Volume-09 Issue 02, February-2025 ISSN: 2456-9348
Impact Factor: 8.232

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International Journal of Engineering Technology Research & Management
Published By:
https://www.ijetrm.com/

PROJECT SCOPE MANAGEMENT AND SUCCESS FACTORS OF DIGITAL LITERACY PROGRAMME FOR SELECTED COUNTIES IN WESTERN KENYA: MODERATING EFFECT OF PROJECT COMPLEXITY

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Purpose-
The management of project scope plays a crucial role in increasing the chances of successful project implementation. The ability to manage scope proficiently is fundamentally connected to the effective handling of complexity. As project complexity escalates, the task of managing the project scope becomes increasingly difficult, necessitating that the project achieves its intended goals within defined constraints. Ongoing reports of project failures linked to poor scope management practices continue to surface, despite thorough research that has identified and analyzed existing deficiencies, highlighting the necessity for additional scrutiny.
Design/Methodology-
The study adopted descriptive research design. The target population of this study was 4,337 public primary schools' projects under the Digital Literacy Program in the selected Western Kenya Counties. The study took place between 2013 and 2019, covering the first phase of the Digital Literacy Program implementation plan. The study used both primary and secondary data.
Findings-
The study found that scope management is statistically significant in explaining success factors of Digital Literacy Program in Western Kenya. Furthermore, the findings indicated that project complexity had a notable moderating effect on the relationship between scope management and success factors of the Digital Literacy Programme in Western Kenya.
Practical Implications-
The insights derived from the study of project complexity imply that complexity is likely to negatively influence the successful implementation of projects. The relationship between scope management and the success factors of a project is significantly compromised by the project's complexity. Thus, the execution of project scope management practices is vital for the successful realization of projects, underscoring the necessity for their consistent application.
Keywords:
Project Scope Management, Success Factors of Digital Literacy Programme, Project Complexity

INTRODUCTION

The discourse surrounding project scope management is increasingly becoming prominent. Recent studies have demonstrated that inadequate definition or ineffective management of a project's scope can result in complete project failure, delays in delivery, or exceeding budgetary constraints (Fashina, Abdilahi, & Fakunle, 2020). Mizra, Pourzolfagha, and Shahnazari (2013) highlight that, despite a well-established recognition of the importance of achieving project success, there exists a surprising scarcity of research focused on the role of scope management in this context. Aborhor (2021) opine that a well-defined scope of a project enhances the chances of completing the project successfully within the time scheduled, budget allocated and the desired quality, in what many project practitioners refer to as the triple constraints.
The Standish Group's 2018 findings indicate that 24% of global projects were terminated prematurely, 32% were delivered on time, within budget, and met quality requirements, while 44% of projects exceeded their budget with schedule overruns and failed to meet their scope and quality specifications. It has been observed that inadequate scope definition is often associated with project failure. A poorly defined scope has a detrimental impact on project

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performance and has long been acknowledged as a critical issue (Nguyen, Mohamed & Mostafa, 2024; Azmat & Siddiqui, 2023). Without clearly defined boundaries, final project costs are likely to escalate due to changes that disrupt the project flow, necessitate rework, extend project timelines, and diminish both productivity and morale among field personnel. Effectively managing complexity is closely associated with proficient scope management.

Gomes, Carvalho and Romão (2021) opine that the success of the project has been the center of attention in extant literature for numerous reasons, mainly, helping identify the achievement of project objectives, evaluate projects in terms of cost, time and quality, strategic alignment of projects to organizational objectives. Varajão (2016) asserts that, although there are many studies that focus on different aspects of project success like, for instance, the success factors or the criteria for success assessment, there are limited studies that mention the processes or practices resourceful in evaluation of project success. The Iron Triangle model (criteria of time, budget, and quality) as advanced by Atkinson (1999) is a popular criterion for measuring project success and has been cited by many scholars: for this reason, this study adopts it as one of the fundamental models to evaluate the relationship between project scope management practices and success factors of a project.

Similarly, Mata, Martins, and Inácio (2023) opine that literature suggests project success is not solely determined by time, budget, and quality, but also by effectively managing project complexity. There are limited studies on the role of project complexity in moderating the relationship between project scope management practices and project success criteria (Crispim, Silva & Rego, 2019; Papke-Shields *et al.,* 2010). Project complexity offers a strong analytical perspective for examining relevant challenges in projects which determine the success of a project and for this reason can be considered as a possible moderating variable (Hartono, Wijaya & Arini, 2019). Therefore, this study examined the moderating effect of project complexity on the relationship between project scope management practices and success factors while also assessing the relationship between the scope management practice and success factors of Digital Literacy Program in Western Kenya. This research augments the existing literature which can be grouped according to the methodological and theoretical contributions. The study fills the knowledge gap by using project complexity as a moderator on the relationship between the predictor and the predicted variables used. Through analyzing of the primary data obtained from various public primary schools in Western Kenya, the study creates a new insight regarding the relationship between project management practices and success factors of Digital Literacy Programme in Western Kenya. It provides a simple model and illustration on the interaction between the various project management practices and presupposes that institutionalizing best project management practices in public institutions is the single most influencer of project success.

