the assembled project team members, and the specific project context. There may also be the need to expand the integrative role of the construction project management specialist role (Walker, 2007) to encompass harmonisation of both the technical and “affective heuristics” differences of the different specialist roles, to foster efficient project management systems, and ultimately project success (Pryke and Smyth, 2006).

**CONCLUSION**

The paper has examined the behavioural patterns of intuitive construction risk management decision processing, and the wider implications for construction project management. The empirical evidence has revealed risk perception categorisation emanating from the differences in specialist roles affective heuristics, which by implication confirms the need for involving wide-range specialist roles in intuitive construction risk management decision processing, to ensure robust risk identification and treatment (Arthur and Pryke, 2013). The empirical evidence of incidental dominant industrial and project affective heuristics nevertheless confirms the benefit for further investigations in the sensitivity of the other sources of construction system differentiation influencing variations in intuitive construction risk management decision processing.

The empirical evidence of behavioural differences in addition to the technical variations among construction specialist roles, also suggest the need for careful consideration in the formation of project teams, by selecting specialist roles with relevant heuristics appropriate for a related project setting, and also, the need for
constant harmonisation of the variations in personnel perceptions during the project delivery process. This suggests the need for further empirical investigations to critically delineate the heuristics edges of the different specialist roles, and also to design tools for detecting the heuristics indicators for different construction project settings, to ensure compatibility between the affective heuristics of the assembled project coalition, and the specific project setting. This calls for expansion of the project management role to encompass integration of both the technical and behavioural differences of the project team members. For this to be realised, there may be the need to incorporate behaviour science modules in the training curriculum for construction project management students, and the continuous professional development programmes for construction project management professional, to equip them with appropriate competencies to identify and manage the differences in affective-heuristics, in addition to the technical variations.

REFERENCES


