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Declaration

All papers in this publication have been through a review process involving a review of abstracts, peer review of full papers by at least two referees, reporting of comments to authors, revision of papers by authors and re-evaluation of the revised papers to ensure quality of content.

EVALUATING THE NEW UNIVERSITIES PROJECT OUTCOMES USING THE PMBOK PROJECT PERFORMANCE DOMAINS

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The Project Management Institute (2021) PMBOK Guide seventh edition presents eight essential domains or activities that are crucial to ensure the success of a project. PMI (2021) defines these Project Performance Domains as a group of related activities that are critical for the effective delivery of project outcomes. The PMI's new focus on performance and project outcomes marks a significant shift away from traditional project management tools and techniques. This paper uses the eight PPDs as a framework to determine the critical factors that enabled the success of the new universities project based on the eight domains. A completed project with comprehensive data was used for the analysis. Hence, data from the project close out report was analysed using the thematic analysis method to identify the key project performance practices that were formulated and implemented to successfully achieve the intended outcomes. The key success factors identified relate to the role of the client as a leader, stakeholder's productive working relationship and the delivery of the project within 1% of the control budget. There may be a common assumption that all clients may employ project managers who may possess the skills to execute these critical functions successfully. However, this is not always the case on all projects, and there is also varying degrees of competency among project managers. Therefore, clients should ensure that those playing leadership roles in their projects are well equipped to perform these critical functions successfully as a condition to achieve better infrastructure project outcomes.

Keywords: document analysis, PMBOK, project performance domain, South Africa.

INTRODUCTION

The performance of infrastructure projects has traditionally been evaluated based on cost, time, and quality criteria in the construction management literature. However, the latest version of the PMI (2021) Guide to the Project Management Body of Knowledge (PMBOK), which introduces a shift away from tools and techniques to project outcomes; presents eight Project Performance Domains (PPDs) that provides a framework for planning and/or examining an infrastructure project in relation to the outcomes.

The objective of this paper was to use the eight PPDs as a framework to determine the critical factors that enabled the success of the New Universities project. The New Universities is one of the major projects delivered in South Africa, which started in 2014. The construction of additional phases/buildings remains ongoing until 2025 to provide universities in two Provinces that previously had no universities. The reason for selecting this project is due to

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access to a 3000+ page comprehensive close out report and project documentation and its relative success despite the failure of major public infrastructure projects within South Africa.

The primary contribution of this paper is the use of the performance domains to evaluate project performance as opposed to the three traditional measures of time, cost, and quality to highlight the importance and role of secondary or other critical objectives within infrastructure project delivery (Sinesilassie et al, 2019; Banihashemi et al, 2021; Mwelu et al, 2024; and Furneaux et al., 2006). The evaluation of the critical success factors will benefit the construction industry with regards to drawing lessons from the New Universities project on formulating and implementing strategies such as ensuring that the people involved in the planning, execution and leadership of the project are well equipped and competent to successfully perform such roles for achieving better infrastructure project outcomes.

This paper outlines the theoretical framework, research questions, research methods, data collection, analysis and results, discussion of results and lastly drawing conclusions and providing areas for future research.

THEORETICAL FRAMEWORK

The Project Management Body of Knowledge (PMBOK) is the commonly used project management standard in the world. It was first published in 1996 and has since gone through seven editions. The 7th edition published in 2021 has introduced a fundamental shift in project management thinking and philosophy by focusing on outcomes rather than traditional techniques and processes. This shift has widened the application of the PMBOK document by making it appropriate and applicable to all project types. It also draws the project management philosophy closer to the central principle of construction procurement strategy which is about identifying the most appropriate way to deliver the outcomes of a project in terms of the pricing, tendering, contracting, packaging, and targeting strategies (Simonaitis et al, 2023; PMBOK, 2021; and Laryea, 2019)

Previously, the PMBOK contained knowledge areas which were fundamentally the groupings of areas in the project management body of knowledge that a project manager was required to know to manage a project successfully. Thus, the previous PMBOK editions were mostly focused on deliverables, current developments, and recent literature such as Radujković and Sjekavica (2017) and Laryea (2019) focus on overall project outcomes and this has influenced the shift in focus of the new PMBOK onto outcomes rather than deliverables.

