COMPETENCES FOR MANAGING MEGA INFRASTRUCTURE PROJECTS: A PILOT STUDY

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ABSTRACT

Mega infrastructure projects have been conceptualised as complex adaptive systems characterised by emergence, co-evolution, and self-organisation. These projects have been found to consistently underperform technically, financially, socially, and environmentally, due to gaps in traditional project management practices regarding complexity management. Consequently, project management teams have been compelled to utilise unique processes and complexity management competences. This article is a pilot study of an ongoing PhD research programme. It aims to assess the appropriateness and feasibility of the proposed data-collection methods, sampling frame and data-analysis techniques. It also aims to establish potential logistical challenges and, consequently, to review the methods and processes of the main survey. Semi-structured interviews were used to collect data from five subject experts working on a bus rapid transit project in Polokwane. The results were analysed using content analysis. The findings of the study assisted in highlighting some of the potential logistical challenges which could have been encountered during the main research interviews. The results were also used to assess the appropriateness of the proposed research approach, the sampling frame and size, and the data-collection tool. Overall, the lessons drawn from the findings of the study will be used to review the proposed methods and processes prior to commencement of the main research. Despite the important insights drawn from this study, the data collected will not be used in the main study, but will only be used to improve the associated methods and processes.

Keywords: mega infrastructure projects, complexity, competences, pilot study

1. INTRODUCTION

This article uses insights which were drawn from a previous publication (Nyarirangwe and Babatunde, 2016), which focused on presenting the findings from a detailed review of existing literature on megaproject complexity and the required management and leadership competences, as part of a PhD research proposal. The findings from that publication, and the valuable insights which were obtained, have since been used to refine and update the key constructs and to design the proposed methodology in the PhD research proposal. Consequently, this study is a subsequent step in the research process. It focuses on piloting the proposed methodology and processes, before commencing the main research. The article begins with a brief review of relevant literature on mega project complexity, the required management competences, and the importance of conducting pilot studies in guiding the main research. This is followed by a brief description of the methodology that was used, and key findings that emanated from the study.

2. LITERATURE REVIEW

This section of the article provides a summary of the findings from an integrated review of existing literature on mega project complexity, the required management processes and competences, and pilot studies. In addition to explaining these constructs, the importance of conducting pilot studies, and the role of such studies in informing and guiding the main research, is clarified.

2.1 Mega infrastructure projects

Mega infrastructure projects as a developing phenomenon have been found to be largely elusive (Brookes and Locatelli, 2015). Consequently, some authors have attempted to define them broadly according to the perspectives of investment, operations, and the economy, respectively (Flyvbjerg, 2014; Brookes and Locatelli, 2015; Mišić and Radujković, 2015). According to the investment perspective, mega infrastructure projects have been delineated in terms of budget size, technological components, and levels of innovation involved (Flyvbjerg, 2014). The operations perspective has been construed to cover aspects such as the implementation time frames and socio-economic and environmental impacts, among other things (Brookes and Locatelli, 2015). Lastly, the economic perspective has been found to focus on the contextual issues which impinge on the project (Locatelli et al., 2014).

Haidar and Ellis (2010) distinguished mega infrastructure projects from other projects, using size and degree of complexity involved. While metrics such as budget and schedule thresholds have been advanced as important features that distinguish mega infrastructure projects from other conventional projects (OMEGA Centre, 2012), they have been found to be largely arbitrary, and hence, not universally applicable across different settings (Brookes and Locatelli, 2015). Consequently, contextual elements, such as the size of the host country’s gross domestic product (GDP), have been advanced as important attributes of the definition of mega infrastructure projects (Flyvbjerg, 2014).

Mega infrastructure projects have also been found to have certain characteristics that distinguish them from other conventional projects (Dimitriou et al., 2013). Some of the commonly cited characteristics include long implementation periods, multiple and diverse stakeholders, novel technology, and high social and political significance, among other things (Johnson and Mulder, 2016). The interaction among these different attributes has been suggested as one of the key sources of mega infrastructure project complexity (OMEGA Centre, 2012). Consequently, complexity has been advanced as the single most important impactful characteristic of mega infrastructure project performance (OMEGA Centre, 2012).

