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Does a Project Manager Assignment Process Affect Project Management Performance Indicators? An Empirical Study

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Abstract: Practitioners in most firms use intuition to assign project managers to projects, despite this decision being one of the vital factors contributing to project management performance linked to sustainable utilization of resources. Extant research reveals the need to improve the project manager assignment (PMA) process. However, existing empirical studies are currently limited, thereby restricting our understanding of this process to a specific context. This study builds on this limited area by extending our understanding to other contexts. Questionnaires and interview surveys were conducted with 73 informants across 12 firms, covering several industries engaged in different types of projects. The results provide strong empirical evidence of unstructured and ineffective PMA processes that significantly affect sustainability issues in terms of a thriving firm such as project manager performance, project manager rewards, and project success. This empirical evidence is a contribution to existing project management knowledge for three reasons: (1) empirical testing of a project management theory for the first time, (2) falsification of the conventional understanding of the theory of PMAs by using the concepts of an index rather than a scale, and (3) adding depth to existing knowledge by extending our understanding of PMA processes.

Keywords: sustainability; project manager assignments; multi-project settings; project success; project manager performance



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1. Introduction

Project manager assignments (PMA) may be defined as a process of assigning responsibility for managing a project or projects to an individual project manager [1]. This process is viewed as an important managerial decision-making process because of its association with project management performance indicators. Notwithstanding this, management in several organizations treat this decision-making process casually and pursue an informal process that is heavily reliant on gut feeling. While gut feeling is useful on the basis of a managers' experience that resides in their brain as tacit knowledge, it results in a mismatch between project managers' competencies and projects' requirements. This casual approach may lead to project manager demotivation and a lack of continuity in PMA decisions when the responsible authority making the decision leaves the organization with his/her tacit knowledge. The inference is that the decision-making process cannot be reviewed and appropriate improvements made in line with sustainability [2–4] and best managerial decision-making practices [5].

Besides the PMA process being one of the crucial factors contributing to project and organizational performance [6–9], there is evidence to suggest that professionals in project-based organizations rely mostly on managerial intuition [5]. Managerial intuition is a convenient but informal approach that is considered suboptimal [10–12], due to a human mind's limited ability for information retention and calculation [13–17]. Empirical evidence

of the cost implications of a PMA process that relies on managerial intuition, in terms of direct but significant annual financial losses in the order of billions, along with a significant loss in a senior manager's time spent in resolving PMA incompatibilities, has been revealed in [18]. These cost implications affect sustainability issues (i.e., thriving organizations, and hence, the economy) in the context of not only short-term organizational profits but also long-term profits [2–4].

Firstly, empirical research on PMA processes in multiproject settings, the motivation of this work, is at present limited. An illustration to support this argument is that only two empirical studies [7,9] were established to be the only relevant studies on PMA processes applicable to multiproject settings. Secondly, these empirical studies do not test the relationship between the structure of a PMA process and project management performance indicators. The influence of three variables (organizational culture, team culture, and team management competency) on project success was tested in [7]. Moreover, existing studies on PMAs use Likert scales to measure project management variables.

Lastly, empirical studies on PMAs applicable to multiproject settings were conducted principally in USA high-technology industries and explicitly for new product development and software projects. The absence of applicable empirical studies conducted in the context of other countries, industries, and particularly other project types other than new product development and software development projects, is another identified gap.

1.1. Gap and Study Motivations

Motivated by the above discussions, this study aims to address three identified gaps. (1) To the authors' best knowledge, empirical testing of the relationship between the structure of a PMA process and project management performance indicators has not been attempted prior to this study. (2) This study falsifies conventional understanding concerning the use of novel data analysis techniques in terms of index as opposed to scale measurements, with a view to furthering our understanding of existing knowledge on PMAs. The use of an index to express the degree of departure from effective PMA processes (phenomena being studied) introduces a common or standardized measurement unit while retaining all collected data, unlike scale measurements that often result in dropping some observed or measured variables. The implementation of an index to falsify conventional understanding is a contribution consistent with the ideas in [19–21]. (3) This study builds on existing but limited empirical studies conducted in multiproject settings by expanding the scope to another region (Africa), country (Botswana), other industries (e.g., mining) and project types (e.g., mineral exploration projects), with a view to increasing our understanding of PMA processes in another context.

Therefore, this research presents the results of a study which sought to investigate the effectiveness of existing PMAs applicable to multiproject settings but in a new context.

1.2. Scope and Objectives

This study was confined to multiproject settings in both private and public organizations spanning different sectors which include: energy, telecommunications, construction, mineral exploration, financial services, and manufacturing. The specific objectives were: (1) to investigate the nature of existing PMA processes, (2) to assess the relationship between the extent of a PMA process structure with four project management performance indicators [5]. Both objectives are linked to sustainability issues in terms of a thriving organization.

The rest of the article is divided into four sections. Section 2 reviews the literature relating to the PMA process and its implications on performance, a sustainability issue from systems thinking [2,4]. Section 3 describes and discusses the research approach used to achieve the objectives. Section 4 presents and discusses the findings, and their implications. Section 5 is a conclusion that provides practical implications of the empirical findings, including contributions and directions for future work in light of applying the integrated approach in practice.