The Government of Kenya launched the Digital Literacy Program with the belief that technology can drive significant transformation in both basic and higher education by enhancing teaching and learning through the integration of technology within educational settings. However, the introduction of this program faces considerable challenges, particularly as many primary school teachers lack adequate ICT training, are computer illiterate, or both. Furthermore, the integration of Digital Literacy into the Competency-Based Curriculum (CBC) has proven problematic, as the development and execution of a digital literacy initiative that aligns with national policies and guidelines has encountered obstacles due to budget constraints. The dynamic nature of the CBC results in a continually shifting scope for the Digital Literacy Program, adversely affecting project timelines. The project scope defines all the work that must be undertaken to complete the project, underscoring the necessity of managing this work effectively to secure a successful outcome. A broader issue is the alarmingly high failure rate of projects globally; research from the Standish Group indicates that 31.1% of projects are canceled before completion, while 52.7% exceed their original budget estimates by 189%. A Project Management Institute survey from 2017 reveals that 37% of project failures stem from poorly defined objectives and milestones, which is the leading cause of project failure. Additionally, 49% of completed projects face scope creep or uncontrolled changes. In relation to Kenya's Digital Literacy Program, World Bank 2023 report highlight significant deficiencies in the provision of fundamental digital skills training in primary and secondary education. For example, although the program has distributed approximately 1.2 million devices to 91% of primary schools, only about one-third of these institutions utilize the equipment effectively, primarily due to issues such as lack of internet access, unreliable electricity, and insufficient teacher training (World Bank, 2023). The absence of clear guidelines regarding the management of the Digital Literacy Program's scope and the criterion for evaluating its success poses a significant risk to the primary goal of transforming education in Kenya into a 21st Century system.

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Consequently, the public may not receive adequate value for the taxes they contribute to the government. This study specifically addresses the uncertainty surrounding the relationship between project scope management and the success factors of the Digital Literacy Programme, as well as the potential influence of project complexity on this relationship, which may hinder the success factors of the Digital Literacy Program. In the absence of this critical information, both the research community and organizational leaders may lack the necessary insights to enhance project success rates. The ongoing challenges of maintaining projects within their defined scope, adhering to timelines, and managing budgets to meet stakeholder expectations will persist. Existing literature indicates a direct correlation between scope management and the success factors of numerous projects. In addition to scope creep, project complexity remains a significant concern that can affect project success, either directly or indirectly (Ahmed & Jawad, 2022). While the role of project complexity in impacting cost, time, and quality objectives has been acknowledged in various studies (Bosch-Rekveldt, 2011; Omonyo, 2018; Kimaru, 2019), there is a notable lack of empirical evidence from research conducted in Kenya, which this study seeks to address. Therefore, this study aims to evaluate the relationship between project scope management practices and the success factors of the Digital Literacy Programme in Western Kenya.

LITERATURE REVIEW

This study was pegged on constraints theory. The theory was advanced by Goldratt (1984). A constraint is a limiting factor that prevents a project from succeeding, an assertion supported by Sarkar, Jha, and Patel (2021) who emphasize that the success of a project hinges on the efficient management of constraints within the project. Cost, scope and time are constraints inherent in managing a project. Various factors such as risks, cost, and quality serve as constraints for all projects, making it essential to comprehend each constraint and effectively handle them for the project to thrive. The two key underlying features in using theory of constraints are the availability of critical resources, and the ability of organizations to mobilize these resources in a timely manner to meet project schedules and maximize resource utilization (Parker, Parson & Isharyanto, 2015). When managing scope, it's critical that you prioritize your tasks, enabling you to plan what project activities will be done and assign resources effectively. Additionally, Mukhongo (2020) asserts that project timelines represent a significant constraint in project execution due to the necessity of reducing contingency expenses resulting from delays and alterations in scope to align with favorable cash flows. The quality of work is constrained by the project's budget, deadlines and scope (features). In complex projects, constraints may not be immediately obvious due to the intricate interrelationships between various project components. There are numerous interdependencies between tasks, resources, and teams in complex projects. These interdependencies can create bottlenecks that slow down progress and complicate project management. The theory of constraints helps to simplify the complexity by identifying the single most critical constraint that limits the project's ability to meet its objectives, thereby providing a clear focal point for management efforts. By focusing on the constraint, project managers can reduce the overwhelming nature of complexity, improve decision-making, and ensure that resources are used effectively to achieve the project's objectives. This theory holds significance in this study as it underscores the constraints of project scope, project quality, project timeliness, and project budget that can obstruct the success of the Digital Literacy Programme.

Conceptual Framework

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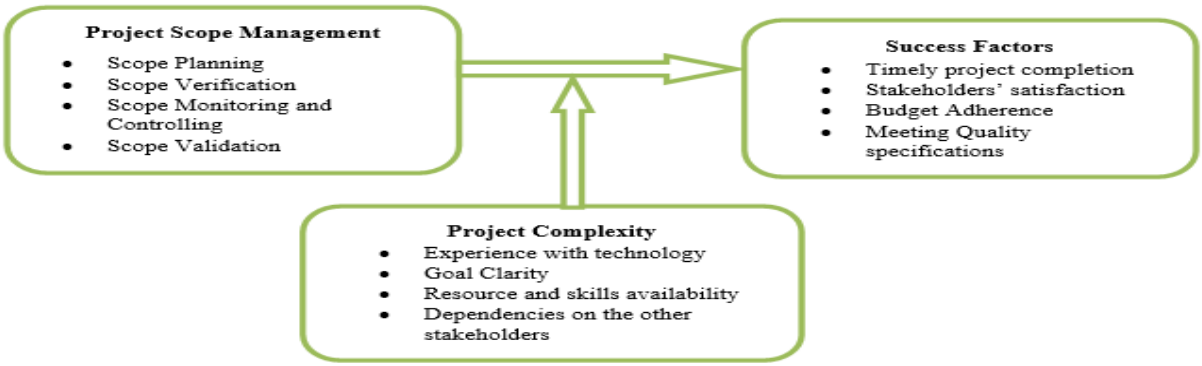

Figure 1.0: Conceptual Framework

Project Scope Management

The PMI (2013) outlines that project scope encompasses all tasks and activities necessary to deliver a product, service, or outcome with defined features and functions. Additionally, project scope management involves three key processes: planning, controlling, and closing (Snyder, 2014). Derenskaya (2018) characterizes project scope as a detailed description of the work to be executed, focusing on the anticipated results. As per PMI (2017), project scope management is dedicated to delineating and regulating what is included and excluded from the project. The PMBOK delineates six processes essential for effectively defining and managing project scope: planning scope management, gathering requirements, defining scope, developing a Work Breakdown Structure (WBS), validating scope, and controlling scope.