2.2 Mega infrastructure project complexity

Complexity theory (CT) in general and complex adaptive system (CAS) theory in particular have been used to provide the necessary theoretical framework for analysing mega infrastructure project complexity dimensions, levels and attributes (Curlee and Gordon, 2011; Wood and Gidado, 2008). The ability of the CT and the CAS theories to explain non-linear relationships and interactions has been underscored in investigating how mega infrastructure project systems adapt to their environments, as well as the resultant emergent properties that emanate from interactions among the components of the systems (Aydinoglu, 2011; Schalcher, 2015).

CAS theory has been found to be applicable at construction industry, project and site levels (Schalcher, 2015). On the one hand, the construction industry has been construed as a complex phenomenon, within which firms operate as autonomous agents that are loosely governed by voluntary institutional structures, rules and standards (Bertelsen, 2014). On the other hand, construction projects have been conceptualised as non-linear and complex phenomena, which demand much more agile processes than those espoused under the traditional project management philosophy (Wood and Gidado, 2008). Lastly, construction sites have been emphasised as complex environments for cooperation and social interaction, which are characterised by multiple layers of formal and informal human relationships (Schalcher, 2015). Consequently, the CT and the CAS theories have been advanced as suitable lenses to illuminate the non-linearity associated with mega infrastructure project systems (The Standish Group, 2012).

2.3 Processes and competences for managing complexity

The failure of infrastructure projects across the globe has been attributed to some of the gaps in traditional project management approaches, tools and processes (Johnson and Mulder, 2016). By using the Pareto principle, 80% of mega infrastructure project failure has been attributed to human factors, in general, and project management-related processes, in particular (Shenhar, 2011). Consequently, from a complexity perspective, it has been postulated that mega infrastructure projects demand unique approaches and delivery models (Johnson and Mulder, 2016). In Nyarirangwe and Babatunde (2016), it was proposed that the success of mega infrastructure project delivery can be enhanced through unique balancing of administrative, enabling and adaptive leadership models, in line with the levels of complexity involved. This balancing process was construed under the complexity-leadership alignment model (Nyarirangwe and Babatunde, 2016). Levels of complexity have also been associated with the size of the project, and this has been presented using the size-complexity matrix, which has been presented as a framework for determining the required delivery competences and processes (The Standish Group, 2012).

Additionally, it has been postulated that competences and processes required to deliver mega infrastructure projects should be distinguished from those commonly found in traditional project management literature (Australian Constructors Association, 2015). It has been distilled that such competences and processes should be flexible and emergent in nature, in order to deal with the unique characteristics of complex adaptive systems (Johnson and Mulder, 2016). Confirming this assertion, Flyvbjerg (2014) equated the competences and processes required to deliver mega infrastructure projects to the need for a jumbo jet pilot’s licence. Accordingly, delivering mega infrastructure projects using traditional management competences and processes has been equated to attempting to fly a jumbo jet using a motor vehicle driver’s licence, and hence the widely reported failures (Flyvbjerg, 2014). The competences and processes required to deliver mega infrastructure projects, which were drawn from the reviewed literature, are summarised in Table 1.

Table 1: Competences and processes for managing megaprojects as CAS theory

COMPLEXITY MANAGEMENT	
MANAGEMENT PROCESSES	MANAGEMENT COMPETENCES
Processes that emphasise leadership approaches more than techniques for maintaining control and power	The ability to create an engaging ecosystem for stakeholder engagement, adaptive concept scoping, and human engineering
Processes that promote positive behaviour and success, e.g. unique incentives and inhibitions	Creating an enabling environment for innovation, through space for creativity, engagement, debate, and co-creation
Processes that emphasise assessment of the value of outcomes, rather than efficiency optimisation	Architecting complex change, through diffused leadership and agile project processes, among other things
Processes that leverage and encourage adaptive and learning attributes, rather than enforcing of optimisation-focused systems, contracts and processes	Building a performance culture, by, for example, structuring of contracts around shared accountability, mutual achievement, and collaborative partnerships
Processes that emphasise incentives and encourage personal commitment, such as transparent organisational practices, policies and outcomes	Aligning business models, through deliberate migration from strict compliance with contracts towards using human collaboration
Models that shift decision-making from centralised command and control to points of interface in the mega infrastructure project structure	Changing leaders, through distributed leadership models, which shift the focus from managing complicated technological projects to leading complex social interactions
Organisational structure and processes which are flexible enough to adapt as more knowledge is gained in the system	Learning agility, through moving away from risk-averse governance frameworks and methodologies to embedded learning models

2.4 Pilot studies

Pilot studies have been defined in different ways by different authors (Dikko, 2016; Marinas et al., 2014). However, what has commonly been found across different studies has been the fact that pilot studies constitute small-scale investigations designed to test the feasibility of the methods and procedures to be used in large-scale research projects, among other things (Arain et al., 2010; Vogel and Draper-Rodi, 2017).

