

THE ROLE OF PROJECT MANAGER COMPETENCE IN PROJECT MANAGEMENT SUCCESS: THE CASE OF A UTILITY COMPANY

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ABSTRACT

A project manager's competency depends on the project's complexity and includes a unique set of personal attributes and the ability to apply appropriate leadership styles. This paper reports on a Delphi study that includes the views of 30 experts - employed by a utility that executes projects with different levels of complexity. The results confirm that project manager competence is influenced by leadership styles that are appropriate for specific project lifecycle stages and levels of project complexity, as well as specific personal attributes. The study thus provides guidance regarding the project manager competence that is required for specific situations.

OPSOMMING

'n Projekbestuurder se vaardighede hang af van projek kompleksiteit en sluit in 'n stel persoonlike eienskappe asook die vermoë om verskillende leierskapstyle te beoefen. Hierdie artikel rapporteer oor 'n Delphi studie wat die menings van 30 kundige praktisyns insluit - almal werknemers van 'n nutsmaatskappy wat projekte met verskillende vlakke van kompleksiteit hanteer. Die resultate bevestig dat die vaardigheid van 'n projekbestuurder beïnvloed word deur leierskapstyle wat toepaslik is vir spesifieke projekfasies en vir spesifieke vlakke van projek-kompleksiteit, asook deur bepaalde persoonlike eienskappe. Die studie verskaf dus leiding oor projekbestuurder vaardighede wat benodig word in spesifieke situasies.

1. INTRODUCTION

It is believed that an appropriately competent project manager is essential for the successful management of a project. It is further believed that the personal attributes and a leadership style that are suitable to different levels of project complexity and to the various lifecycle stages of a project are central to the successful management of a project. The goal of this paper is to provide guidelines for the identification and appointment of competent project managers in a South African utility.

The objectives of the study are (i) to identify the individual personal attributes a project manager should have, (ii) to identify the leadership styles a project manager should exhibit, and (iii) to determine whether different types of project management competence are needed for different project situations to enable the successful management of a project.

Projects may be classified as 'mega', 'complex', or 'standard', as determined by their monetary value. For example, Flyvbjerg [1] defines a megaproject as a large-scale, complex venture with a project cost estimate of US\$ 1 billion or more, while infrastructure projects in a South African utility, with monetary values between US\$ 20 million and US\$ 120 million, are generally viewed as 'standard' projects.

Crawford, Hobbs and Turner [2] found that several organisations develop in-house project categorisation systems to provide direction and to guide project categorisation at a corporate level. The project standard [3] at a South African utility categorises projects in the company and uses two of the categorisation attributes from the list used by Crawford *et al.* [2] to categorise projects, namely project complexity and resource intensity.

The standard also incorporates several other listed categorisation attributes, such as funding, application area, technology, risk, and scope. Figure 1 (with complexity and resource intensity forming the two axes) has been adapted from the utility’s standard.

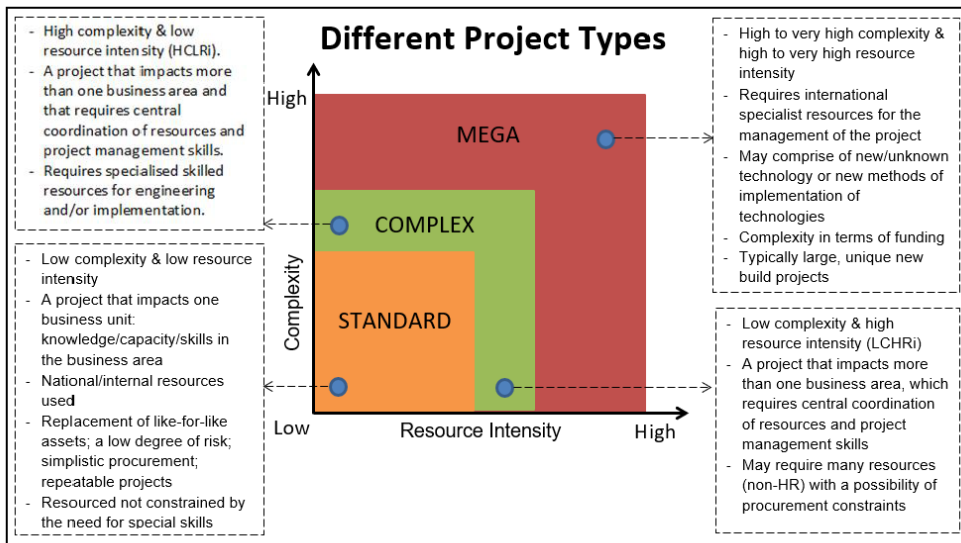


Figure 1: Project classification (Adapted from [3])

