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Abstract

Project length refers to the amount of time it takes to complete a particular project from start to finish. The complexity and size of the project scope can significantly impact the project length. The impact of project length on management control can vary depending on the location of the project. The availability and allocation of resources such as people, equipment, and funding can also affect project length. Effective management control and quality management can help project managers to identify potential issues, control costs, ensure compliance with project requirements and standards, and ultimately deliver a high-quality project that meets or exceeds stakeholders' expectations. Performance measurement is an essential component of management control. The research used the descriptive research design. The target population was 55 employees of the IT Company in Berlin, Germany. The research did sampling of 43 participants that were chosen from the target population of 55 employees of the IT Company in Berlin, Germany. Questionnaires were utilized to gather the data. It was concluded that a longer project length may introduce additional risks, including changes in technology, evolving business requirements, and shifting stakeholder expectations. These factors necessitate ongoing adjustments and adaptations to the project plan, with a particular focus on ensuring the quality of the IT system upgrade. Vigilant management control practices, such as regular quality assessments, risk management, and effective communication, are crucial in mitigating these risks and maintaining a high standard of deliverables. The study recommended that a robust project governance structure should be established. This structure should clearly outline roles and responsibilities, decision-making processes, and communication channels. Appointing a competent project manager who possesses the necessary authority and resources to enforce control measures is vital. The project manager should be supported by a skilled and multidisciplinary team, fostering effective collaboration and information flow among team members and stakeholders.

Keywords: *Project Length, Management Control, IT System Upgrade, Germany*

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1.0 Background of the Study

Project length and management control are critical factors that can significantly influence the success of any project, especially in the case of an IT system upgrade in Berlin, Germany. The length of a project refers to the time it takes from initiation to completion, and it can vary greatly depending on the complexity and scope of the upgrade (Kerzner, 2022). A longer project length can pose challenges to management control. As the duration of a project increases, it becomes more difficult to maintain effective oversight and control over various project activities. Project managers may face challenges in resource allocation, scheduling, and coordination of tasks. In the case of the IT system upgrade in Berlin, Germany, a longer project duration may require a larger team of professionals to handle the complex tasks involved, making it essential to manage and coordinate the efforts of a diverse group of individuals. Akhtar (2020) noted that failure to exercise adequate management control over such an extended period can lead to inefficiencies, delays, and cost overruns.

The quality of the project deliverables can be impacted by the project length. In an IT system upgrade, ensuring the quality of the upgraded system is crucial to meet user requirements and expectations (Alrikabi, 2022). However, as the project duration extends, there is a risk of quality degradation due to various factors. The longer the project, the more opportunities there are for errors to occur during the development, testing, and implementation phases. Additionally, changes in technology or requirements may arise during the extended project timeline, necessitating adaptations and modifications that can introduce uncertainties and compromise quality. Moreover, a longer project length can lead to potential scope creep. Scope creep refers to the uncontrolled expansion of project scope beyond its original objectives. As time passes, stakeholders may introduce new requirements or modifications, which, if not carefully managed, can lead to project scope expanding beyond what was initially planned (Niederman, 2021). This expansion can strain resources, create additional complexities, and potentially compromise the overall quality of the project.

It is important to note that the impact of project length on management control is not solely negative. A longer project duration can also provide opportunities for thorough planning, meticulous execution, and in-depth testing, resulting in higher-quality outcomes (Hussain, He, Ahmad, Iqbal & Nazneen, 2023). With adequate management control systems in place, project managers can effectively monitor progress, identify potential risks, and implement corrective measures to ensure the project remains on track. The impact of project length on management control in the case of an IT system upgrade in Berlin, Germany is multifaceted. While longer project durations can pose challenges to management control and introduce risks to project quality, proper planning, coordination, and control mechanisms can mitigate these risks. Project managers ought to strike a balance between time, resources, and quality to ensure the successful completion of the project and the delivery of a high-quality IT system that meets the needs of stakeholders (Alwaly & Alawi, 2020).

Management control and quality are two essential elements of project management that ensure successful project completion (Lill, Wald & Munck, 2021). Effective management control and quality management can help project managers to identify potential issues, control costs, ensure

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compliance with project requirements and standards, and ultimately deliver a high-quality project that meets or exceeds stakeholders' expectations. The planning phase of a project is critical to the success of management control and quality management. The project manager should establish clear goals and objectives, define project scope, identify resources, and establish a realistic timeline. Performance measurement is an essential component of management control. Project managers should monitor project progress, identify any deviations from the project plan, and take corrective action if necessary (Yousefi, Sobhani, Naeni & Currie, 2019).