2. Literature Review

A project manager assignment (PMA) is a decision-making process of assigning project managers to projects. This process is viewed as a key management challenge [22,23], but an important sustainability issue [2–4], particularly in multiproject settings [24–28], where project managers lead several projects simultaneously [29]. The reason is that unlike single project management settings, there are clear links between projects and organizational strategy [30]. An effective PMA process involves the following constituents that complement managerial intuition: (1) the use of formal guidelines such as documentation and management tools and techniques, (2) standardization in the context of reducing subjectivity, and (3) comprehensiveness in relation to important criteria to be considered [5,7,9], all of which are associated with sustainability issues in the context of organizational profits [2–4].

2.1. Importance of a Structured Project Manager Assignment Process

Several authors [5,16,31–34] agree that the PMA process affects organizational performance, and hence, profits. This process is vital to project success [35–38] in the context of the importance of selecting a project manager. This selection is an outcome of a decision associated with the PMA process, which eventually affects organizational performance, and hence, profits [7,9,30,35,36]. A thriving organization in terms of consistent profit margins may translate into economic output [2–4]. There is a link between the effectiveness of the PMA process and resource productivity [39], in relation to project manager motivation, which in turn affects project manager performance on assigned projects, and hence, project performance [5,6,40]. A project manager is viewed in this study as an example of a resource, in the context of the need for sustainable utilization of that resource [2–4]. Additional studies [6,22,23,26,36,37,41] also corroborate this association. A discrepancy in the PMA process may significantly impact on organizational performance, and hence, profits [32,37,38].

An effective PMA process influences the level of match between a project manager and a project, on the basis of a methodical, standardized, inclusive, objective, and transparent process that is applied consistently [6,9]. Empirical studies [6–9] established a relationship between the right project manager for a given project and organizational performance. A study by [5] concluded that selecting the right project manager for a given project is associated with both business success and reward for performance, both of which are sustainability issues [2–4]. Other researchers [26,33] established a link between business success and project performance. A PMA process that considers similarities among projects is associated with the following: project manager productivity, project manager performance, project manager career advancement, and reward for performance [5]; all of which may be linked to sustainability [2–4].

To understand how extant research has studied the PMA process, a critical appraisal of management literature applicable to PMAs in multiproject settings was conducted. This appraisal revealed that whilst extant research provided valuable insights concerning the need to improve PMA processes, it is focused primarily on one country (USA), industry (high-technology), and project types (new products and software development). This identified gap confines our understanding of PMA processes to a specific context. Table 1 is a summary of the literature review, to set the tone for the motivation of this study in relation to addressing the identified gaps.

The theoretical foundations in Table 1 were used to enable a deeper understanding of the PMA process, in the context of studying other sectors and industries (including a different region and country) that engage in different types of projects, other than those in the existing literature. Consequently, this approach helps to provide new insights and additions to the existing bodies of knowledge, as well as implications for both research and practice, in light of this new knowledge.

Table 1. Summary of extant literature and identified gaps.

Country	Industry	Sector	Project Types	Constructs	Measurements	References
USA	High-technology	Private	Software	Project similarity and resource productivity	Scale	[39]
USA	High-technology	Private	New product development	Project similarity and project manager productivity	Scale	[5,6,41]
USA	High-technology	Private	New product development, Manufacturing	PMA and organizational performance	Scale	[6–9]
Iran	Construction	Private	Construction	PMAs	Scale	[42,43]
Israel	Construction	Private	Construction	Project manager selection and past performance	Scale	[44]
Thailand	Construction	Private	Construction	Criteria for PMAs	Scale	[45]
USA	Construction	Private	Construction	PMAs		[46]
UK	Construction	Private	Construction	Employee needs, project requirements and organizational priorities	Scale	[4,47]
Botswana	Mining, Energy, Telecommunications, Financial, Manufacturing, Construction	Private Public	Mineral exploration, Power generation and distribution, Telephone Network, Change management, Banking, Manufacturing, Construction	PMA process structure and project management performance indicators Sustainability	Scale Index	

NB—bold font signifies identified gaps being addressed by current study.

2.2. Research Propositions and Associated Hypotheses

A structured PMA process is defined, in this study, in terms of the extent of use of the following to guide PMA decisions: documentation, formal management tools [1], prescribed and/or standardized process, clear guidelines, and hence, a transparent and systematic process. The extent of a PMA process structure is therefore defined in relation to the degree to which the above items are used to guide the decision making process of assigning a group of project managers to multiple projects, in the context of an effective process. For example, Adler et al. (1996) [37] and Brown and Eisenhardt (1995) [36] highlight the importance of management tools and techniques, while PMBOK [1] highlight the importance of documentation to guide decision making.