In the current seventh edition, performance domains are the areas a project manager or the project management team needs to focus on and not necessarily know in a detailed manner. Another key variance between performance domains and the knowledge areas is that performance domains focus on outcomes instead of outputs. The performance domains assist the project management teams to generate outcomes that will ultimately create value for the organisation and the stakeholders involved. At the end of performing processes based on the specified knowledge areas, project managers were expected to produce some outputs rather than outcomes. In contrast, all performance domains should have a set of quantifiable outcomes. The domains are interrelated, independent and interactive and working in one accord to achieve the intended objectives of the project (Amaro and Domingues, 2023).

Moreover, the current edition has introduced the concept of tailoring which is about adapting unique objectives, complexity of the environment, and stakeholders which are factors that contributes to the success of the project. This is done by empowerment of project teams and their leaders with a combination of principles and primary domains that provides guidance for definition of development approach including the management elements and the project life

cycle to be utilised in project execution. (Amaro and Domingues, 2023; Rodrigues et al, 2023; and PMBOK, 2021).

Defining the eight PMBOK project performance domains

Performance domains in the PMBOK are the critical group of activities required to be performed to deliver the project outcomes successfully. The eight performance areas are the broad aspects of a project that the project leader and project team are advised to focus from start of the project to its delivery to achieve successful outcomes.

The eight different performance domains are detailed below and used as a framework for analysing the outcomes of a major project in South Africa being the New Universities;

1. Stakeholder Performance Domain [PPD1] refers to the processes and activities related to stakeholders. As outlined in the PMBOK and other key literature such as Laryea (2019), effective stakeholder engagement is a critical key to project success. This stakeholder engagement and performance is further supported by Oppong et al, (2017) in the sense that the paper outlines that project stakeholders have a substantial influence on the project success and the project stakeholder performance is anticipated to provide the project managers with sufficient support to assist the selection of realistic options that will expand the final value of the project to the stakeholders (Locatelli et al, 2023).
2. Team Performance Domain [PPD2] refers to the people (project team) appointed to be responsible for developing the processes that will realize the business outcomes. In relation to project teams, research by the Construction Industry Institute (2017) on the impact of diverse project delivery systems on cost, schedule, and quality showed that when it comes to successful projects, there are three critical factors to success. namely:
 - A knowledgeable, trustworthy, and decisive facility owner/developer;
 - A team with relevant experience and chemistry assembled as early as possible, but certainly before 25% of the project design is complete; and
 - A contract that motivates and rewards organizations for behaving as a team.

The fact that projects are built by people highlights how this performance domain focuses on all actions and processes about the project team, including managing conflicts, developing teams, and monitoring their interactions.

3. Development Approach and Life-Cycle Performance Domain [PPD3] refers to the procedures and activities related to the life cycle and development approach decisions of the project that is determined in accordance the characteristics of deliverables by utilising tailored approaches.
4. Planning Performance Domain [PPD4] refers to activities and processes that will be useful to coordinate, elaborate and organise the scope of work throughout the project. It is performed in the beginning and constantly throughout the project.
5. Project Work Performance Domain [PPD5] refers to the establishment of project processes, management of physical resources, and performing activities which will result in building an effective learning environment.
6. Delivery Performance Domain [PPD6] refers to business value of the project after successful completion. Deliveries and results produced because the project continues to generate business value for a long time even after completion. The delivery performance domain includes all processes and actions related to the delivery performance of projects.

7. Measurement Performance Domain [PPD7] refers to assessment of the project performance and decisions about the necessary modifications to sustain anticipated project performance.
8. Uncertainty Performance Domain [PPD8] refers to the management of uncertainty in projects. Uncertainty is existent in all projects in different levels. This could positively or negatively impact projects. This domain is mainly about risk management.

RESEARCH QUESTIONS

Based on the eight performance domains, the following questions were investigated:

- How were the processes and activities related to stakeholders managed by the client team?
- What was the nature of the project team appointed to deliver the project and realize the business outcomes?
- What were the key activities and processes related to the life cycle and development approach decisions of the project?
- What were the key actions and processes used to organize and coordinate project activities?
- What systems were established for project processes, management of physical resources, and performing activities which will result in building an effective learning environment?
- What was the key business value outlined for the project after completion?
- What was the performance of the project in comparison to expected outcomes?
- What were the key uncertainties in the project and how was this managed (effectively)?