The level of complexity, according to the standard [3], is determined through an assessment of a project in respect of planning and management. The standard identifies several factors to assess the complexity of a project: several integration points, design drawings, software coding, business interfaces, contracts, contractor interfaces, contract integration, and risk level [3]. To assess the complexity of a project, aspects related to the following items should be considered further: technical, funding, contracting, political, health and safety, environmental, social, demographic, legal and regulatory, input resource development, and availability [3]. Resource intensity involves the assessment of resource availability, both internal and external to the business, and takes the following factors into account: employee, supplier, and service-provider skills, competencies, capability, and availability; business and organisational capability; support services; raw input materials; availability of funding; and local infrastructure [3].

The standard uses sub-categorisation to classify projects into project categories: ‘mega’, ‘complex’, and ‘standard and repeatable’. The factors used to categorise projects for this study are illustrated in **Table 1**.

2. CURRENT THEORIES AND CONCEPTUAL MODEL

2.1. Project classification

Müller and Turner [4] state that the project categorisation by Crawford *et al.* [2] is viewed as the most comprehensive work that is focused on project categorisation systems and that practitioners use. Crawford *et al.* [2] note that project categorisation is mainly done to match project types with management styles and project management approaches. They identify 14 attributes, referred to as ‘major building blocks’, that are used to categorise projects.

Table 1: Utility project classification - determining factors [3]

Project classification	Determining factors
Mega- and high-complexity projects	<ul style="list-style-type: none"> • These projects are significantly dependent on physical and financial resources. In their complexity these projects exemplify a significant departure from the norm. • Such projects are unique, and exceed the typical resource requirements of other projects. They might require special funding and also the importation of resources that are not available in South Africa. • They require central coordination of resources and of project management skills.
Complex projects	<ul style="list-style-type: none"> • Projects that can be developed and executed within the local industry and the capabilities of the utility. • They require resources with knowledge of the technologies and methods that are generally available within the utility. • They require central coordination of resources and of project management skills.
Standard and repeatable projects	<ul style="list-style-type: none"> • These are routinely undertaken projects that have scope, time to execute, and quality requirements similar to other existing or completed projects. • These projects use standard systems, sub-systems and components, processes, and methodologies. • They affect only one business area that has the knowledge and capacity to manage the project. • At least 80% of designs are according to accepted and approved technical standards.

Project complexity, as defined by Remington [5], “is a matter of perception, related to experience and familiarity” where the outcomes are difficult to predict with any degree of certainty. The complexity of a project could increase because of the project manager’s or project team’s lack of experience, and it could decrease with higher levels of experience. Remington [5] highlights that, if complex projects are not led effectively at all levels, they could fail in many ways.

Megaprojects, defined by Flyvbjerg [1] as large-scale, complex ventures with a project cost estimate of typically US\$ 1 billion or more, is a distinct project type in its level of aspiration, lead times, complexity, and stakeholder involvement. Such ventures represent a unique type of project to manage [1].

2.2. Project lifecycle

The Project Management Institute (PMI) [6] defines a project lifecycle as a “... series of phases that represent the evolution of a product, from concept through delivery, growth, maturity, and to retirement”. The phase of a project is defined as the “... collection of logically related project activities that culminates in the completion of one or more deliverables” [6]. The project lifecycle provides a basic framework, a structure for the management of a project, considering the project dynamic, and accepts the size and complexity of projects as variables [6, 7]. The most often used project lifecycle framework uses four distinct phases: conceptual (starting the project), planning (organising and preparing), execution (carrying out the work), and termination (closing the project) [6, 7].