2.4.1 Reasons for conducting pilot studies

The utility of pilot studies has been underscored for both quantitative and qualitative research (Dikko, 2016; Hazzi and Maldaon, 2015). In both research approaches, pilot studies have been found to be used to assess the feasibility and adequacy of proposed research instruments, to illuminate unforeseen problems regarding the proposed data-collection strategies and methods, and to answer methodological questions, among other things (Thabane et al., 2010). The rationale behind conducting pilot studies has been conceptualised according to process, resources, management and scientific perspectives, respectively (Hazzi and Maldaon, 2015; Thabane et al., 2010). In terms of process, pilot studies have been used to assess the feasibility of the steps that need to take place as part of the main study (Hazzi and Maldaon, 2015; Nunes et al., 2010). According to the resources perspective, pilot studies have been used to assess the time and budget problems that can occur during the main study (Marinas et al., 2014). The management perspective of pilot studies has been construed as addressing the potential human and data-optimisation problems which could be encountered during the main study (Nunes et al., 2010). Lastly, the scientific perspective has been found to be applicable mainly in medical research in terms of aspects such as assessment of treatment safety and determination of dose levels, among other things (Hertzog, 2008).

Some of the key questions a pilot study can assist in addressing include whether the proposed methods are appropriate, whether they should be adjusted or changed, and whether the questions will be well understood or whether they should be reformulated (Marinas et al., 2014; Nunes et al., 2010). Pilot studies have also been found to assist in checking the terminology used in the data-collection tool, as well as refining the research plans (Hazzi and Maldaon, 2015). It has also been advanced that pilot studies assist in revealing potential logistical challenges, and consequently improving the quality and efficiency of the main study (Nunes et al., 2010). Additionally, it has been suggested that well-conducted pilot studies can assist in designing a clear roadmap, by refining the data-collection and analytical procedures, which increases the likelihood of getting clearer findings in the main study (Hazzi and Maldaon, 2015). Consequently, pilot studies have been strongly recommended as a way of timeously identifying and correcting possible errors and avoiding potentially disastrous consequences before resources have been committed in the main study (Nunes et al., 2010).

Some of the gaps associated with pilot studies have been found to include the limited information they generate, which constrains their ability to guarantee the success of the main study (Nunes et al., 2010). Additionally, it has been suggested that many pilot studies remain unpublished, due to factors such as incorrect reporting of results, with too much emphasis on analysing statistical significance, poorly designed objectives, and the absence of analytical plans and success criteria, among other things (Thabane et al., 2010). Consequently, researchers have been compelled to use pilot studies mainly to establish the feasibility of the main research, as opposed to using them for hypothesis testing or sample size calculations (Hazzi and Maldaon, 2015).

2.4.2 Sample size for pilot studies

Generally speaking, it has been observed that there is limited published guidance regarding the recommended sample size for pilot studies (Vogel and Draper-Rodi, 2017). Consequently, some researchers have opined that even though all studies should have a sample size justification, pilot studies do not require a sample size calculation (Thabane et al., 2011). Some authors, however, have suggested that 10% to 20% of the sample size of the main study is generally sufficient for an associated pilot study (Hertzog, 2008), while specifically for a PhD research pilot study, four to five interviews has been considered as acceptable (Hazzi and Maldaon, 2015; Hertzog, 2008).

Other authors have proposed that regardless of the sample size used, the sampling frame for a pilot study should be representative of the target study population and should apply similar inclusion and exclusion criteria to those of the main study (Thabane et al., 2010). Additionally, it has been suggested that if there is a compelling need to pool the pilot and the main study, caution must be exercised to ensure that the key features of the main study are preserved in the pilot study (Sorzano et al., 2017). Consequently, it has been recommended that any such pooling should be planned beforehand, and that it should be described clearly in the protocol, together with the statistical consequences and the remedial measures to be used to avoid or minimise the potential bias that may occur due to multiple testing issues (Sorzano et al., 2017; Thabane et al., 2011).