The evidence in [48–50] is unified in suggesting that a formal process associated with the management of project management resources is characterized by documentation, consultation, standard procedures, and transparency in project management activities. These activities include reviews of project manager competencies in relation to suitability for project requirements [48–50]. Several project management studies have highlighted the importance of an effective PMA process and link it to both project and organizational performance [6–8,28,29,36,41–43].

However, existing and relevant studies applicable to multiproject settings [5,8,46,51] have examined the nature of PMA processes and revealed that practitioners in project-based organizations rely on intuition to make PMA decisions. Therefore, the first proposition (Proposition 1) associated with the nature of PMA processes (i.e., the extent of PMA process structure) was constructed, from which one associated hypothesis was derived. Proposition 1 was constructed as follows—the nature of PMA processes is such that assignment decisions are made informally (casually), despite their links to the performance of the project manager, performance of the project, and the organization [5,8,37]. The associated hypothesis to this proposition, comprising two competing and simple statements (null and alternative hypothesis) that cover the sample space [52,53], was then adopted as:

Hypothesis 1 (H1). *The PMA process is not structured (null hypothesis, denoted by H_0). By definition, the alternative hypothesis (H_1) is that the PMA process is structured.*

The second proposition (proposition 2) was constructed as follows—the extent of PMA process structure is most likely to be associated with project manager performance, project manager motivation, project manager rewards, and project success [7,8,22,23,26,36–38,54]. Based on proposition 2, four associated hypotheses (H2, H3, H4, and H5) were derived as:

Hypothesis 2 (H2). *The extent of PMA process structure is correlated with project manager performance.*

Hypothesis 3 (H3). *The extent of PMA process structure is correlated with project manager motivation.*

Hypothesis 4 (H4). *The extent of PMA process structure is correlated with project manager rewards.*

Hypothesis 5 (H5). *The extent of PMA process structure is correlated with project success.*

The hypothesized model, showing a summary of the hypothesized relationships between the five key variables, is depicted in Figure 1.

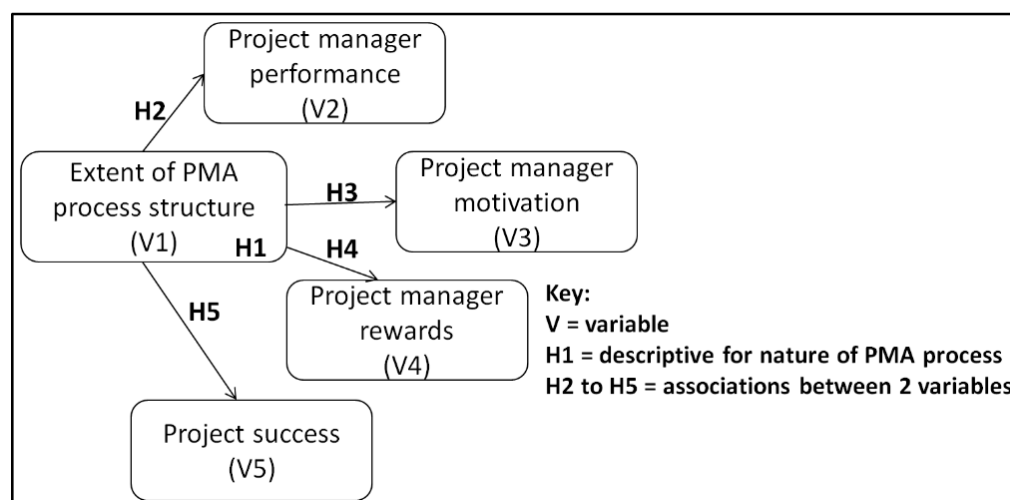


Figure 1. Hypothesized model.

Hypothesis H1 is associated with the extent of PMA process structure, which indicates something about descriptive statistics for the nature of PMA processes. Hypotheses H2 to H5 are associated with correlations [52] that indicate the relationships between the extent of PMA process structure (independent variable) and four project management performance variables (dependent variables).

A total of five key research variables (latent or underlying variables) were therefore identified as: (1) extent of PMA process structure, (2) project manager performance, (3) project manager motivation, (4) project manager rewards, and (5) project success. These five variables and their measurements (i.e., observed variables) are shown in Table 2. All dependent variables in Table 2 may be linked to sustainability issues in the context of a thriving organization that will yield economic output [2–4]. These dependent variables are affected by the PMA process, which constitutes the sustainable utilization of resources (i.e., project managers).

Table 2. Relating objectives to variables and their measurements.