RESEARCH METHODS

A qualitative research approach was undertaken to address the research aim and answer research question(s). The aim of the study was to utilise the eight PPDs as a framework to determine the critical factors that enabled the success of the new universities project based on the eight domains. The study adopts the philosophy approach of interpretivism as this is about the need for the researchers to understand the subjective and socially created meanings articulated about the phenomenon currently being investigated (Saunders, Lewis and Thornhill, 2021). A case study approach was used for the study, with the new universities project being the unit of analysis. The study is built upon secondary data and hence the use of a documentary analysis as a research strategy and thematic analysis as a data analysis method. The New Universities project close out report was obtained online at the University of the Witwatersrand, (2018) New Universities Case Study Close Out Report, University of the Witwatersrand. Available at: <https://www.wits.ac.za/ipdm/evidence-based-publications/close-out-report/> (Accessed: 15 January 2024).

The New Universities were used as a case study due to the availability of data from this project on all aspects of the analytical framework. A completed project with a comprehensive project documentation and the close out report was required for the analysis. Moreover, the project is one of the few major projects on South Africa which was relatively delivered successfully as compared to others. Hence, data from the project close out report was analysed to identify the

key project performance practices that were formulated and implemented to successfully achieve the intended outcomes in line with the PPDs.

DATA COLLECTION, ANALYSIS AND RESULTS

The research questions were addressed using the data provided in the close out report and other official project documentation pertaining the project. The close-out report was thoroughly analysed using thematic analysis based on the PMBOK project performance domains which informed the analytical framework and the research questions. Key success factors (for achievement of each domain) from the framework were identified on the PMBOK and utilised to code and capture data.

The following table outlines the evidence and analysis from the analysed data in alignment with the analytical framework and the research question(s) in relation to the performance and the outcomes of the New Universities Project;

Table 1: New Universities project performance key success factors analysis

Number	Project Performance Domains	PPDs Key Success Factors Identified	Analysis remarks
1.	Stakeholder Performance	Stakeholder productive working relationship, active involvement, and support. (See NUPMT, 2018: pages 214, 215, 217 and 218)	The project had stakeholder buy in and there was an active involvement and participation of the stakeholders. Their commitment was assisted by three-year framework contracts rather than a once-off projects. Community liaison was used as a tool to effectively mobilise stakeholders, including potential suppliers and sub-contractors.
2.	Team Performance	Shared ownership, high-performance team, and relevant leadership (See NUPMT, 2018: pages 9, 10, 21, 166 and 168).	A highly skilled, client driven, and competent delivery team was appointed, and the role of the team was to initiate, plan and oversee the development of the project, and it was made up of the client team and client delivery manager. The delivery manager was responsible for leading the team to achieve the project objectives. The client was responsible for balancing competing interests for achievement of the primary objectives of cost, time and quality including the desired development outcomes.
3.	Development Approach and Life-Cycle Performance	Consistent Development approaches, project life cycle phases and delivery of business and stakeholder value (see NUPMT, 2018, pages 22, 169, 170, 187, 258 and 281).	The development approach was designed in alignment with the project objectives from the start and completion of the project. The BBEE Empowerment (local participation and skills development) outcomes were substantial in the project and surpassed the expected construction development targets.
4.	Planning Performance	Organised, coordinated and deliberate, time spent on planning, evolving information for outcomes (see NUPMT, 2018, pages 13, 22, 167, 257 and 297).	The execution of the new universities project was done by Wits University by entering into a memorandum of agreement with DHET. A project implementation plan was prepared which had 4 phases throughout the duration of the project.

5.	Project Work Performance	Efficient and effective project performance, appropriate project processes (see NUPMT, 2018, pages 40, 41, 217 and 250)	The project work performance was analysed using recorded project documentation and the Programme Management Information System (PMIS) maintained by the New Universities Project Management Team (NUPMT).
6.	Delivery Performance	Realisation of intended outcomes, contribution to business objectives (see NUPMT, 2018, pages 258, 275, 279, 281 and 283)	Cost, Time, Quality, Value for money, and contractually enforceable targets: The procurement strategies developed resulted in the creation of efficient construction service capacity to accelerate the design and implementation of the physical infrastructure for the two universities with market rates within the three-year framework contracts. The project was achieved within time and within 1% of the target cost. The quality aspect received architectural recognition.
7.	Measurement Performance	Understanding of the project status, performance tracking, achieving targets and generating business value (see NUPMT, 2018, pages 40, 41, 217 and 250)	Performance was measured using New Universities Programme Management System (NUPMS) which measured cost allocations, procurements, contracting and payments, including the tracking and reporting on the budgeted versus expenditure. There was constant monitoring and review of performance data between project managers and contractors. This enabled early identification of challenges and introducing corrective measures where necessary.
8.	Uncertainty Performance	Proactively exploring and responding to uncertainty, project environment awareness. (see NUPMT, 2018, pages 42, 43)	Risk Management and risk registers: Uncertainty performance of the project was instituted, reviewed, and updated using risk registers.