A review of the literature on project scope management indicates a consensus that effective scope management is a vital factor in achieving project success and performance. Efficient management of project scope ensures the successful oversight of other critical project management elements such as time, cost, and quality (Nath & Momin, 2014). In alignment with this, Ramage (2018) emphasizes that the project planning process incorporates scope management as integral to time, cost, and performance, with the project baseline anchoring scope management to the project objectives. Furthermore, a well-defined and managed scope is essential for delivering a quality product within the agreed budget and timeline to stakeholders. Mizra *et al.* (2013) argue that to deliver a quality product on schedule and within budget that meets customer expectations, a clear vision of the product is necessary. This involves explicitly defining the project and product scope, objectives, project drivers, constraints, and other relevant factors. This study conceptualizes the collection of requirements, scope validation, and scope control as fundamental components of scope management, consistent with previous research by Ramage (2018) and Mizra et al. (2013).

Ogunberu, Akintelu and Olaposi (2018) in a study to examine the application of project scope management practices on project success employed in the implementation of Information and Communication Technology (ICT) projects found out that the major project scope management success criteria were customers satisfaction, customers expectation, project costing, project quality and project duration respectively as confirmed by mean and standard deviation. The study employed use of questionnaire to collect primary data analyzed using both descriptive and inferential statistics. Regression results revealed that out of the six (6) indicators only four indicators used had significant impact on project successes in the selected firms at 0.05 level of significance, and these were customer expectations, customers satisfaction, resource allocation, and project duration. Two (2) variables that had no significance were project costing, and project quality. The study concluded that the project success criteria of the firms were generally satisfactory and very satisfactory with the implementation of project scope management practices.

Fraz *et al.* (2016) survey on the effect of scope management on project success employing the use of questionnaire to collect data, revealed that scope management is significantly correlated with project success. The results were consistent with studies conducted by Aborhor and Baiden (2021) and Kim and Ryu (2019). The study concluded that project success was related to scope management in Make-to-Order Organizations with the hypothesis being accepted. Failure to manage the scope appropriately of the project would result in a higher chance of the project being deemed

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unsatisfactory among stakeholders and even lead to cancellation of the project given the cost, time, and quality implications likely to arise.

According to Mirza *et al.* (2013) who analyzed the significance of scope in project success through literature review, one of the leading causes of project failure judging by the numbers of published studies in project management practices, is the lack of understanding or defining project scope at the start of the project. Unfortunately, there is limited research published on the significance of project scope management on project success. In this regard, this study purposes to contribute to the literature available on project scope management while depicting its relationship to project success linking it to project complexity.

A separate investigation conducted by Nibyiza et al. (2015) aimed to assess the influence of project scope alterations on project success in Rwanda. The results indicate that project managers occasionally need to make decisions regarding changes to the project scope to achieve the project's objectives. The research findings suggest that the interrelationship between time, scope, and cost significantly impacts the overall success of the project.

Project Complexity

A variety of studies have analyzed the literature concerning project complexity, with many suggesting that a widely accepted definition remains elusive (Morcov, Pintelon, and Kusters, 2020; Qazi et al., 2016; Bakhshi & Gorod, 2016; Herszon & Keraminiyage, 2014). Morcov et al. (2020) contend that the terminology is both overloaded and excessively utilized. However, the dominant view in the project management research and practice community is that complexity has a detrimental effect on both project performance and the performance of project management. It is evident that there is a lack of investigation into the moderating role of project complexity in the relationship between various project scope management and project success factors, with most studies indicating a robust correlation between the dimensions of project complexity and project success (Shahroz, Khan, Khushnood, Aslam, Khattak, & Abbas, 2021).

The correlation between project complexity, project scope, and project performance is still unclear in the project management field, and this can be attributed to unpredictability of projects in terms of problems and failures (Vida *et al.*, 2011). However, it is worth mentioning that complexity can also negatively influence a project performance as well as project outcomes as the properties emerging from complexity can create certain new prospects. Furthermore, the success of a project therefore ultimately depends upon project performance and its related project complexity (Abdou, Yong, & Othman, 2016). Project complexity may therefore moderate the relationship between scope management and project performance.

Bjorvatn and Wald (2018) opine that different studies have observed that project complexity reduces project management performance hence success, though so far research has failed to establish this causal relationship to address this belief conclusively. Dwivedi *et al.* (2012) suggests that, in many cases the size of the project is an important factor in planning resources, analyzing risk exposure, and estimating the time, less becomes a failure factor. Furthermore, the project size factor is demonstrated through "scope creep", in the number of stakeholders involved in the project and it may be correlated with the team size as well. Poveda-Bautista *et al.* (2016) argues that complex projects have no recognizable standards to guide their management, hence, to lead complex projects to success; this complexity must be measured quantitatively suing a tool based on existing PM standards.

This study adopted the moderating variable, project complexity, from existing research work by Hartono, *et al.* (2019), Bosch-rekveldt *et al*. (2011) and Kimaru (2019) in Technical, Organizational, and Environmental (TOE) framework where project complexity dimensions (Technological, Organizational and Environmental) are conceptualized. This model has been successfully cited in several other studies (Kimaru, 2019; Gautam & Kiridena, 2019; Bosch-Rekveldt, Bakker & Hertogh, 2018; Saed, Yong & Othman, 2016). Technological complexity is defined in terms of in terms of differentiation and interdependencies where technological complexity by differentiation refers to the variety and diversity of some aspects of a task such as number and diversity of inputs/outputs, number and diversity of tasks to undertake, and number of specialties and contractors, involved in the project (San Cristóbal, Carral, Diaz, Fraguela & Iglesias, 2018).Technological complexity by interdependency encompasses interdependencies between tasks, within a network of tasks, between teams, between different technologies, and between inputs (San Cristóbal, *et al*., 2018).