Müller, Sankaran, Drouin, Vaagaasar, Bekker and Jain [8] and Pretorius, Steyn, Bond-Barnard and Cronjé [9] note that the leadership style of a project manager varies across the different phases of the project lifecycle, depending on the dynamics of the project.

2.3. Leadership styles

Crawford *et al.* [2] argue that it would be appropriate to apply different project management approaches to different types of projects. This approach implies that different leadership styles would be appropriate for different types of projects. Müller and Turner [10] determined that the leadership style of the project manager influences project success, and that different leadership styles are appropriate for different project types. Megaprojects require a totally different type of project manager, as conventional project managers are not equipped to manage megaprojects [1]. Remington [5] states that advanced leadership

and management skills are required at every level of leadership in a large project, with specific expertise and capabilities assigned to different project leadership levels.

Müller *et al.* [8] and Pretorius *et al.* [9] mention that studying the role of leadership has been at the centre of recent project management research, with shared and vertical leadership emerging as focus areas. According to Müller *et al.* [8] and Pretorius *et al.* [11], it is becoming an accepted norm that a balance (a mix) between vertical and shared leadership is required.

In addition to the above, no one specific leadership style is associated with any particular stage in the lifecycle of a project [7, 11]. The accepted approach in the utility that is the focus of this article is that major project lifecycle stages are assigned to different project management individuals, even from different internal business units. However, no literature related to mega- and highly complex or standard and repeatable projects in the utility project environment could be found to support or verify this practice.

The discussion above leads to propositions 1 and 2:

Proposition 1: The appropriate balance between vertical and shared leadership styles varies with different levels of project complexity, and finding an appropriate balance forms part of project manager competence.

Proposition 2: The appropriate balance between vertical and shared leadership styles varies as the project progresses through the different project lifecycle phases, and finding an appropriate balance forms part of project manager competence.

2.4. Personal attributes

Shi and Chen [12] comment that leadership behaviour reflects the individual characteristics and traits of the leader, while Louw, Steyn, Wium and Gevers [13] have found a relationship between personal attributes, effectiveness, and the success of megaprojects.

This study uses a list of twenty personal attributes identified by Shi and Chen [12] (see Table 2 and Table 3) that incorporates and expands on the personality characteristics listed by Müller and Turner [10] and Remington [5]. This leads to Proposition 3:

Proposition 3: To be competent, a project manager requires a specific set of personal attributes to manage projects at different levels of complexity.

2.5. Project manager competence

For this study, the personal attributes include the leadership skills required to motivate and direct a team. Shi and Chen [12] found that the desirable traits of a project leader should also include intelligence, subject knowledge, and self-confidence. They state that leadership traits are reflected through the behaviour of the project leader. Müller and Turner [9] concur that, to manage a project adequately, a project manager should have the necessary intellectual capacity and a distinguished level of managerial intelligence.

To manage a project successfully, a project manager needs to possess certain personal attributes and exhibit leadership characteristics, traits, and management skills at an advanced level.

This leads to Proposition 4:

Proposition 4: Project manager competence contributes to the successful management of a project.

2.6. Project management success

“There are few topics in the field of project management that are so frequently discussed and yet so rarely agreed upon as that of the notion of project success” [14]. Pretorius, Steyn and Bond-Barnard [15] note

that success is an individual perception; what one individual may view as success, another may view as failure.

Several researchers have made a distinction between project success and project management success. Baccarini [16] states that project management success is a subset of project success. Munns and Bjeirmi [17] and Cooke-Davies [18] make it clear that project success is to be evaluated against the objectives of the project. Munns and Bjeirmi [17], Baccarini [16], and Cooke-Davies [18] are all in agreement that project management success is determined on the basis of an evaluation of the time, cost, and quality objectives, while Collins and Baccarini [19] and Shokri-Ghasabeh and Kavousi-Chabok [20] conclude that there is a positive relationship between project success and project management success.

Kendra and Taplin [21] propose that project management success depends on four dimensions: (i) project manager skills and competencies (including leadership behaviour); (ii) organisational structure at project level; (iii) performance measurement system (time, cost, and quality); and (iv) the supporting management practices. The research by Müller and Turner [4] agrees with that of Kendra and Taplin [21], that the success of a project is dependent on the competence of the project manager, and particularly their leadership style.