Objectives	Variables and Measures	Variable Type
1. To investigate the nature of existing PMA processes	1. Extent of PMA process structure (V1)	Independent
	1.1 Use of documentation	
	1.2 Use of formal management tools	
	1.3 Prescribed process	
	1.4 Use of clear guidelines	
2. To assess the relationship between existing PMA processes on project management performance indicators	1.5 Systematic process	Dependent
	2. Project manager performance (V2)	
	2.1 Extent of PMA process structure is associated with PM performance	
	2.2 Extent of PMA process structure is associated with PM performance on given projects	
	3. Project manager motivation (V3)	
	3.1 Extent of PMA process structure is associated with PM motivation	
	4. Project manager rewards (V4)	
	4.1 Extent of PMA process structure is associated with PM rewards (e.g., bonus)	
	5. Project success (V5)	
	5.1 Extent of PMA process structure is associated with the success of project	

The first variable (independent) addresses the first objective in relation to the nature of existing PMA processes. Extent of PMA process structure depicts the nature of existing PMA processes, in relation to measured items that indicate aspects of the structure such as use of documentation and management tools to guide the PMA process, standardization, and transparency in assessing the suitability of project manager competencies to project requirements, the presence or absence of a systematic process and the ability to justify assignment decisions. The last four variables (dependent variables) address the second objective in terms of testing the relationships between the extent of PMA process structure and the four project management performance indicators (dependent variables). The four dependent variables indicate something about the effectiveness of existing PMA processes.

3. Methodology

A mixed-methods research approach was embraced on the basis that the two research objectives investigated different aspects surrounding the PMA process. Pragmatism was therefore used to inform the mixed-methods approach, with a view to fully address the two research objectives [55]. Both quantitative and qualitative data were collected from project managers and heads of projects across different industries from both the private and public sectors, using both questionnaires and interview surveys. The two groups of informants provided deep insights about the effectiveness of existing PMA processes. The heads of projects were included on the basis of their direct participation in making PMAs, while project managers were included because they represent resources that are directly linked to the nature of existing PMA processes [5], in terms of the level of process structure.

The difference between project managers and heads of projects, as two stakeholder groups within the direct scope of a project management function, lies in the fact that project managers are responsible for managing assigned projects, while heads of projects have a more organizational strategic role in not only making PMA decisions relating to which project managers must be assigned to which projects, but also aligning and motivating project managers in the context of management of multiple concurrent projects. While heads of projects were included to give an organization's perspective on existing PMA processes, it was important to also involve project managers who are directly impacted by PMA

decisions (made by heads of projects), such that they give the employee's perspective. The intent was to have a balanced perspective on existing PMA processes and their relationships with four project management performance indicators, using both groups of stakeholders.

These two groups of stakeholders represent different data sources, as part of the design to address common method bias [56–58]. For example, the project managers provided their own perspective about the existing PMA processes, while the heads of projects provided another perspective about the same phenomena being examined. The participant information sheets as well as participant consent forms provided to informants assured informants both anonymity and confidentiality, with a view to encourage more honest responses concerning existing PMA processes. These forms also indicated to the informants that there are no wrong or right responses but rather seeking honest responses.

Besides both the context and sources of measurements, another remedy to address the issue of common method bias was careful derivation of item measurements (observed or measured variables) by: (1) avoiding complex question wording, (2) avoiding compound questions containing more than two distinct issues, and (3) defining terms that may be considered vague in the context of the different informant groups from both public and private sector. Two procedures proved useful in addressing the above 3 points relating to counter measures for common method bias in the context of feedback on the measurements. The first procedure involved a rigorous ethical review process that provided an initial opportunity to address measurement errors. The second procedure involved pilot testing of research instruments to address a measurement error that has the potential to affect interviews and particularly questionnaire surveys, due to the lack of prospects to clarify seemingly unclear questions [56–58].

3.1. Population and Sampling Methods

The context for research design pertaining to the selection of participating organizations was based on the population of eligible organizations at the country level. Two eligibility criteria for this population were: (1) organizations that operate in a multiproject setting, and (2) organizations that have a team of project managers, who implement a portfolio of projects. Eligible organizations that form this population were derived from a total of 46 organizations (general population) listed to be operating in the country where the research was conducted [59]. There were a total of 16 organizations in the public sector, of which only 6 satisfied the two selection criteria above, and hence, they were eligible to participate in this study. In the private sector, there were a total of 30 organizations, of which only 9 were eligible to participate. Given the relatively small number of eligible organizations that constituted the target population (a total of 15), enumeration was used to select this population of eligible organizations, and hence, no sampling. However, 12 organizations (accessible population) participated in this study, given the practical challenges of access to data [60–62].

The major unit of analysis is, therefore, the individual organizations, in which PMA decisions are made [34,62]. Two attributes of the unit of analysis were used for the selection of individual informants, namely, (1) working in a multiproject setting within a project organization, (2) participation in the management of multiple concurrent projects. Data were ultimately collected from inside informants [34], the embedded unit of analysis. Data provided by the group of inside informants consisted of attributes of the PMA process in a particular organization [5].

A convenience sample was used for interviews, given careful reflections associated with constraints of time and cost [34,62,63]. However, for questionnaires, the population of eligible informants was enumerated by using an online questionnaire. Snowball sampling [64,65] was used by e-mailing a link to the online questionnaire to a contact person in each organization, to forward the link to all eligible informants within each organization as a case [5].