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According to Kimaru (2019) organizational complexity is described in relation to project size (in terms of capital, budget, effort, duration, number of stakeholders or technical components needed for project), project drive and the softer elements such as project team composition, resources availability, skills, experience, and trust while environmental complexity includes the factors such as organizational internal support, dependencies on other stakeholders, variety in stakeholders' perspective etc. Technological complexity indicators under consideration for this study are experience with technology, clarity of goals and the number of tasks also successfully adopted by (Kimaru, 2019) in line with Bosch-rekveldt *et al.* (2011) studies. This study conceptualizes resources and skills availability as the key attributes of organizational complexity while dependencies on the other stakeholders are the main attribute of environmental complexity.

Regarding the above reviews with no consensus on definition of project complexity, this study will adopt TOE framework by Bosch-rekveldt *et al.* (2011) also used by Kimaru (2019). According to San Cristóbal, Carra, Diaz, Fraguela and Iglesias (2018) how complexity is perceived and interpreted by project managers may result in different types of project complexity. Literature has shown different perspective and classification of project complexity, and there is a common agreement on confirmed complexity dimensions particularly organizational and technological complexity (Ghaleb & Abdullah, 2021) However, in this study, the dimensions of project complexity is chosen in the theoretical framework from existing research work by Bosch-rekveldt *et al.* (2011) in TOE framework. The study will try to establish whether they are usable tools to manage complexity in public primary schools undertaking projects. This study also aims at linking project complexity to project management practices and project success since the tenets of project complexity affect both project management practices (communication management, project risk management, project stakeholder management, project scope management) and project success therefore add value to existing literature on this subject.

Success Factors of Project Management

The term projects success continues to generate a lot of debate with no consensus regarding the criteria to evaluate success among project management practitioners and academicians (Gomes & Romão, 2016; Hussein, Ahmad & Zidane, 2015; Collins & Baccarini, 2004; Rodrigues *et al.*, 2014). According to Hussein et al. (2015) over the last two decades, there has been a lot of research on the concept of project success criteria. The benchmark for measuring project success varies among different stakeholders and perhaps it's the reason as to why stakeholders' differences remain a challenge in project management (Hammond, 2018). The authors note that the current research within this field could be grouped into the following three areas: an assessment of project success at or after project completion, the importance of defining project success criteria up-front in the project for managing the project and the potential threats and challenges influencing the initial definition of project success criteria.

According to Gomes and Romão (2016) project success is so broad that its meaning varies across the different communities and cultures. They further add that with reference to studies conducted by Shenhar, Tishler, Dvir, Lipovetsky and Lechler (2002) on "refining the search for project success factors: a multivariate, typological approach", there is no conclusive evidence or common agreement that has been reached so far to determine whether a project is a success or failure. Gomes and Romão, conclude that the idea of considering a project a successful or a failure, depending exclusively on whether it meets or fails the criteria for time, cost and quality is outdated. They further note that apart from the triple constraints (time, cost and quality) aspects like objectives achievement and technical requirements need to be evaluated to determine success criteria.

Among the methodology used in the above studies include an extensive literature review to short list the most important problems associated with defining the success criteria. The study tested the literature findings with the help of a web-based survey distributed to 2000 practitioners with the data collected being examined for statistical correlations between the problems (Hussein *et al.*, 2015). Gomes and Romão (2016) used a single case study approach with data being collected in the form of semi structured questionnaires and document analysis and the findings being triangulated. Gomes and Romão's case study has however, been criticized for methodological rigor concerns, researcher subjectivity and external validity or generality. Rodrigues *et al.* (2014) studies involved a survey of practitioners with project success being assessed using a model proposed by Papke-Shields, Besise and Quan (2010), whose purpose was to know how often project goals for six different dimensions (time, cost, technical specifications, quality requirements, customer satisfaction and business objectives) are met in projects carried out in Portugal. The

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answers were expressed on a 5 level Likert scale, fully anchored, where 1 meant "never", 2 meant "rarely", 3 meant "sometimes", 4 meant "often" and 5 meant "always ". Statistical tests, including variables normality and variance homogeneity were done using SPSS.

In the pursuit of defining project success, it is essential to identify the factors that contribute to it. Critical success factors typically represent a collection of project parameters and variables that are significantly associated with successful project outcomes. Effective management of these factors is crucial for attaining project success (Fraz *et al.*, 2016). The authors highlight that important aspects of successful projects include meticulous planning, clearly defined roles and responsibilities, effective control of the project schedule, strong leadership and management authority, and efficient communication throughout all channels.

RESEARCH METHODOLOGY

The study adopted a descriptive survey research design which allows qualitative and quantitative research approach to be used. Descriptive survey design entails use of questionnaires for purposes such as describing, comparing, and correlating (Koh & Owen, 2000). The design was considered appropriate to give descriptive statistics as well as for inferential statistics.The target population of this study was 4,337 public primary schools' projects under the Digital Literacy Program in the selected Western Kenya Counties and their 7 County Director of Educations. Stratified random sampling technique was used to identify 347 head teachers and 7 County Directors of Education as respondents from the target population. The period under review in the study was between 2019 and 2022 covering phase two of the project implementation plan schedule roll out. The head teachers oversee school administration, hence were targeted as the appropriate respondents for their schools for the following reasons. They are charged with the responsibility of implementing the school Digital Literacy Program. They also oversee project management practices used in school projects and determine the level and scope of project management practices deployed in the schools in consultation with the County Directors of Education to facilitate the role out of government projects in schools. For these reasons, head teachers and the County Directors of Education can provide reliable information for the study. The research incorporated both primary and secondary data sources. Following the administration and collection of questionnaires, the data underwent a thorough examination for completeness, accuracy, and consistency. Subsequently, it was prepared for editing, classification, cleaning, transformation, tabulation, and coding, employing both quantitative and qualitative methodologies. The analysis was conducted using the Statistical Package for the Social Sciences (SPSS) version 24 to perform various statistical tests. Qualitative data were analyzed through content analysis techniques.