Risk management is critical for ensuring project quality. Project managers should identify potential risks, assess the likelihood and impact of each risk, and develop appropriate mitigation strategies to minimize the impact on the project. Quality assurance involves ensuring that the project meets or exceeds the required quality standards. This includes establishing quality objectives, implementing quality control procedures, and conducting quality audits. Change management is critical to ensure that any changes to project requirements or scope are managed effectively. Project managers should establish a change control process to ensure that any changes are properly assessed, approved, and implemented. Effective communication is critical to management control and quality management. Project managers should communicate project status, issues, and risks to stakeholders regularly. Documentation is a critical aspect of quality management. Project managers should document project requirements, decisions, and actions taken throughout the project lifecycle to ensure that project quality is maintained (Saad, Zahid & Muhammad, 2022). Project managers can deliver high-quality projects that meet or exceed stakeholder expectations if they follow the above approaches.

2.0 Literature Review

2.1 Theoretical Review

Time-Based Theory: Votto, Lee Ho and Berssaneti (2020) noted that the Time-Based Theory suggests that project length can have a significant impact on management control and quality. The theory posits that as the duration of a project increases, the likelihood of delays, changes in scope, and other disruptions also increase. These disruptions can make it more difficult for project managers to maintain control over the project and may lead to potential quality issues. One of the primary factors that can lead to delays and disruptions is poor time management. Project managers should carefully plan and schedule project activities to ensure that each task is completed within the allotted time frame. As project duration increases, it becomes more challenging to maintain the project schedule, and delays may occur. These delays can have a cascading effect on the project, leading to further delays and disruptions.

Another factor that can impact the project schedule is changes in project scope. As the project progresses, stakeholders may request changes or additions to the project scope, leading to potential delays and disruptions. Project managers should properly manage project scope to ensure that changes are incorporated in a timely and effective manner without compromising project quality. Proper time management is essential for ensuring project quality. As project duration increases, project managers should be vigilant in monitoring project progress and addressing any delays or disruptions promptly (Gondia, Ezzeldin & El-Dakhakhni, 2022). This may require adjustments to the project schedule, allocation of additional resources, or re-evaluation of the project scope.

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Project managers should be aware of the potential challenges associated with longer projects and take proactive steps to manage project time effectively.

Resource-Based Theory: Park and Yi (2021) argued that the Resource-Based Theory suggests that project length can impact management control and quality due to resource constraints. As the duration of a project increases, the demand for resources such as personnel, materials, and equipment may also increase, making it more challenging to secure these resources. This can lead to delays or other quality issues. Resource management is essential for ensuring that projects are completed on time and within budget. As project duration increases, it becomes more challenging to manage resources effectively. Project managers should carefully plan and manage resource allocation to ensure that resources are utilized efficiently and effectively.

One of the primary challenges associated with resource management is the allocation of personnel. As the duration of a project increases, it may become more challenging to retain key personnel, and there may be a need to bring on new team members to complete the project. This can impact team dynamics and project management, potentially leading to quality issues. Project managers must carefully manage team dynamics and ensure that new team members are integrated effectively into the project team (Lukovszki, Rideg & Sipos, 2021). Another challenge associated with resource management is the availability of materials and equipment. As the duration of a project lengthens, the demand for materials and equipment may also increase, making it more challenging to secure these resources. Project managers should properly plan and manage the procurement and delivery of materials and equipment to ensure that they are available when needed and that project quality is not compromised. Project managers should be vigilant in monitoring resource utilization and addressing any resource constraints promptly. This may require adjustments to the project schedule, allocation of additional resources, or re-evaluation of the project scope. Project managers should be aware of the potential challenges associated with longer projects and take proactive steps to manage resources effectively (Donnellan & Rutledge, 2019). Effective resource management is critical for maintaining project control and ensuring project quality, and project managers should continuously monitor resource utilization and adjust plans as necessary to ensure project success.

2.2 Empirical Review

Rahman, Al Ameri, Memon, Al-Emad and Alhammadi (2022) conducted study to look into the causes and consequences of building project delays in the UAE. The research is exploratory in nature, using a preliminary questionnaire survey and interviews. A detailed literature analysis identifies various elements that might affect building completion time. The questionnaires were distributed to 60 construction firms. Forty percent of the replies were completed. The survey data analysis indicated that around 48 probable causes and consequences of delay are related to distinct categories of stakeholders. According to the findings, the top fifteen criteria are related to clients, project managers, and financial concerns. Cost and time overruns were shown to be the most important consequences. These findings are partially consistent with earlier research. The study contends that on-time project delivery is the most important factor of project control. The study's findings might give reasonable support for a proposed hypothesis using a framework of project

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success variables. It should be a top priority for knowledge managers in various professions, as well as decision-makers.