3.2. Data Collection

Questionnaires and interview surveys were developed on the basis of literature. These research instruments contained both quantitative and qualitative questions that were focused on two characteristics, namely, (1) the nature of existing PMA processes and (2) the relationship between extent of PMA process with four project management performance variables, all of which may be linked to sustainability issues in terms of a flourishing organization [2–4]. Although empirical studies surrounding the PMA process in multi-project settings [7,9,42,43] used different Likert scales, a five-point Likert scale (1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, 5 = Always) was used to measure specific items about the five identified variables in Table 2. The questionnaire was designed using Bristol online survey, such that incomplete responses could not be submitted, while allowing participants to save and complete the questionnaire at a later time [5].

Questionnaires and interview surveys were administered to a total of 73 informants comprising 53 project managers and 20 heads of projects across 12 organizations in the private and public sector. Issues of reliability were addressed through the use of self-administered questionnaires containing the same questions and administered in a consistent manner, and also through the use of an interview schedule that was conducted using the same procedures for interviewing.

Participant consent forms were used in conjunction with both the questionnaire survey and the interview survey, to collect primary data about the five identified variables. Specific items measured on the scale used formed components of an index for each of the five variables pertaining to each data set (i.e., project managers and heads of projects). Only positively worded questions were included to form components of the index, although negatively worded questions were also used to form a pair of questions designed to measure response bias. An index was favored over the concepts of scale and reliability because the nature of existing PMA processes (extent of PMA process structure) and its relationship with the four project management performance variables (described in Section 2.1) are different constructs that cannot be combined into one underlying variable [5,34,66,67].

The questions asked to the two stakeholder groups (project managers and heads of projects) explored the same themes for both questionnaires and interview surveys, albeit aligned to each stakeholder group in terms of question wording. An extract of the questionnaire survey for project managers is included in Appendix A.

3.3. Data Analysis

Two variables were generated to calculate (1) average scores for the items that form the components of an index for each informant and (2) the index score for each informant. These index scores represent empirical testing of a project management theory for the first time, in the context of building a foundation to make meaningful new insights into theory. Furthermore, the index scores represent a falsification of conventional understanding (i.e., the concept of a scale rather than an index) of PMAs in multiproject settings.

Using the independent research variable—extent of PMA process structure (which portrays the nature of existing PMA processes) as an example, the higher the index scores for this variable, the more effective the existing PMA processes. Similarly, the lower the index scores for this variable, the least effective the existing PMA processes. Index scores of 100% indicate an ideal situation as regards the extent of PMA process structure in existing PMA processes. Using one of the four dependent research variables—project success (which depicts the performance of existing PMA processes) as an example, the higher the index score for this variable, the better the performance of the existing PMA processes in terms of its effectiveness as it relates to project success. The variation in the measurement of any two variables (H2 to H5 in Figure 1) associated with the nature of existing PMA processes and the performance of those processes were used for correlation analysis [5].

Analysis of quantitative data followed a systematic process that involved two steps, namely, (1) statistical analysis concerning descriptive statistics for hypotheses tests, and (2) exploring correlations between variables. However, the analysis of qualitative data

focused on themes that indicate the extent of PMA process structure and its relationship with four project management performance variables, given that the qualitative data from interviews measured the same variables as questionnaires [5], for the purpose of establishing research validity [68]. Framework method was then used to combine the analysis of both quantitative and qualitative data, using a case (i.e., informant) and theme-based approach. The whole data was sorted by cases and themes. This combination was achieved by looking across both the rows (cases) and columns (themes) of the matrix. The intent was to determine two things, namely, (1) views of a particular case or cases across all themes, and (2) overall views about a particular theme or themes [69,70]. Between-method triangulation was also used to contrast quantitative and qualitative data, with a view to determine the validity of the findings in relation to a complete picture of the effectiveness of existing PMA processes.

4. Results and Discussion

This study was aimed at investigating the nature of existing PMA processes, with a view to assessing the influence of those processes on performance, a sustainability issue given the need for organizations to thrive by yielding consistent profit margins [2–4]. Five key variables were used in the assessment. The results are structured into five themes, namely, (1) profile of informants, (2) differences between private and public sector, (3) descriptive statistics for all variables and internal consistency of the scales used, (4) nature of existing PMA processes (objective 1), and (5) associations between the extent of PMA process structure and four project management performance variables (objective 2).

4.1. Theme 1—Profile of Informants

Besides the eligibility criteria relating to participating organizations and associated informants (as discussed in Sections 3.1 and 3.2), the questionnaire surveys and interview surveys comprised project managers and heads of projects from different industries with the following attributes: 72% of the 53 project managers had a minimum of 5 years in managing multiple concurrent projects; 45% of the 53 project managers were senior project managers; 90% of the 20 heads of projects had a minimum of 10 years in making PMA decisions. These attributes indicate that the informants were capable of providing useful insights about the effectiveness of existing PMAs in multiproject settings concerning their respective organizations, particularly in relation to implications for either theory or practice and/or both.

4.2. Theme 2—Differences between Private and Public Sector

Preliminary statistical tests were performed to explore the statistical significance of the two groups of informants (project managers and heads of projects) concerning the five variables (V1 to V5). K-S tests for normality were performed, followed by Mann–Whitney U test, given nonparametric data. The mean scores of informant groups (factored by private or public sector) were used to explore whether the difference between private and public sector is not simply due to random causes [52]. The results are depicted in Table 3.