Source: Table created by authors, 2024 based on the New Universities Project Close out report published in 2018

DISCUSSION OF RESULTS

The results indicate that the project responded to all the eight-project performance domains and the key success factors per domain was established to make the analysis of the close out report efficient. The study shows that the general project outcomes did not only focus on the primary objectives, but also the secondary objectives which ended up addressing the key variables identified. The key results are summarised and discussed as follows;

Stakeholder performance domain

According to literature, project stakeholder engagement and performance have a substantial influence on the project success (Oppong et al, 2017). The evidence in Table 1 shows that the management and performance of the stakeholders was done through continuous stakeholder engagements meetings, presentations, and comprehensive workshops throughout the programme. There was also consistent support received from the stakeholders. Stakeholder engagement and efficient stakeholder management is critical to construction projects and greatly contributes to optimal performance of construction projects. This provided a channel

through which the community articulated their inputs and expectations regarding the project. The social aspects of project leadership and delivery is critical for successful project outcomes in developing countries where local communities perceive construction as a socio-economic development opportunity requiring their participation. The productive working relationship with the stakeholder is the key success factor within this domain (Ebekozi et al, 2023).

Team performance domain

In contributing to project success, the project team needs to be knowledgeable, trustworthy, and decisive; have appropriate experience and chemistry; appointed as early as possible; and also utilise a contract that motivates and rewards organizations for team behaviour (CII, 2017). The evidence in Table 1 shows that the project team (see Laryea, 2019 and Laryea and Watermeyer, 2020) had shared ownership in the sense that the project establishment and execution was done through a shared vision. It was also high performing, knowledgeable and competent and that is how it was able to achieve the intended objectives. Successful delivery of projects should focus on people-related aspects as they greatly contribute to project delivery and establish team structures that foster collaborative working relationships. The team nature and structure align with the reviewed literature on project teams. (Mosalaesi and Laryea, 2019, and Simonaitis et al, 2023).

Development Approach and Life-Cycle Performance domain.

The evidence in Table 1 shows that the key activities and processes related to the life cycle and development approach decisions for the project were done by designing a development approach in alignment with the project objectives from the start to completion of the project. The approach started with developing the business case and has been delivered through a series of project phases, including planning, design, construction, and commissioning. However, on top of the primary objectives of cost, time and quality, Broad Based Black Economic Empowerment (BBBEE -local participation and skills development) was targeted as one of the development goals and it has substantially exceeded the specified construction development targets. The literature reviewed argues that development approach which extends throughout the life-cycle of the project acts as a road map for project initiation and execution and therefore effective implementation of the approach will often lead to the desired outcomes and this was the case with the New Universities Project (Amaro and Domingues, 2023 and PMBOK, 2021).

Planning Performance Domain

In relation to the planning performance domain, the evidence in Table 1 shows that there was a systematic planning approach which the client team ensured that sufficient time was spent in the planning processes which included the development of the project implementation plan outlining the project life-cycle. All the planning activities of the project were structured, organised, and deliberate in alignment with the delivery approach. The division of tasks and responsibilities during the project stages is an integral part of managing a project as it assists with the achievement of project goals and efficient work organisation (Imeri and Imeri, 2024; and PMBOK, 2021). The responsibility for the systematic planning of the project, at the portfolio management, programme management, and project management levels, was carried out by the New Universities Project Management Team (NUPMT) whose composition and roles are in a paper by Laryea (2019) on the procurement strategy. The detailed team composition and timelines are also in a study by Laryea and Watermeyer (2019) which examines the project management approach used by the NUPMT in dealing with the complexity and uncertainties associated with the project planning.

Project Work Performance Domain

According to literature, the project work performance domain is about the establishment of project processes, management of physical resources, and performing activities which will

result in building an effective learning environment (PMBOK, 2021). The evidence in Table 1 shows that the project demonstrated effective and efficient project performance through the outlining of the plan/programme and ensuring that the processes and activities were aligned to the project, environment and academic activities in relation to the project work performance. Utilising an automated method to measure and record project work was more effective and there was less room for errors.