Podgórska and Pichlak, (2019) conducted an exploratory analysis study of existing IS project management techniques for projects of various sizes and levels of complexity across various sectors. 50 IS project managers participated in a survey that gathered information on a wide variety of project management difficulties. Four project performance indicators and 20 project management techniques were used to investigate the links between project complexity, size, and size. Additionally, an empirical study examined the impact of a PMO on the adoption of best practices in project management and the success of individual projects. According to the research, project complexity affects the utilization of certain project management techniques, whereas project size affects budget and project quality. The PMO and project budget are empirically related.

Heigermoser, de Soto, Abbott and Chua, (2019) found that although the quality of the process affects the quality of the final result, there is presently a lack of understanding about the quality of project management (PM) procedures that directly influences the quality of the delivered product (constructed building). The study will provide a proposal for modeling the influence of the project management process quality on the quality of the constructed building. The main quality criteria and product quality indicators over the quality of the product are used to demonstrate the quality of the project management process. It will provide the findings of interviews performed in Bulgaria with a range of project participants (from various management perspectives) on indicators of product quality. Regardless of management perspective, all participants think that the most significant indication of product quality for each phase of the project is "customer contentment in the end phase," which is measured differently for each project phase that will be presented. The findings of the definition and planning phase factor analysis suggest that variables the quality factors of the PM process, 9 variables may be grouped into 4 new factors, accounting for 57.96% of the basic set of variables.

Khattak and Mustafa (2019) discovered that project complexity has become a severe concern and an impediment to their effective completion. To tackle these complications, it has become critical to identify project managers' necessary management abilities. The goal of this study is to use managerial competences to handle the cost, schedule, and scope issues that arise in engineering infrastructure projects owing to their complexity. In the first part of the investigation, 40 experts were questioned using a pre-tested semi-structured questionnaire. Initially, fundamental elements of difficulties were found at this phase. Following that, the needed dimensions of skills were identified in order to counteract these complications and achieve improved performance. In the last step, required levels of competency for various difficulty aspects were defined. In the second phase, 90 "project managers" were contacted to provide comments on recently completed public sector engineering infrastructure projects in Pakistan. Results in the event of competences and bad law and order situation, political instability, land difficulties, energy crises, and insufficient authorization of project managers in the case of complications, the study discovered additional aspects, including honesty, enthusiasm, and dedication. Top quality attributes required include leadership, managerial ability, communication ability, effectiveness, and result oriented. The study revealed that managerial competences and project complexity had a substantial influence on project performance. The research helps to increase understanding of how to improve performance

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in complex technical infrastructure projects by implementing management capabilities. It also demonstrates empirically the relationships between project management abilities, complexity, and project performance. Although the research is focused on public-sector infrastructure projects, its conclusions may be applicable to project management approaches in other industries.

Ballesteros-Pérez, Cerezo-Narvaez, Otero-Mateo, Pastor-Fernandez and Vanhoucke (2019) noted that activity sensitivity measures are used in Schedule Risk Analysis (SRA) to assess the relevance of activities in a project schedule. Highly sensitive activities are those that are more likely to cause project period fluctuation and/or project length extensions. Several activity sensitivity measurements have been developed throughout the years, but none have ever been compared. This has made it difficult to determine which measurements perform best and under what conditions. Using a collection of 2500 artificial projects, this research conducts a comprehensive comparison of all key SRA activity sensitivity indicators. Unlike earlier research, the comparison framework is not linked to remedial measures (such as activity crashing), allowing the advantages of each indicator to be evaluated independently. A new metric that performs better for overall sensitivity ranking is also offered. Most sensitivity measurements do not function well unless used repeatedly (the sensitivity of the remaining planned activities should be reassessed anytime the duration variability of at least one activity is constrained). Most metrics, however, when implemented iteratively, may improve project monitoring and control while drastically cutting project length.

3.0 Research Methodology

The study used the descriptive research design. The target population was 55 employees of the IT Company in Berlin, Germany. The study did sampling of 43 participants that were chosen from the target population of 55 employees of the IT Company in Berlin, Germany. Questionnaires were used to collect the data.

4.0 Research Findings and Discussion

4.1 Correlation Analysis

The findings presented in Table 1 shows the correlation analysis

Table 1: Correlation Analysis

		Management Control	Project Length
Management Control	Pearson Correlation	1.000	
	Sig. (2-tailed)		
Project Length	Pearson Correlation	.211**	
	Sig. (2-tailed)	0.000	0.000

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The correlation results from Table 1 indicate that the project length was positively and significantly associated with management control ($r=.211$, $p=.000$). This concurs with Podgórska and Pichlak, (2019) who reported that project complexity affects the utilization of certain project management techniques, whereas project size affects budget and project quality.