The results show no difference between private and public sector, which implies that the existing PMA processes in the private sector is not significantly different to that in the public sector. On this basis, the two groups (private and public sector) were considered together as one data set, upon which subsequent statistical analyses were performed, such as binomial tests for response bias and Cohen’s effect size index.

Binomial tests for response bias among both stakeholder groups indicated sufficient evidence to conclude that the proportion of observed successes (i.e., not biased) are statistically significant. Moreover, the computed values of Cohen’s effect size index (g) for the binomial test [52,71–73] all indicated large effects. This result corroborates that of the binomial test and provides additional statistical inference over and above significance tests. These two findings (significance test and Cohen’s effect size index) lead to the inference that the data obtained from administering the research instruments is not biased.

Table 3. Mann–Whitney U test for differences between private and public sector.

Variables	Project Managers	Heads of Projects
1. Extent of PMA process structure (V1)	0.33 (significance value) Mean: 26.5 (private), 27.5 (public) No significant difference	0.68 (significance value) Mean: 11.1 (private), 9.9 (public) No significant difference
2. Project manager performance (V2)	0.78 (significance value) Mean: 27.6 (private), 26.2 (public) No significant difference	0.97 (significance value) Mean: 10.6 (private), 10.5 (public) No significant difference
3. Project manager motivation (V3)	0.20 (significance value) Mean: 29.7 (private), 24.3 (public) No significant difference	0.03 (significance value) Mean: 8.0 (private), 13.0 (public) No significant difference
4. Project manager rewards (V4)	0.08 (significance value) Mean: 30.6 (private), 23.3 (public) No significant difference	0.28 (significance value) Mean: 11.9 (private), 9.1 (public) No significant difference
5. Project success (V5)	0.41 (significance value) Mean: 25.3 (private), 28.8 (public) No significant difference	0.65 (significance value) Mean: 11.0 (private), 10.0 (public) No significant difference

4.3. Theme 3—Descriptive Statistics for All Variables and Internal Consistency of the Scales Used

Table 4 presents a summary of Cronbach’s alpha coefficient for both the project manager dataset and heads of projects dataset, in relation to all five variables (latent variables). The number of items (N) under each latent variable is also given.

Table 4. Summary of reliability of scales used for project managers and heads of projects.

Research Variables	Cronbach’s Alpha Coefficient for Project Managers and Number of Items (N) Used	Cronbach’s Alpha Coefficient for Heads of Projects and Number of Items (N) Used
Extent of PMA process structure (V1)	0.813 (N = 5)	0.821 (N = 3)
Project manager performance (V2)	0.737 (N = 2)	0.875 (N = 2)
Project manager motivation (V3)	0.786 (N = 2)	0.787 (N = 4)
Project manager rewards (V4)	0.760 (N = 2)	0.701 (N = 3)
Project success (V5)	0.710 (N = 2)	0.875 (N = 2)

Using the variable extent of PMA process structure (V1) as an example to interpret the results in Table 4, 5 items and 3 items were submitted for measuring the reliability analysis concerning the extent of PMA process structure for project managers and heads of projects, respectively. All these items were scored on the same five-point Likert scale (i.e., 1 = Never, 2 = Seldom, 3 = Sometimes, 4 = Often, 5 = Always). Given Cronbach’s alpha (i.e., overall reliability of the scale) values of 0.813 and 0.821 for project managers and heads of projects, respectively, the inference is that 81.3% and 82.1% of the variability in the composite score for project managers and heads of projects, respectively (based on 5 items used for reliability analysis for project managers and 3 items used for reliability analysis for heads of projects), for the extent of the PMA process structure would be considered internally consistent reliable variance (i.e., true score variance). This means that the scale used is reliable in that 81.3% (in the case of project managers) and 82.1% (in the case of heads of projects) of the time it will produce the same results when administered to the same participant (project manager and head of project) in the same setting [74]. Similar interpretations can be made for the remaining variables.

Given that Cronbach's alpha coefficients for all variables in Table 4 range from 0.701 to 0.875, which is within the acceptable limits of 0.70 to 0.80 [75–78], it can be concluded that the items used in the scale measure the same latent variable. However, it is acknowledged that the reliability of the measurement scale used cannot be 100%, given that the measurement of each item within the scale incorporates an element of error [79].

4.4. Theme 4—Nature of Existing PMA Processes

A binomial test was used to test descriptive statistics associated with hypothesis tests for the extent of PMA process structure (H1), among both project managers and heads of projects [5]. The results are shown in Table 5.

Table 5. Hypothesis test for the extent of PMA process structure (H1).