RESULTS AND DISCUSSION

The researcher distributed 347 questionnaires to the headteachers at the public primary schools and one questionnaire to each County Director of Education in Kakamega, Bungoma, Busia, Kisumu, Migori, Kisii and Vihiga Counties. The total number of questionnaires administered was 354. Out of the 354 questionnaires issued, 308 questionnaires were successfully filled and handed back to the researcher translating to a response rate of 87.0%. According to Baruch and Holtom (2008) a minimum average level of response rate of 52.7 percent is good; with any rates above 70% deemed to be excellent. Therefore, the response rate obtained for this study (87.0%) was adequate to draw conclusions.

Descriptive Statistics

Project Scope Management

In this section, the study presents findings on Likert scale questions where respondents were asked to indicate their level of agreement with various statements about management of the scope of Digital Literacy Programme in Western Kenya. Table 1.1 presents the findings obtained.

Table 1: Descriptive Analysis for Scope Management:

1-Strongly Disagree, 2-Disagree, 3-Undecided, 4-Agree, 5-Strongly Agree

	1	2	3	4	5
All the project activities identified are known from the onset of the project.	4.6%	8.8%	4.6%	36.8%	45.3 %

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Change in project activities results in a change in Project outcome quality.	2.6%	24.4%	1.3%	66.1%	5.5 %
In case there is a need to change the project scope, a scope change request form is filled, analyzed, reviewed and approved by stakeholders.	0.7%	8.1%	4.2%	49.5%	37.5 %
Changes in project activities resulted to change in Project cost.	4.6%	11.1%	2%	81.1%	1.3 %
Changes in project activities resulted in a change in Project schedule/time	2.9%	18.2%	2.6%	63.5%	12.7 %
During scope planning all key stakeholders were involved.	2.6%	17.6%	1%	76.5%	2.3 %
There is a clear way of tracking and measuring critical project achievements (milestones) as the project progresses in line with objectives at every stage of implementation.	4.2%	37.1%	27%	28%	3.6 %
There were project team members who were experienced in scope planning.	2.9%	17.9%	3.3%	21.5%	54.4 %
There was a scope management plan initiated before project execution	9.8%	4.2%	15%	35.8%	35.2 %
There is a detailed scope statement which was given to all the project stakeholders before the project was executed.	5.5%	25.4%	1.3%	50.2%	17.6 %

Average level of Scope Management	Mean(%Mean)	Std. Dev.	Std. Error of mean	Min	Max
	3.6710 (73.4%)	.67908	.03876	1.00	5.00

From the findings in Table 1., the aggregate mean value was 3.6710 which suggest that on average, the respondents agreed with the statements on project scope management with regards to success factors of Digital Literacy Program in Western Kenya. The implication of this finding is that all the processes that define and control the success and accomplishment of a project were well conducted hence significant in determining the success factors of Digital Literacy Program in Western Kenya which are within budget, within schedule and meeting quality requirements. Specifically, the findings revealed that 45.3% of the respondents strongly agreed that all the project activities identified were known from the onset of the project as presented in Table 1.0. The findings also indicated that, 66.1%, 49.5%, 81.1%, 63.5% and 76.5% of the respondents respectively agreed with the following sentiments; that change in project activities results to change in project outcome quality, that in case there was need to change the project scope, a scope change request form was filled, analyzed, reviewed and approved by stakeholders, that changes in project activities resulted to change in project cost, that changes in project activities resulted to change in project schedule/time and, agreed that during scope planning all key stakeholders were involved.

To establish the relationship between scope management and success factors of Digital Literacy Programme in Western Kenya, respondents were asked to avail scope management plans and the findings as presented in Table 1.2 indicated that majority of the sampled public primary schools in Western Kenya, (73%) were implemented had a well-developed scope management plan with 27% having no evidence of having such a plan in place implying lack of standardized scope management tools across the public primary schools.

Table 1.2: Document analysis for Scope Management

Document	Availability	Frequency	% Frequency
Scope Management Plan	Available	21	73%
	Not available	8	27%

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Total	**29**	**100%**

The results of this study, to large extent, are consistent with the study conducted by Derenskaya (2018) who found out that the process of managing the project scope considers the planning, definition of the project scope, creation of the structure of project work, confirmation of the scope and management of the project scope and that the use a project scope management plan in structure of project work is vital. According to Standish Group (2018), inappropriate definition of project scope is one the factors that led global project failures. This suggestion agrees with the findings of this study as well as Blaskovics (2014) where all the respondents agreed that scope of the project should be defined clearly, and all project activities need to be known at onset of the project. However, these authors also emphasize that the project may be completed within cost and time, but still not meet scope criteria.

Project Complexity

To determine the moderating effect of project complexity on the relationship between the project scope management practices and success factors of Digital Literacy Program in Western Kenya, the respondents were asked to provide evidence of a Project Complexity Assessment and Management (PCAM) report used to identify, assess, and manage project complexity and the findings were as presented in Table 2.0. From the findings of Project Complexity Assessment and Management (PCAM) report analysis (see Table 2.0, majority of the sampled schools, 83% indicated the project were less complex. However, 17% of the sampled schools seem to indicate the project was complex to implement.