4.2 Regression Analysis

The section consists of model fitness, analysis of variance and regression of coefficient. The findings presented in Table 2 show the model fitness

Table 2: Model Fitness

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.211a	0.249	0.222	0.0008375

The results from Table 2 indicate that project length was discovered to be satisfactory in explaining the management control of the IT Company in Berlin, Germany. This was supported by the coefficient of determination, i.e. the R square of 0.249. It shows that project length explain 24.9% of the variations in the management control of the IT Company in Berlin, Germany.

Table 3: Analysis of Variance

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	3.93	1	3.93	37.08	.000b
	Residual	5.83	55	0.106		
	Total	9.76	54			

The result in Table 3 shows that the overall model was statistically significant. The results indicate that management control is a good predictor in explaining the project length in the IT Company in Berlin, Germany. This was supported by an F statistic of 37.08 and the reported p-value of 0.000 which was less than the conventional probability significance level of 0.05.

Table 4: Regression of Coefficient

	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	0.329	0.106		3.104	0.055
Project Length	0.534	0.211	0.964	2.531	0.006

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According to the results presented in Table 4, it was found that project length was positively and significantly associated to management control ($\beta=0.534$, $p=0.006$). This was supported by a calculated t-statistic of 2.531 that is larger than the critical t-statistic of 1.96. The results implies that when project length improves by one unit, the management control of the IT Company in Berlin, Germany will increase by 0.534 units while other factors that influence the management control remain unchanged. Rahman, Al Ameri, Memon, Al-Emad and Alhammadi (2022) articulated that on-time project delivery is the most important factor of project control. Projects with dependencies on other projects or activities can have a significant impact on project length. A delay in one activity can result in a delay in the entire project. A thorough risk assessment can help to identify potential project delays and implement appropriate mitigation strategies to minimize the impact on project length.

5.0 Conclusion

In conclusion, the project length plays a crucial role in determining the management control and quality outcomes of an IT system upgrade, as evidenced by the case study conducted in Berlin, Germany. The findings of the study shed light on several important factors that project managers and organizations should consider when planning and executing similar projects. A longer project duration tends to pose greater challenges to management control. As the project extends over time, the complexity and scope of the undertaking often increase, leading to a higher risk of deviations from the initial plan. It becomes essential for project managers to closely monitor and control various aspects, such as resource allocation, timeline adherence, and stakeholder engagement, to ensure project success. Failure to maintain adequate control mechanisms can result in cost overruns, delays, and ultimately a lower quality outcome. A longer project length may introduce additional risks, including changes in technology, evolving business requirements, and shifting stakeholder expectations. These factors necessitate ongoing adjustments and adaptations to the project plan, with a particular focus on ensuring the quality of the IT system upgrade. Vigilant management control practices, such as regular quality assessments, risk management, and effective communication, are crucial in mitigating these risks and maintaining a high standard of deliverables. Furthermore, the case study emphasizes the significance of effective project management strategies to counteract the negative impacts of project length on control and quality. It is imperative to establish a robust project governance structure, allocate sufficient resources, and foster collaboration among team members and stakeholders. Additionally, the use of agile methodologies and iterative development approaches can enhance flexibility and adaptability, enabling timely adjustments to changing circumstances while ensuring continuous quality improvement.

6.0 Recommendations

It is crucial to engage in comprehensive planning at the beginning of the project. This entails conducting a thorough analysis of the project scope, complexity, and potential risks. By defining clear objectives, deliverables, and realistic timelines, the project team can establish a solid foundation for effective management control throughout the project lifecycle. This planning phase should also involve aligning stakeholder expectations and ensuring their active involvement and support. A robust project governance structure should be established. This structure should clearly

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outline roles and responsibilities, decision-making processes, and communication channels. Appointing a competent project manager who possesses the necessary authority and resources to enforce control measures is vital. The project manager should be supported by a skilled and multidisciplinary team, fostering effective collaboration and information flow among team members and stakeholders. Moreover, adopting agile project management methodologies can be beneficial. Agile approaches, such as Scrum or Kanban, emphasize flexibility, adaptability, and iterative development. By breaking the project into manageable increments, the team can continuously reassess and adjust project plans and priorities as needed. This allows for timely responses to changing circumstances, reducing the risks associated with longer project durations and ensuring that the quality of the IT system upgrade is maintained throughout the project.

Implementing effective risk management strategies is essential. Identify potential risks and develop mitigation plans to address them proactively. Regular risk assessments should be conducted throughout the project, and appropriate actions should be taken to minimize their impact. This proactive approach to risk management can significantly contribute to maintaining control and ensuring high-quality outcomes, particularly in projects with extended durations. Continuous monitoring and evaluation are critical. Implement robust control mechanisms to monitor project progress, identify deviations, and address them promptly. Regular quality assessments should be performed to ensure that the IT system upgrade meets the desired standards. Additionally, maintaining open and transparent communication channels with stakeholders will facilitate effective management control and help manage expectations throughout the project.

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