Research Variable	Hypothesis Test among Project Managers	Hypothesis Test among Heads of Projects
Extent of PMA process structure	Unstructured (Sig. .061)	Unstructured (Sig. .998)

These results suggest that the existing PMAs are unstructured, based on the proportion of project managers and heads of projects' responses for the whole study. On this basis, the results imply that the probability of finding unstructured PMA practices among both project managers and heads of projects across multiproject organizations in different industries, from both private and public sectors, that engage in different types of projects is closer to 1, when tested at a 95% confidence interval. This probability is significant since its p value is greater than 0.05.

These results illustrate how widespread the extent of unstructuredness is in existing PMA practices in a new context: region (Africa), country (Botswana), other industries (e.g., mining) and other project types (e.g., mineral exploration projects) [5]. The implication is that existing PMA processes are not prescribed/standardized, not systematic, and characterized by low levels of usage of documentation, formal management tools, and clear guidelines in terms of transparency. Consequently, the interpretation is that existing PMA processes may be characterized by mismatches between project managers and projects. Empirical evidence from a US context and specific to new product development and software development projects [7,80] corroborates this finding.

Based on the methods described in Section 3.3, the results from the analysis of qualitative data indicate four dominant themes associated with the extent of PMA process structure, namely, (1) limited use of documentation, (2) informality (limited use of formal management tools and clear guidelines), (3) lack of transparency, and (4) lack of consistency in PMAs. The results revealed that documentation to guide PMA decisions is rarely used in both the public and private sector. The reason given is that the heads of projects know their project managers, although the heads of projects acknowledged the likely ineffectiveness of the use of limited documents in situations of them changing roles or leaving the organization. The results also revealed the inconsistency and probable variation in the existing PMAs, arising out of an unstructured PMA process.

The extent of this unstructuredness among both datasets also revealed two more dominant themes, namely, (1) mismatches between project managers and projects, and (2) inability to justify PMA decisions. The results from the analysis of heads of projects revealed that their changing roles within the organization may be a reason for inconsistencies in their PMA decisions that are subjected to human error, mainly in the absence of a standardized and systematic process. However, analysis of open responses from both datasets (project managers and heads of projects) in both the public and private sectors revealed that the existing PMA practice is based predominantly on the availability of a project manager at the time of the assignment, rather than the suitability of a project manager to a given project. This finding may explain the inability to justify PMA decisions, and hence, the mismatches between project managers and projects, which corroborates

the findings from the analysis of quantitative data relating to the statistically significant probability of finding unstructured PMA processes in both the public and private sector.

4.5. Theme 5—Association between the Extent of PMA Process Structure and the Four Project Management Performance Variables

Based on the hypothesized model in Figure 1, bivariate correlations between the extent of PMA process structure (H1) and four project management performance variables, namely: project manager performance, project manager motivation, project manager rewards and project success (i.e., H2 to H5), were performed using Spearman rank, which is suitable for nonparametric data [81,82]. Hypotheses H2 to H5 are linked to sustainability issues in the context of organizational profits, and hence, the economy [2–4]. The results revealed a positive and significant relationship between the extent of PMA process structure (V1) and three independent variables [5], namely, project manager performance (V2), project manager rewards (V4), and project success (V5). One relationship (V1 and V5) was significant at the 99% level, while the remaining two relationships (V1 and V2; V1 and V4) were significant at the 95% level for both project managers and heads of projects, from both private and public sectors, and across different industries and project types (see Table 6).

Table 6. Spearman rank correlations between variables.

Variables		Hypothesis	rs for:		Sig. Value (p) for:		Effect Size for:	
		Accepted (✓)	PM	HoP	PM	HoP	PM	HoP
V1	V2	H2✓	+0.425	+0.423	>0.05	<0.05	0.22	0.41
V1	V3	H3	+0.015	+0.155	<0.05	<0.05	0.0001	0.0001
V1	V4	H4✓	+0.046	+0.466	>0.05	<0.05	0.002	0.22
V1	V5	H5✓	+0.525	+0.529	>0.01	<0.01	0.46	0.51

Key: r_s = Spearman rank correlation coefficients, PM = project managers, HoP = heads of projects.

The first result suggests a very strong positive relationship between the extent of PMA process structure (V1) and project success (V5), in terms of three observations, namely, the largest correlation coefficient, largest significance testing, and the largest effect size index (see Table 5). This finding implies that a structured PMA process is positively associated with project success, leading to significant organizational cost savings in the context of sustainability. Therefore, we accept H5. This association is immense in the context of a mining industry that engages in underground mineral exploration projects whose revenues contribute about 30% to the national GDP [83].

The remaining two relationships also suggest strong positive relationships between the extent of PMA process structure (V1) and two project management performance variables, namely, project manager performance (V2) and project manager rewards (V4). The implication is that a structured PMA process is positively associated with both project manager performance and project manager rewards. Therefore, we accept H2 and H4. These findings have important implications for the management of concurrent projects across different industries and sectors, in the context of the importance of a structured PMA process to complement managerial intuition [5].

The last result suggests a weak positive relationship between the extent of PMA process structure (V1) and project manager motivation (V3). This finding implies that a structured PMA process is not strongly associated with project manager motivation. Therefore, we fail to accept H3.