Louw *et al.* [13] observe a relationship between personal competence and project success, while Turner and Müller [22] state that the success of a project manager is related to their competence.

2.7. Conceptual model

The model in Figure 2 is based on the propositions stated earlier. It was used to investigate the case under consideration.

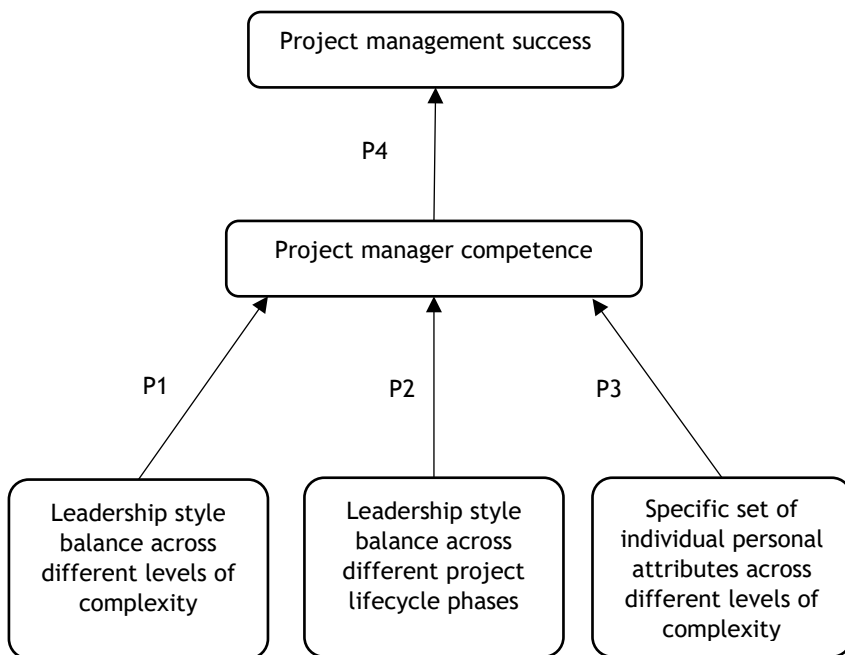


Figure 2: Conceptual model

3. RESEARCH METHODOLOGY AND DESIGN

The criteria for selecting respondents for this study were that:

- i) the participants were actively involved in project management in the specific case;
- ii) they had been working in the environment for a sufficient period of time;
- iii) they had the insight required to partake in the study; and
- iv) they understood different types of projects and leadership styles.

The propositions that were derived from the literature were tested empirically. The test population had to be carefully selected and sufficiently representative to ensure validity [23].

Respondents were selected to ensure that the informant panel met the requirements for the knowledge and insight of experts that would allow for in-depth exploration, as described by Pill [24] and Cantrill, Sibbald and Buetow [25]. The study also took guidance from Cavalli-Sforza and Ortolano [26], Reid [27], and Mullen [28] in the selection of the ideal acceptable number of respondents, namely a minimum of eight and a maximum of 20 participants. Two expert panels took part in the study: an initial panel and an expanded panel.

The initial expert panel consisted of nine project professionals. The participants were selected on the basis of their project-specific work experience (of more than 20 years) and their current roles as senior professionals in the utility.

A second, expanded expert panel included the initial expert panel and an additional 21 project professionals whose project-specific experience averaged seven years and whose roles ensured a balanced representation across various disciplines (including finance, engineering, legal, and asset management) in the project environment.

Mullen [28] states that the objective of adopting a Delphi technique research methodology is to achieve consensus among the experts, while Lindeman [29] states: "the Delphi technique ... involves the use of a series of questionnaires designed to produce group consensus".

The initial questionnaire contained open-ended questions, was semi-structured, and was administered through in-depth interviews. It invited the experts to identify issues, state their views, and offer opinions about the study topic. The in-depth interview technique, as described by Powell and Single [30], pursues an expert's subjective interpretation on a specific subject through a series of interview questions. The responses from the initial round of interviews were used to develop questions for the subsequent questionnaire, the objective of which was to collate feedback that could be used to confirm group consensus. The second questionnaire was administered via an internet-based application, inviting the initial experts and the members of the extended expert panel to participate.