2.4.3 Interpreting pilot study results

In order to derive optimum benefit from pilot studies, it has been suggested that the analysis and reporting of pilot study results should highlight the key challenges that might affect the feasibility of the main study, and that it should recommend suitable remedial or mitigation measures for the main study (Arain et al., 2010). Consequently, the outcomes of a pilot study have been construed as recommendations to either stop the main study if it is not feasible, continue the main study, with modifications, continue the main study, without modifications, but with close monitoring, or continue the main study, with neither modifications nor close monitoring (Thabane et al., 2011).

3. RESEARCH METHODOLOGY

This study used a qualitative approach, which has been proposed in the PhD proposal. The choice of this research approach was informed by the epistemological and ontological aspects, as articulated by Creswell (2003) and Hall (2013). These two authors advanced that the epistemological and ontological questions constrain a study's methodological questions, as well as the investigator's choice of research approach (Creswell, 2003; Hall, 2013). Consequently, the study's research approach focuses on establishing the informants' perceptions regarding mega infrastructure project complexity and the required management processes and competences.

In the main research, the sampling frame firstly consisted of mega projects drawn from the list of strategic infrastructure projects (SIPs). A sample size of six projects covering the transport, water, gas and electrical sectors was selected. Secondly, the main study sampling frame also consisted of institutions mandated by the Presidential Infrastructure Coordinating Committee (PICC) to implement these projects, and senior managers responsible for delivering the projects. Only those institutions responsible for delivering the six selected projects were earmarked for data collection in the main study, with special focus on senior managers from clients, consultants and contractors involved. Selection of these three project stakeholders in the main study was guided by Winch's stakeholder mapping framework (Winch, 2004). Literature on mega infrastructure projects where this framework has been used has suggested the need to focus on internal stakeholders, rather than external stakeholders, due to the diversity of interests associated with the latter (Brookes and Locatelli, 2015).

This pilot study used a similar approach in defining the same sampling frame and the associated inclusion and exclusion criteria as proposed in the main study. Consequently, this pilot study is based on a mega project drawn from the list of strategic infrastructure projects (SIPs). In a similar approach to the main study, this pilot study also focused on internal project stakeholders, who consisted of senior professionals currently working on a bus rapid transit (BRT) project in Polokwane. These professionals were considered to exhibit the same traits as those targeted in the main research. The decision regarding the sample size was based on insights drawn from the literature, where it has been recommended that the sample size of a pilot study should be equivalent to between 10% and 20% of the sample size to be used in the main study (Hazzi and Maldaon, 2015). The proposed sample for the main study consists of a minimum of 42 senior managers drawn from internal stakeholder institutions responsible for delivering the selected megaprojects. Consequently, a minimum sample of four interviews was required to satisfy the sample size guidelines given by Hazzi and Maldaon (2015). In this pilot study, a total of five senior professionals involved in delivering the Polokwane BRT project were interviewed. This is equivalent to about 11.9% of the sample size for the main study.

In terms of data collection, a semi-structured interview guide with the same questions as those in the main research was used in this study to collect data from five subject experts currently working on a bus rapid transit (BRT) project in Polokwane. The semi-structured interview guide consisted of six broad questions, which were designed based on insights drawn from existing literature on mega infrastructure project complexity and the required management processes and competences. The interview questions were designed to enable the interviewees to use their personal experiences on the project in discussing the different complexity attributes and management processes and competences, which were discussed in the preceding sections. Each of the questions was also designed to align with the objectives of the main research. In order to ensure that all the elements under each construct were adequately covered, each of the main questions was complemented by a set of probing sub-questions.

The data-collection process was guided by recommendations from the reviewed literature regarding the expected focus of pilot studies, as discussed in the preceding sections. It was recommended that no statistical analysis or hypothesis testing be conducted in pilot studies, due to the small sample sizes involved. Instead, it was suggested that the analysis processes should focus on assessing the feasibility of the proposed data-collection methods, the research protocol, and the sampling frame, and that potential logistical challenges that could be experienced in the main study should be established.

In order to assess the clarity of the different questions and the terminology used, content analysis was done of the responses. This assisted in assessing whether there are specific terminologies used in different disciplines, and the extent to which the respondents were familiar with the industry jargon used in the interview schedule. Consequently, the analysis process in this study focused on establishing these elements, with the aim of using the findings to refine the research methodology, tools and processes, before commencement of data collection for the main study. Due to the sample size used in this study, this process will be undertaken manually and will be limited to situations where marked variations would have been established. The different aspects of the findings from this study are explored in the following sections.