Based on the methods for analysis of qualitative data described in Section 3.3, the results show that the most dominant theme was the relationship between the extent of PMA process structure with project success. The second most dominant theme was a link between the extent of PMA process structure and project manager performance. These results corroborate the findings from the analysis of quantitative data and imply that the suitability or match between a project manager's competencies and a given project's requirements may increase a project manager's performance, and hence, project success.

Although quantitative results showed a weak relationship between the extent of PMA process structure with project manager motivation, results from the analysis of qualitative data showed that the project managers were unified in highlighting the relationship between the low level of PMA process structure and their motivation, arising from several reasons such as mismatches between their competencies and projects requirements, and lack of consideration for their marital status, in terms of assigning them to projects requiring frequent and long travelling distances to and from project sites. This finding, dominant in both the public and private sector, seems to demotivate project managers concerning both financial and family issues. Some heads of projects also acknowledged the link between the low level of PMA process structure and project manager motivation and instances of mismatches in PMAs, although they stressed that projects have to be conducted as part of a business need, which takes priority over project managers' needs, preferences and suitability for projects.

While the results from analysis of qualitative data validated the findings from quantitative data, the qualitative analysis revealed more insights. For example, it emerged that the mismatch between project managers and projects is linked to a number of factors such as the low level of use of documentation and formal management tools, lack of clear guidelines, and the need to make assignments to progress incoming projects. However, heads of projects recognized the need for formal management tools and documentation to standardize PMAs in terms of a structured process, given the reality of their business environment such as changes in roles.

5. Conclusions and Recommendations

This study aimed to investigate the effectiveness of existing PMA processes implemented by organizations in multiproject settings across different industries, sectors, and project types, including the relationship between the extent of PMA process structure and project management performance variables. The specific objectives were: (1) to investigate the nature of existing PMA processes, and (2) to assess the association between the extent of PMA process structure with four project management performance variables.

The findings provided convincing empirical evidence of the ineffectiveness of existing PMAs in both private and public organizations across different industries and project types, arising from the extent of unstructuredness in PMAs. The results revealed no statistically significant differences between the private and public sector among both stakeholders. However, the extent of unstructuredness in both sectors is strongly negatively correlated with three project management performance variables, namely, project manager performance (V2), project manager rewards (V4) and project success (V5). This finding implies an inverse relationship between the extent of unstructuredness and the three project management performance variables.

The contribution of these findings adds depth to our understanding of PMA processes, in the context of the following implications for theory: (1) first empirical testing of a project management theory that resulted in valuable new insights, (2) falsification of conventional understanding of PMAs by using an index as opposed to a scale, and (3) new knowledge regarding no statistically significant differences in PMA processes between the private and public sector. Furthermore, the findings from this study have meaningful implications for practice concerning project management and financial implications (both direct and nondirect financial) from the cost implications of mismatches between project managers and projects, arising from an unstructured PMA process. These implications are even more significant in a multiproject setting, where such projects have clear linkages with the organization's strategic goals. Non-financial project management implications include the lost management time required to deal with mismatches in PMAs, in the context of the need to get PMAs right the first time. These findings, now known, can be used for the first time to enable enhancements in existing PMAs to provide value to different multiproject organizations.

Based on the study findings, the authors recommend that the participating organizations across different industries and sectors consider using a structured PMA process to close the gap in practice, given the demonstrated positive association between PMA process structure and the performance of the project managers and projects, in terms of improving effectiveness of existing PMA processes. However, the limitation is that these findings should not be taken to represent all multiproject settings in the country, given that not all 15 eligible organizations participated. Another limitation may be the absence of additional methodologies involving further concepts of structural equation modelling other than factor analysis, to complement correlation tests. Future work may include surveying all eligible organizations as well as using further concepts of structural equation modelling to mitigate these limitations.

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Appendix A

Appendix A—questionnaire survey for project managers.

Table A1

Independent Variable	Survey Questions (Only Positively Worded Questions Measured on 5 Point Scale Included Here as Components of an Index)	Average Scores	Index Scores (%)
Extent of PMA process structure (V1)	To what extent does your superior use documentation to guide his/her decision making process in relation to your assignment to projects?		
	To what extent does your superior use formal management tools to guide his/her decision making process in relation to your assignment to projects?		
	The way in which my superior assigns me to projects is prescribed and not casual.		
	My superior uses clear guidelines and necessary documentation to arrive at a consistent decision regarding which projects I get assigned to.		
	The approach used by my superior to assign me to projects is systematic.		
Dependent Variable			
Project manager performance (V2)	The PMA process used to assign me to projects has a positive impact on my performance.		
	The PMA process used to assign me to projects considers the impact of my own likely performance on those projects.		
Project manager motivation (V3)	The PMA process used to assign me to projects has a positive impact on my motivation.		
Project manager rewards (V4)	The PMA process used to assign me to projects has a positive impact on my rewards (e.g., promotions, performance bonus and career advancement).		
Project success (V5)	The PMA process used to assign me to projects has a positive impact on the success of all projects assigned to me.		
Key—V = variable			

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