Walker and Selfe [31] state that, because of an increased probability of response fatigue, the number of rounds should be limited to two or three, while Butterworth and Bishop [32] note from several studies that the use of an open-ended initial questionnaire only requires one further questionnaire round to finalise the study. The responses received from the initial expert panel were compared with the responses received from the second round to determine data validity. Based on the high level of agreement, consensus was found to have been reached, satisfying the objective of the Delphi technique.

4. RESULTS

The initial in-depth interviews provided insight into the extent to which the vertical leadership style is used in the management of mega- and highly complex projects in a South African utility. The utility's leadership style is influenced by the nature, size, and structure of the projects and by the utility's organisational culture; it is a large utility with a strong hierarchical and bureaucratic structure, and restricted by prescriptive governance frameworks, policies, and procedures. More than 60% of the respondents confirmed that vertical leadership is the most appropriate leadership style for the management of mega- and highly complex projects. This finding corresponded with the input of the initial expert panel about the generally applied and practised leadership style in the utility. The data for the standard and repeatable projects revealed a different response, with nearly 60% of the respondents opting for shared leadership as the

appropriate leadership style. A summary of the responses is provided in Figure 3; this evidence validates Proposition 1.

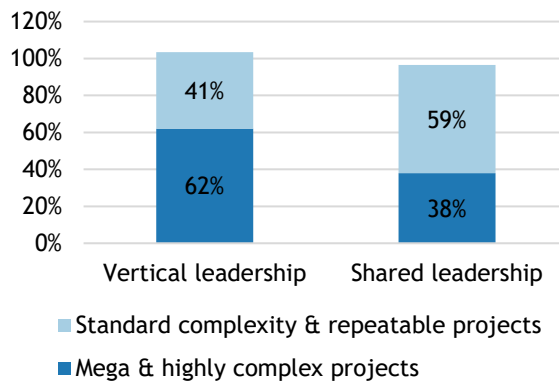


Figure 3: Utility leadership style preference based on project classification.

The second proposition considers the appropriate balance between vertical and shared leadership as a project progresses through the different project lifecycle phases.

An analysis of the expert panel responses indicates that the preferred leadership style of a project manager through the various lifecycle stages fluctuates between vertical and shared leadership, depending on the particular lifecycle stage, as presented in Figure 4. This finding confirms the view of the initial expert panel.

The finding that the preferred leadership style fluctuates is indicative of the dynamic adjustment that is typical of balanced leadership, as described in the literature [8, 9, 10, 11]. This finding confirms that the project manager’s leadership approach and preference changes as the situation/needs of the project change.

Two participants did not agree with a balanced approach with the one of them citing the following reasons: i) accountability in a shared leadership style is not conducive to effective project management, and ii) collective decision cannot easily be held to account, while the second individual did not agree and explained that iii) there needs to be a leadership balance, based on the specific situation; and iv) there is a need for some dynamic balance between vertical and shared leadership. Some support for Proposition 2 was therefore found.

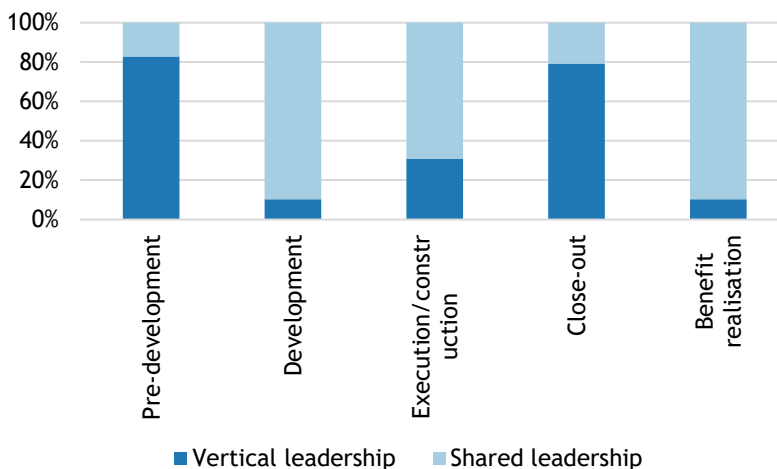


Figure 4: Lifecycle leadership styles

Proposition 3 states that a competent project manager requires a specific set of personal attributes to manage projects at different levels of complexity.