4. FINDINGS AND DISCUSSION

The study findings focused on the appropriateness of the proposed research approach, the sampling frame and size, the proposed data-collection methods, and the face reliability and validity of the interview guide. It has been proposed that face reliability and validity assessments be limited to establishing whether the questions have no errors and are clear enough to ensure that they generate appropriate responses required to address the questions and objectives of the research (Lancaster, 2015).

4.1 Appropriateness of the proposed research approach

To establish the appropriateness of the proposed research approach, the interviewees were required to use their personal experiences on the project in discussing the different elements under study. For instance, based on their current experience on the BRT project, the interviewees were requested to explain their perceptions regarding the flexibility of the project management processes, the ease of change management procedures, the diffusion of leadership processes, the extent of decentralisation and mutual ownership of decisions, and successes and failures in dealing with emergent complexity aspects. These elements have been found to be largely experiential in nature, and hence best explored using a qualitative approach. Consequently, this approach enabled the interviewees to provide a narrative of their personal experiences with the different competences and processes when delivering mega infrastructure projects. This is in line with the approach used in other studies, where similar constructs have been found to be best explored using a qualitative rather than a quantitative approach (Brookes and Locatelli, 2015; OMEGA Centre, 2012).

4.2 Suitability of the sampling frame and size

The suitability of the sampling frame was assessed based on the extent of compliance with the inclusion and exclusion rules defined in the main study, which were outlined in the preceding sections. The selected project falls under the strategic infrastructure projects category number 7 (SIP 7) and qualified as a megaproject, based on the size of the budget and the number and the diversity of stakeholders involved, among other things. The selected interviewees qualified as consisting of senior project managers, as required in the main study. All the five interviewees involved held at least a degree qualification in either the built environment and/or project management. Their average project management experience ranged from five to over 20 years. With respect to their involvement on the project under study, their experience ranged from 18 months to four years. These attributes were considered sufficient to qualify the interviewees as experienced enough to both understand and articulate the subject matter and elements addressed in the interview. Consequently, the sampling frame was considered suitable, and it will be maintained for the main study.

The sample size was guided by recommendations from the literature, where it has been suggested that pilot study samples should be between 10% and 20% of the size of the sample of the main study (Hertzog, 2008; Lancaster, 2015). Consequently, the five semi-structured interviews which were used in this study complied with this suggested guideline. Some authors have proposed that four to five interviews constitutes a generally acceptable sample size for PhD research pilot studies (Hazzi and Maldaon, 2015; Hertzog, 2008; Lancaster, 2015). Based on these guidelines, this pilot study suggests that the main study's proposed sample size of 42 interviews should be maintained.

4.3 Appropriateness of the data-collection methods and instrument

This study used the same protocol and set of open-ended questions as proposed in the main study's interview schedule. However, an analysis of the responses obtained revealed some of the potential pitfalls associated with the diversity of responses obtained from the open-ended questions. While different responses had been expected from those to the open-ended questions, the range of response diversity revealed some potential analytical challenges. To a certain extent this diversity of responses has been attributed to the tenure of the interviewees on the project, and consequently their level of awareness and understanding of applied processes and competence levels among the project teams. For instance, variations were found among responses to questions that focused on the existence and application of management processes on the project. These variations were particularly found in responses provided by professionals who have been working on the project for about 18 months, as compared to those who have been on the project for over four years.

In order to minimise the range of response diversity, insights were drawn from similar studies, where semi-structured group interviews were used instead of individual interviews (Brookes and Locatelli, 2015). These group interviews have been upheld for enabling the experts to share their experiences, and consequently co-create meaning regarding the different elements of the study constructs (Colucci, 2007; Kinchin et al., 2006). Other studies have also complemented the group interviews with integrative engagement tools, such as decision matrices or cognitive maps (Mojtahed et al., 2014). Consequently, this study underscored the importance of utilising similar complementary methods in the main research, in order to manage the diversity of responses, and also to utilise the collective experience of expert groups.