Table 2.0: Document analysis for Project Complexity

Document	Complexity	Frequency	% Frequency
Project Complexity Assessment & Management (PCAM) Report	Complex	5	17%
	Less complex	24	83%
	Total	**29**	**100%**

Further, the respondents were asked to rate the level of complexity during the implementation of Digital Literacy Program in public primary schools in Western Kenya. The statements were measured on a 5-point Liker Scale and the findings were as presented in Table 2.1.The results indicated that 54.7% of the respondents agreed with the following sentiments; that the bottlenecks during execution of the project held up key processes hence delaying project activities, 45.6% of the respondents agreed that the processes or methods to achieve the project goals were unclear, 47.2% agreed that the key risks were not identified early enough and when triggered, were not managed proactively. 54.1% agreed that the project team members numbers were sufficient for this kind of a project, 38.4% agreed that the sub-activities and sub-tasks during execution of the project were diverse and highly unpredictable and 53.7% strongly agreed that the level of innovation within the project was unpredictable and required hiring external consultants as indicated by 54%, 46%, 49%, 57%, 42% and 54% of the respondents respectively in Table 2.1. The aggregate mean value was at 78.4% mean response (mean=3.9224, std. dev. =68137) rated high as presented in Table 2.1. An implication that project complexity had a significant influence on the relationship between project management practices and success factors of Digital Literacy Program in the schools.

Table 2.1: Descriptive Analysis for Project Complexity:

1-Strongly Disagree, 2-Disagree, 3-Undecided, 4-Agree, 5-Strongly Agree.

Statements	1	2	3	4	5
Bottlenecks during execution of the project held up key processes hence delaying project activities	4.2%	6.2%	3.6%	54.7%	31.3%
Processes or methods to achieve the project goals were unclear.	4.2%	7.8%	6.5%	45.6%	35.8%
Key risks were not identified early enough and when triggered, were not managed productively.	7.8%	5.9%	4.9%	47.2%	34.2%

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The project team members' numbers were sufficient for this kind of a project.	8.8%	9.1%	4.9%	54.1%	23.1%
Sub-activities and sub-tasks during execution of the project were diverse and highly unpredictable.	7.8%	5.5%	31.3%	38.4%	16.9%
Level of innovation within the project was unpredictable and required hiring external consultants.	1.6%	4.6%	8.8%	31.3%	53.7%

Average level of Project Complexity	Mean(%Mean)	Std. Dev.	Std. Error of mean	Min	Max
	3.9224 (78.4%)	.68137	.03876	1.8333	4.83

The study findings affirm previous findings (Moza, Paul, & Solanki, 2022; Kashiwagi, 2020; Kimaru,2019; Luo *et al.*, 2017; Bosch-Rekveldt et *al.*, 2011) that unclear project goals, lack of experience, resource and skills availability and dependencies on the other stakeholders are aspects of complexity that could affect success factors of a project leading to different project outcomes.

Project Success Factors

To explore the relationship between project scope management and success factors of Digital Literacy Programme in Western Kenya, the researcher sought to find information regarding the success factors of Digital Literacy Programme which is the main response variable in this study. The findings were as presented in Table 3.0.

Table 3.0: Descriptive Analysis on Success Factors

1-Strongly Disagree, 2- Disagree, 3- Undecided, 4- Agree, 5- Strongly Agree,

Statement	1	2	3	4	5
Project completed within planned budget contributes to project success.	3.3%	3.3%	4.9%	54.4%	34.2%
Projects delivered to stakeholders' expectations are successful	1.6%	4.5%	2.9%	53.9%	37%
Project is successful if completed within proposed timelines.	2.3%	3.9%	4.9%	39.7%	49.2%
Projects implemented within technical specifications are deemed successful.	1.6%	4.2%	3.6%	46.8%	43.8%

Aggregate Score	Mean(%Mean)	Std. Dev.	Std. Error of mean	Min	Max
	4.1471 (82.9%)	.53875	0.02809	1.40	5.00

The composite mean for success factors of Digital Literacy Program was at 82.9% mean response (mean=4.1471, std. dev. =53875) rated high as presented in table 3.0. The results showed that the responses had a mean greater than 3.0 implying that majority of the respondents agreed about success factors of Digital Literacy Programme in Western Kenya. The results also indicated a standard deviation of less than 0.6 implying that the difference in responses received did not show much variation. Specifically, most of the respondents agreed that projects completed within planned budget contribute to project success as indicated by 54.4%. Similarly, 53.9% of the respondents agreed projects delivered to stakeholders' expectations are successful. Also, 49% and 46.8% respectively agreed that a project is successful if completed within proposed timelines and it is important to comply with technical specifications for project success.

The findings for Document Analysis entailed review of Weekly/ Monthly Project Status reports and the results are as presented in Table 3.1.

Table 3.1: Document Analysis for Success Factors Reports

Document	Project Success	Frequency	% Frequency

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Weekly/ Monthly Project Status reports	Successful	9	31%
	Less Successful	20	69%
	Total	**29**	**100%**

From the findings of Weekly/ Monthly Project Status reports analysis (see Table 3.1), majority of the sampled reports capturing the success factors of Digital Literacy Program, (69%) showed they were less successful. However, 31% of the sampled reports on success factors of Digital Literacy Program seem to have been successful with respect to analysis of the monthly project status reports. The findings (tables 3.0 and table 3.1) concur with previous studies by Rodrigues *et al.* (2014), Mhirat and Irtemeh, (2017) and Akbar & Shahid (2023), that timely project completion, stakeholders' satisfaction, budget adherence and meeting quality specifications are critical indicators for project success and therefore projects that are implemented based on this criterion can be termed as successful projects.