Delivery Performance Domain

In relation to delivery performance domain, the evidence in Table 1 shows that the key business value achieved after project completion was delivery within 1% of the target cost, the intended quality was realised, and other above-mentioned secondary objectives were achieved. The performance of target costs contracts at both universities were evaluated in a paper by Laryea (2016). The evidence showed close tolerance between what was planned and what was achieved in the delivery and implementation phase. Time related outcomes were largely achieved for the University of Mpumalanga, compared to the case of Sol Plaatje University. However, the academic year still commenced in 2016 as planned (see Laryea, 2019). Notwithstanding the granting of extensions of time and incomplete designs when construction commenced; the buildings and infrastructure were achieved within the set control budgets and slightly below the DHET cost norms for university facilities. The construction work packages were delivered within 1% of the target price. The works were according to the required specifications and architectural recognition was received for the buildings constructed. Achieving the delivery outcomes of time, cost and quality is a traditional approach to achieving project success, however, social value, client/stakeholder satisfaction, and other secondary objectives are also crucial in determining holistic success and performance of a project (Locatelli et al, 2023; Hassan and Al-Kindy, 2023; and Kumar et al, 2023). This was how the delivery performance was achieved with the new Universities project.

Measurement Performance Domain

The evidence in Table 1 shows that performance was measured using New Universities Programme Management System (NUPMS) which measured budgetary allocations, procurements, contracting and payment, as well as monitoring and reporting budget versus expenditure. There was constant review of performance data between the contractor and project managers. This assisted in early identification of challenges and introducing corrective measures where contractors were behind the targets. The overall governance of the system formed a central focus of the contract committees and performance measurement of the project. Literature outlines that the benefits of utilising a good project management methodology includes easy measurement of the project completion percentages and measurement of achievements versus the initial plans (Simonaitis et al, 2023). A paper by Laryea (2019) presented a detailed assessment of the new universities project time and cost performance outcomes. Another paper by Laryea and Watermeyer (2024) presents evidence on the measurement of secondary procurement outcomes. These outcomes relate to four socio-economic development key performance indicators (KPIs) that were integrated into the main works contracts to promote skills development, Broad-Based Black Economic Empowerment, local employment, and local expenditure.

Uncertainty Performance domain.

Literature outlines that the uncertainty performance domain refers to management of uncertainty in the project. The evidence in Table 1 shows that uncertainty in the project was managed utilising a detailed risk register was developed, reviewed, and updated regularly. Newly identified risks were added as the project progressed from the initial site identification through to feasibility and viability studies, implementation planning including the risks associated with the actual development and construction of the universities. Achieving project

success needs regular risk management and discovery throughout all the phases of the project (Imeri and Imeri, 2024; and Kumar et al, 2023). The research by Laryea and Watermeyer (2020) presents detailed insights into the approach the New Universities Project Management Team (NUPMT) used to effectively manage the significant uncertainty involved in the project from inception to completion.

CONCLUSIONS

Theoretical and practical implications

The aim of the study was to utilise the eight PPDs as a framework to determine the critical factors that enabled the success of the new universities project based on the eight domains. Eight research questions which are in alignment with the PPDs framework were developed to assist in addressing the research aim. The New Universities project addressed all the eight PPDs in relation to the outcomes achieved. However, the key success factors identified relate to the role of the client as a leader and selecting the right, knowledgeable and competent project team to fulfil the objectives of the project. The stakeholder's productive working relationship, which was achieved through active involvement and engagement of the project stakeholders, greatly contributed to the project's success. The delivery of the project within 1% of the control budget indicate that it is possible for major projects within South Africa to achieve relative successful cost performance.

The study's theoretical contribution is the demonstration and importance of shifting the focus from only focusing on primary objectives with regards to measurement and evaluation of the project outcomes. There is a need to consider secondary objectives as they also contribute to the overall success of the project as outlined in literature and the PMBOK document. Acclimatising to uniquely structured project goals, stakeholder engagement and involvement and complexity of the environment contributes to successful delivery of construction projects

Research limitations and future research

The study was only focusing on the close out report of the New Universities in Mpumalanga and Northern Cape Provinces in South Africa for data collection and analysis. The evaluation of the project was done utilising the PPDs as an analytical framework and therefore the evaluation is not exhaustive of any additional project outcome evaluation factors. However, future research should be conducted on the project managers who were involved in the New Universities to gather data on how they achieved the project outcomes in accordance with the eight PPDs.

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