The expert panel was asked to rank the importance of the different personal attributes identified by Shi and Chen [12] by using a Likert-scale. Beside this assessment, the group was asked to rank the personal attributes subjectively, according to the perceived importance from the perspective of each participating expert. The expert panel was also asked to rank the different attributes, based on different levels of project complexity. The aim was to determine whether the expert panel viewed the ranking (i.e. the importance) of the different personal attributes differently, based on the project categories for mega-, highly complex, or standard and repeatable projects. The results indicated very little difference in the importance of the personal attributes, irrespective of project complexity. A summary of the project managers' ranking of important personal attributes based on project complexity is provided in Table 2.

Table 2: Expert panel group's Likert-scale prioritisation and personal-attribute ranking

Attribute description	Frequency of responses				Expert panel ranking	
	Very important	Important	Normal	Not important	Mega- and highly complex	Standard and repeatable
	Ability to deal with pressure	8	1			1
Decisiveness	8	1			2	2
Proactive	6	3			3	4
Honesty	8	1			4	3
Sense of responsibility	6	3			6	5
Self-confidence	6	3			5	6
Maturity	7	2			7	8
Foresight	4	5			8	7
Innovation/be creative	2	5	2		9	9
Energy	4	3	2		10	10
Endurance	5	2	2		11	12
Respectfulness of others' feelings	4	3	2		13	11
Justice	2	4	3		12	13
Loyalty	2	6		1	14	14
Stable emotions	3	5	1		16	15
Optimism	1	6	1	1	15	16
Affinity/Empathy	1	4	4		17	19
Kindness		3	6		18	17
Sensitivity	1	1	7		19	18
Attractiveness			5	4	20	20

The participants on the extended expert panel were subsequently prompted to rank only the personal attributes, independent of the level of project complexity. The personal attributes that were ranked by the extended expert panel were selected by the first expert panel. The ranking results from the second panel were analysed and are presented in Table 3. These findings show consensus on the first twelve personal attributes. Although there is a difference in the attribute ranking between the groups from ranks

13 through 16 (highlighted in light blue in Table 3), the ranking differences between the two panels are small.

Proposition 3 is therefore partially supported.

Proposition 4 states that project manager competence contributes to the successful management of a project. Both panels confirmed a positive association between project manager competence and project management success. Success was self-defined by the participants, and no distinction was made between project success and project management success.

Proposition 4 was therefore supported.

The second panel concurred that, regardless of the project complexity level, the project manager needs to have an acceptable level of competence.

The expert panels were asked to comment on the relationship between project management success and a balanced leadership style according to the level of project complexity. The participants of both panels concluded that a definite link exists between project success and a balanced leadership style, and between project management success and the right leadership balance, independent of the level of project complexity.

Table 3: Expanded expert panel personal attribute ranking

Attribute description	Expert panel ranking	Expanded expert panel rank
Ability to deal with pressure	1	1
Decisiveness	2	2
Pro-activeness	3	3
Honesty	4	4
Sense of responsibility	5	5
Self-confidence	6	6
Maturity	7	7
Foresight	8	8
Innovation/be creative	9	9
Energy	10	10
Endurance	11	11
Respectfulness of others' feelings	12	12
Justice	13	14
Loyalty	14	16
Stable emotions	15	13
Optimism	16	15
Affinity/Empathy	17	17
Kindness	18	18
Sensitivity	19	19
Attractiveness	20	20

5. DISCUSSION

The successful management of a project across varying levels of complexity depends on the project manager's attribute profile and balanced situational leadership style.

The objective of the study was to identify the individual personal attributes and the appropriate leadership styles needed by a project manager across different levels of project complexity to enable successful project management. This objective was achieved. An overview of the findings is given below.