Correlation Analysis

The study conducted a correlation analysis to determine the relationship between project scope management (independent variable) and success factors (dependent variable).

Table 4.0: Correlation

		Success Factors	**Project Scope Management**
Success Factors	Pearson Correlation	1	
	P-value		
	N	308	
Scope Management	Pearson Correlation	.557**	1
	P-value	.000	
	N	307	307

The findings in Table 4 imply that project scope management and success factors of Digital Literacy Program have a strong positive and significant relationship (r=0.557, p=0.00). The relationship was significant since the p-value was less than the selected level of significance. This finding imply that the independent variable (project scope management) has a strong relationship with success factors of Digital Literacy Program in Western Kenya.

The study therefore computed linear regression analysis to further understand the relationship nature between these variables having carried out diagnostic tests (multicollinearity, heteroscedasticity, outlier tests, linearity tests and normality tests) to ensure the relationship satisfied all the assumptions of this model.

The study sought a Simple Linear Regression between project scope management and success factors of Digital Literacy Program in Western Kenya, by assessing the relationship between project scope management and success factors of Digital Literacy Program. The researcher tested the following hypothesis.

H_{01}*: *There is no significant relationship between project scope management and success factors of Digital Literacy Programme in Western Kenya.

Given the findings as presented in Table 5.0, the adjusted R squared was 0.308; this is an indication that at 95% confidence interval, there was variation of 30.8% in success factors of Digital Literacy Program in Western Kenya. This implies that 69.2% of the success factors of Digital Literacy Program in Western Kenya is accounted for by other factors not considered in the model. Adjusted R^2 shows the variation in the dependent variable due to changes in the independent variable.

The ANOVA test results as presented in Table 5.0 were, F (1, 305) =136.878, P = 0.000< 0.05; an indication that the simple linear regression model was a good fit to our dataset (ideal for making a conclusion on the population parameters).

The regression Coefficient results showed that β= 0.442, *t* =11.700, *p=0.000<0.05*; hence scope management had a statistically significant influence on the success factors of Digital Literacy Program in Western Kenya. Scope Management had a positive standardized beta coefficient = 0.442 as shown in the coefficients results of Table 5; this

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indicates that an improvement in the Scope Management by 1% was likely to result to an improvement in the Success Factors of Digital Literacy Program in Western Kenya by 44.2%.
To predict the Success of Digital Literacy Program in Western Kenya when given the level of Scope Management, the study suggests the use of the following model.
Success Factors of Digital Literacy Program = 2.528+ 0.442 Scope Management

Table 5.0: Linear Regression between Scope Management and Success Factors of Digital Literacy Program in Western Kenya

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.557a	.310	.308	.44830

a. Predictors: (Constant), Scope Management
b. Dependent Variable: Success Factors of DIGITAL LITERACY PROGRAM

ANOVA[a]

Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	27.509	1	27.509	136.878	.000b
	Residual	61.298	305	.201		
	Total	88.807	306			

a. Dependent Variable: Success Factors of Digital Literacy Program

b. Predictors: (Constant), Scope Management

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients		
		β	Std. Error	Beta	T	Sig.
1	(Constant)	2.528	.141		17.944	.000
	Scope Management	.442	.038	.557	11.700	.000

a. Dependent Variable: Success Factors of Digital Literacy Program

The finding suggests that the relationship is statistically significant as the p-value (0.000) was less than the significance level (0.05). Therefore, we can reject the null hypothesis that "*There is no significant relationship between project scope management and success factors of Digital Literacy Programme in Western Kenya.*".
The findings above are in commensuration with previous research (Abdilahi *et al.,* 2020; Fraz *et al.,* 2016; Madhuri *et al.,* 2018; Nibyiza *et al.,* 2015) which have found out that scope management is significantly correlated with project success and that scope management has a positive influence on project success. The study by Fraz et al. (2016) explored the impact of scope management on project success, revealing a significant association within Make-to-Order Organizations. These findings are consistent with the research conducted by Cooke-Davies (2010) and Clarke (1999), who noted that inadequate management of project scope could lead to a greater likelihood of projects being considered unsatisfactory by stakeholders, which may ultimately result in project cancellation due to cost, time, and quality concerns. Abdilahi et al. (2020) effectively summarizes the reasons for these outcomes, asserting that scope management is vital for accurately defining and mapping a project's scope, thus enabling project managers to allocate the necessary resources to complete the project within the timelines agreed upon by stakeholders.

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Moderating influence of Project Complexity on the Relationship between Project Scope Management and Success Factors of Digital Literacy Program

To test for this hypothesis, the researcher used SPSS process to run the analysis with control variables (age of respondents and years of experience) controlling for the moderation effect on the relationship between dependent and independent variables. This was done in line with studies that found out that demographic variables like gender, different job positions and years of experience may impact project success thus it would be important to treat them as control variables to investigate their impact (Liu, Cao, Duan, & Wu, 2022; Cao, Li, Wang, Luo, & Tan ,2018). This was achieved by undertaking hierarchical regression analysis consisting of five stages yielding four models. In each step the change in R square, F and significance level was noted.