The research instrument was also evaluated against the planned duration. On average, each of the interviews was found to have exceeded the planned one-hour duration by between 10 and 20 minutes. This was attributed to two main reasons. Firstly, the interview guide consisted of main questions and pre-planned probes. The latter were carefully designed to ensure that none of the elements of the main study's constructs were inadequately addressed. However, the pilot interviews resulted in additional probing questions, which had to be asked to follow up on issues that emanated from the open-endedness of the interview questions. The net effect was an increase in the number of questions, which consequently compromised the interview duration.

Secondly, the interview protocol had been designed to distinguish questions in line with the different study objectives. Consequently, a number of questions were repeated under the categories of management processes and management competences, respectively. For instance, questions about the flexibility of project management procedures, decentralisation of decision-making, change management processes, and contract management had been asked twice, under the category of management processes, and under the category of management competences. This resulted in response redundancy. In order to address this ambiguity and redundancy, this pilot study underscored the need for reviewing the interview protocol, by merging some of the questions, based on the subject matter under investigation, instead of focusing on the research objectives. This study also proposed the need to keep the number of pre-planned probing questions to a minimum, in order to allow room for additional follow-up probes within the planned time constraints.

The semi-structured interview schedule was also assessed in terms of the clarity of the research questions. The assessment mainly focused on establishing the extent to which the interviewees struggled to understand the subject matter and the terminology used in each of the questions. Indicators such as the number of times interviewees sought clarity on the subject matter and the terminology, as well as the precision of answers, enabled the different questions used to assess the extent to which the interview questions were easily understood. During the pilot interview it was found that none of the participants struggled with either the subject matter or the terminology used in the different questions.

In terms of the terminology used, a short glossary covering key terminology used, including terminology related to complexity, competences, project management processes, and governance procedures, was provided and explained beforehand to guide the interviewees. By the time the interviews commenced, these terms were well understood. All the interviewees were also familiar with project management and governance processes, as well as the main guides provided by institutions, such as the South African Council for Project and Construction Management Professionals (SACPCMP), the Project Management Institute (PMI), and the Engineering Council of South Africa (ECSA). Minor variations in the responses were largely attributed to the different backgrounds and experiences of the interviewees. For instance, while some interviewees referred to the governing document for the project as a "project charter", others referred to it as an "inception report". Similarly, some respondents used the term "workstreams", while others used the term "functional lines", when referring to the specialist segments of the project structure. Consequently, these terms are used interchangeably in this study. The outcomes of the pilot study resulted in some important decisions that will be used in reviewing the semi-structured interview guide and the data-collection processes before commencement of the main research. These different aspects are summarised in Table 2 below.

Table 2: Findings, and required reviews for the main study

ELEMENT	KEY FINDINGS	REQUIRED ACTIONS
Logistical aspects	Interview exceeds planned duration	Combine questions, and sequence them based on subject matter
Proposed research approach	A qualitative approach was upheld	Maintain the research approach
Proposed sampling frame	The sampling frame was upheld	Maintain the sampling frame
Data-collection instrument	The diversity of responses is too high, and it must be controlled to avoid data-analysis challenges	Use group interviews instead of individual interviews. Complement with interactive methods, such as decision matrices or cognitive maps.
Proposed sample size	4–5 interviews, or 10% to 20% of the main study sample size, is adequate	Maintain the sample size (a minimum of five experts in each of the proposed group interview sessions)
Clarity of questions	Questions were easy to understand, and terminology used was well understood	Maintain the terminology used, but complement it with a short glossary of terms
Instrument validity and reliability	Only face validity and reliability were assessed. Further assessments are needed to improve the validity and reliability.	The instrument will be assessed by at least two research experts before the main study commences

5. CONCLUSION

The findings from the pilot study provided some important lessons, which need to be incorporated in reviewing the proposed methods, tools and processes before undertaking the main research. The review process will assist in addressing potential pitfalls and logistical challenges in undertaking the main research. In addition to reviewing the interview schedule, questions and protocol, the data-collection instrument will be presented to at least three subject experts, for further face validation and reliability assessments, prior to commencement of the main study. Additionally, the Cronbach's alpha will be determined to further assess the internal validity of the interview questions. The researcher will also explore the possibility of complementing the semi-structured group interviews with interactive methods, such as decision matrices or cognitive maps, so as to co-create meaning and manage the diversity of responses. Given the sample size used in undertaking this study, and the required reviews to the research methods, tools and processes, the resultant data will not be used in the main study. Only new data collected using the revised tool will be used to test the main study's proposition and to address the research questions.

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