5.1. Leadership style balance across different levels of complexity

In addition to differentiating between two leadership styles (vertical and shared), the study categorised the level of project complexity into two categories: (a) mega- and highly complex projects, and (b) standard and repeatable projects.

The findings confirm the need for a balance between leadership styles across the different project complexity levels. In the utility, the predominant view is that a vertical leadership style is most evident. The research participants concurred that this was in most part "...due to the nature, size and structure of the projects..." and was linked to the organisational structure.

The findings also indicate that the leadership style varies when there is a change in the level of project complexity. For example, a change to the standard and repeatable projects category indicates a shift in the leadership balance towards shared leadership. The participants agreed about this finding; they mentioned that, in the utility's project environment, most projects are executed on the basis of shared accountability and participative decision-making. This is particularly the case for projects with standard and repeatable scopes.

Proposition 1 is supported. The findings from the research show how the leadership style changes in the utility as the project complexity level changes.

5.2. Leadership style balance across different project lifecycle phases

The initial questionnaire asked the expert panel to identify the preferred leadership style for each lifecycle phase. The second questionnaire, which built on the first, asked the participants to indicate whether they agreed or disagreed with the preferred leadership style per phase. The second expert panel participants agreed with the preferred leadership style choices of the initial expert panel for each of the lifecycle phases. This finding confirms that experts from the utility agree that the preferred leadership style changes as a project moves through its lifecycle phases.

Proposition 2 is supported.

5.3. Individual personal attributes across different levels of project complexity

An analysis of the results from the initial ranking request indicates that there is no significant difference in the ranking of the project manager's personal attributes when a project's complexity level in the utility changes. The lack of variation between the personal attributes and project complexity levels needs to be critically analysed, and it links back to the definition of project complexity: "...a matter of perception, related to experience and familiarity" [5].

Important to note are the similarities in the ranking of the personal attributes between the results obtained by Shi and Chen [12] and those of this study. Both studies confirm that the highest-ranking personal attributes are similar across different levels of complexity, with minor changes in ranking noted between rankings 13 to 16 (see Table 3). Because there is little change in the personal attribute rankings based on the project complexity level, the personal attribute rankings can be done independently of the level of project complexity.

A conclusion that could be drawn from the results is that the project manager's set of personal attributes, regardless of the level of complexity, needs to include the ability to deal with pressure, being decisive and resolute, being proactive, having a firm sense of responsibility, and having a high level of self-confidence.

Proposition 3 is partially supported, as a project manager requires a specific set of personal attributes to manage projects. However, the top personal attributes do not change for different levels of project complexity.

5.4. Project manager competence and leadership style for project management success

Responses to the second-round questionnaire confirmed the findings from the initial interview questions. The project management experts in the utility agreed that there was a definite link between project manager competence and project management success.

The link between a balanced leadership approach and project management success was not that apparent at first, based on an assessment of the responses received from the initial expert panel. However, an analysis of the narrative responses of the second expert panel to this same question confirmed a significant link.

Proposition 4 is supported, and the detailed responses of the second expert panel participants answer this particular research question.

6. CONCLUSIONS AND RECOMMENDATIONS

The identification and assignment of appropriately competent project managers is emphasised as an important determinant of project management success. The findings support there being a link between leadership style (suitable for specific levels of project complexity and for specific project lifecycle phases) and project manager competence in the case studied. These links have not previously been adequately researched, defined, or understood in the utility.

The study also highlights a specific set of personal attributes that could assist the utility's management team to identify and appoint suitable individuals to manage its projects.

The need for a balanced leadership approach has been emphasised in the recent literature, and is supported by the findings of this study [8, 9]. The results also indicate a preference for a vertical leadership style within the case organisation, and that a shared leadership style is preferred as the level of project complexity increases. For projects at a lower level of complexity, the project manager tends to operate with greater independence of the project team, resulting in the project manager employing a more vertical leadership style as the primary source of instruction, oversight, and control.

This study contributes to the professional development of individuals in the project environment of the case study organisation by providing guidance on the personal attributes that are important for a project manager to have.

Further investigations could be undertaken into the personal attributes needed by project managers in settings other than the case organisation, a utility.

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