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	4.058	.235		17.288	**.000**
	Age	.023	.053	.025	.439	.661
2	(Constant)	3.945	.237		16.631	**.000**
	Age	-.081	.068	-.088	-1.201	.231
	Experience	.135	.054	.181	2.476	**.014**
3	(Constant)	.677	.230		2.941	**.004**
	Age	-.040	.043	-.043	-.936	.350
	Experience	.037	.035	.049	1.056	.292
	Scope Management	.158	.040	.202	3.990	**.000**
4	(Constant)	.710	.234		3.036	**.003**
	Age	-.041	.043	-.044	-.954	.341
	Experience	.037	.035	.049	1.054	.293
	Scope Management	.154	.040	.197	3.869	**.000**
	Project Complexity	-.040	.049	-.050	-.810	.419
5	(Constant)	-1.871	.911		-2.054	**.041**
	Age	-.069	.041	-.075	-1.680	.094
	Experience	.071	.034	.095	2.096	**.037**
	Scope Management	.262	.051	.335	5.146	**.000**
	Project Complexity	.937	.278	1.185	3.368	**.001**
	Scope Management* Project Complexity	-.047	.014	-.274	-3.364	**.001**
a. Dependent Variable: Success Factors						

Scope management interaction with project complexity coefficient is negative but significant, meaning that the interactive effect is negative. Thus, as project complexity increases by one percent, the level of scope management effect on success factors of Digital Literacy Program significantly increases by 4.7% (β=-0.047, p=0.001). The study found that project complexity practices have a negative significant moderating effect on the relationship between scope management and success factors of Digital Literacy Program in Western Kenya.

As presented in figure 2, low levels of project complexity show a gradual positive slope which is a causal relationship between scope management and success factors of Digital Literacy Program. Increasing the levels of project complexity causes a change in the direction of the relationship as shown in the negative slope of the curve between scope management and project success at medium levels of project complexity. The slope keeps decreasing at higher levels of project complexity implying that increasing the levels of project complexity has a negative moderating effect which decreases the strength of the causal relationship between scope management and project success.

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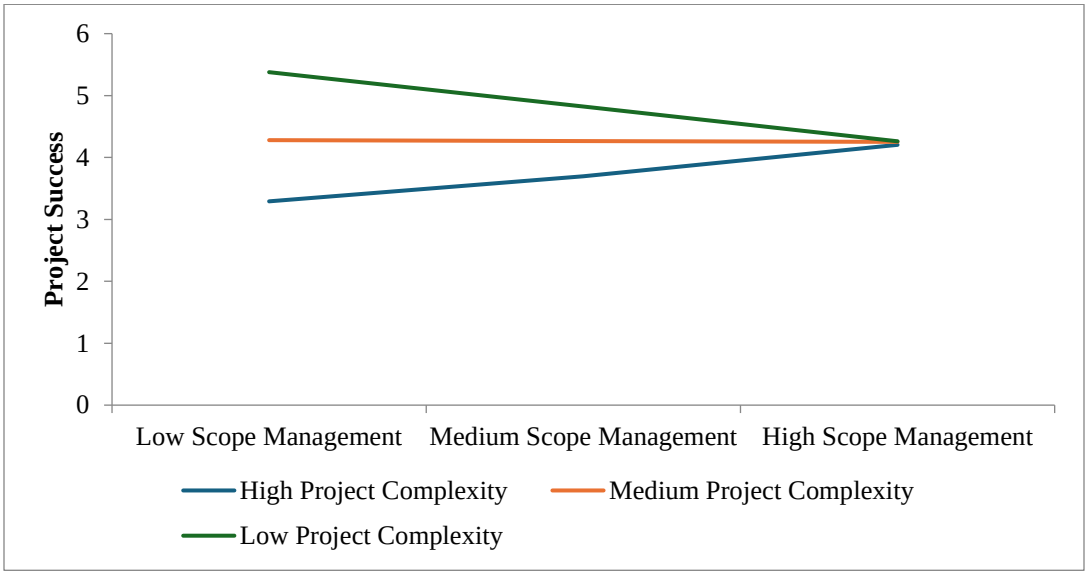

Figure 2.0: Moderating Effect of Project Complexity on Scope Management and Success Factors of Digital Literacy Program

Therefore, this study rejected the null hypothesis and accepted that the relationship between project scope management practices and success factors of Digital Literacy Program can be moderated by project complexity.

Discussion

Correlation analysis indicated scope management is positively correlated to the success factors Digital Literacy Programme. The correlation was found to be positive and significant implying that increase in scope management would enhance success factors of Digital Literacy Program in Western Kenya. To establish the causal relationship, simple linear regression analysis revealed that scope management is a significant predicator of success factors of Digital Literacy Programme in Western Kenya. The study also concluded that adoption of scope management tools such as scope management plan is significant in determining success factors of Digital Literacy Program in Western Kenya. The study concluded there is a potentially significant moderation effect of project complexity on the relationship between project scope management and success factors of Digital Literacy Program in Western Kenya.

Practical Implications

Based on the findings of the study, the researcher recommends that boards of management in the public primary schools should develop policy supporting the standardization of project management practices and project management tools like scope management plan, and project complexity assessment management matrices to assist in planning and management of school projects as well as help in measuring critical project achievements. The empirical findings of the study indicate that implementation of project scope management practices is key to successful implementation of projects and therefore there is need for continuous application of this practice which should be incorporated in project implementation policies in schools. To effectively manage the complexities associated with changing project scope, project managers should incorporate project management tools, clarify project goals, ensure that all stakeholders are on the same wavelength, formulate realistic expectations concerning resource availability, and establish deadlines that support the delivery of quality results. This investigation marks a pivotal point for subsequent research in this field, particularly with its findings in Kenya regarding the moderating role of project complexity on the relationship between project scope management practices and project success factors. The study offered valuable insights into the application of diverse project scope management practices within public primary schools in Western Kenya. To manage the complexities linked to changes in project scope effectively, project managers should adopt project management tools, clarify project objectives, ensure that all stakeholders are aligned,

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set realistic expectations regarding resource availability, and establish deadlines that support the attainment of quality outcomes.

Funding: This research received no external funding.
Acknowledgments: The author acknowledges the scholarly support received from the School of Business, JKUAT.
Conflicts of Interest: The authors declare no conflict of interest.

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