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PROJECT SOFTWARE DEVELOPMENT AND PERFORMANCE OF SMALL AND MEDIUM ENTERPRISES IN NAIROBI CITY COUNTY, KENYA

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ABSTRACT

This study sought to explore on projects software development and performance of small and medium enterprises in Nairobi city county, Kenya. The objectives of the study were to determine the effect of programming language and project platform on performance of SMS in Nairobi city county, Kenya. The theories on which the study is hinged are Institutional leadership theory and stakeholders' theory. The study adopted a descriptive research design and will use both qualitative and quantitative approaches. The target population was 112 respondents from projects software development in Nairobi City County. This study used purposive random sampling techniques. It was census survey. The study used open-ended and closed-ended questionnaire as the main mode of data collection. Primary data was collected using structured questionnaires. Secondary data was collected from institutional documents, Ministry of water publications within the County and relevant publications in referred journals. The collected data was edited, coded and entered into Statistical Package for Social Science version 26. Data was analyzed using descriptive and inferential statistics. In particular, Regression Analysis was used to investigate the relationships between hypothesized variables. Analysis of Variance (ANOVA) was also used to investigate whether independent variables have a combined effect on the dependent variable. The data was analyzed through the use of descriptive statistics. Findings show that there is a strong significant relationship between programing languages and SME performance (r=0.629, p=0.000), a strong significant relationship between project platform and SME performance (r=0.578, p=0.000).The recommendations are; There should also be proper coordination of the words to enhance and packing of the software programs to enhance ease of use, the software development companies should carry out market surveys to understand the needs of their customers, project managers should endeavor to involve all the project team members in the project, and to enhance quality of the software development projects, there should be regular monitoring and evaluation practices.

Key Words: Projects software development, Performance of small and Medium enterprises, Programming language, Project platform

INTRODUCTION

Software development projects have gained immense significance in the modern business landscape, empowering organizations to leverage technology for enhancing operational efficiency, improving customer experiences, and driving innovation (Brown et al., 2022). SMEs, as key contributors to economic growth, job creation, and entrepreneurial spirit in many countries (World Economic Forum, 2021), often encounter unique challenges and constraints in software development projects. Limited resources, budgetary constraints, and a lack of specialized expertise pose significant obstacles to the successful execution of these projects (Lindgren et al., 2020). Moreover, the dynamic nature of the software industry, characterized by constantly evolving technologies and changing customer demands, adds complexity to the development process (Jones et al., 2021).

In the African context, software development projects present unique challenges and opportunities for SMEs. The software industry in Africa is experiencing rapid growth, fueled by the continent's digital transformation and increasing demand for technology solutions. However, SMEs in Africa face specific hurdles that require attention. Studies conducted in countries like Nigeria (Adeyemi et al., 2018) and South Africa (china masa et al., 2021) have highlighted the need for capacity building in project management practices for SMEs. Building project management capabilities, particularly in agile methodologies, is crucial for successful software development projects in Africa. Software development was considered as a field that requires proper planning and execution. Organizations all over the world have appreciated the fact that software development projects are the solutions to some of the organizational problems. They have improved on the quality of work, accuracy of transactions and made operations more effective (Chow & Cao, 2008).

In Kenya, software development projects and the performance of SMEs have gained significant attention due to the country's thriving technology sector. Kenya has emerged as a hub for technology and innovation in Africa, with a growing number of SMEs engaged in software development. Research conducted in Kenya has emphasized the importance of project management practices in software development projects. Agile methodologies, such as Scrum, have gained popularity among Kenyan SMEs (Mwangi et al., 2019). However, challenges in implementing these methodologies, such as a lack of skilled project managers, have also been identified (Oduor et al., 2022).

The importance of constantly involving the users in the process of requirements analysis and specifications cannot be overemphasized. Only the users know their domain properly, and for that reason they should certainly participate in defining the system's functions, designing them, and evaluating their implementation and testing. The users should also participate in creating, verifying, and updating the requirements specification 30 document for the project. The users should share with the developers the responsibility for the requirements' completeness and consistency. It is the project managers' duty to establish and maintain good relations with the users throughout the development process, as well as to consult them whenever the project gets stuck due to the development team's lack of domain understanding (Smith, 2021).

Statement of the Problem

Software development projects are increasingly important for small and medium enterprises (SMEs), but there is a significant research gap in understanding the specific determinants that influence project outcomes and their subsequent impact on SME performance (ICACTE, 2010). This problem is rooted in the challenges faced by SMEs in effectively executing software development projects, including limited resources, budgetary constraints, and a lack of specialized expertise (Lindgren et al., 2020). The dynamic nature of the software industry, with its evolving technologies and changing customer demands, further complicates the development process (Jones

et al., 2021). These challenges can lead to project delays, cost overruns, and suboptimal performance, hindering SMEs' ability to compete and succeed in the market (Smith, 2021).

To highlight the severity of the problem, a survey conducted by the Kenya National Bureau of Statistics (KNBS) in 2020 revealed that only 52% of SMEs in Kenya reported successful completion of software development projects within the planned time frame and budget. This indicates a significant need for improvement in project execution and performance among SMEs. Additionally, a study by Oduor et al. (2022) found that 65% of Kenyan SMEs identified a lack of skilled project managers as a major challenge in implementing software development projects. Furthermore, a research report by the African Development Bank Group (AfDB) in 2021 highlighted that SMEs in Kenya face significant challenges related to access to financing for software development projects. Only 30% of SMEs in Kenya have access to formal financing options for technology-related projects, limiting their ability to invest in the necessary resources and talent for successful project execution (Smith, 2021).

Several previous studies have explored factors affecting project implementation in various contexts. According to Mahianyu and Njeru (2016) found that top management involvement and effective communication significantly influence project implementation in the public health sector. They highlighted the importance of communication, clarity of project scope, and project managers' competencies in effective implementation of donor-funded projects. Also Nyanje and Wanyoike (2016) identified planning, communication, and monitoring as key factors for effective implementation of NGO projects. He categorized factors influencing ICT project implementation into success factors and barriers, emphasizing the significance of vision, strategy, and government support. Kagendo (2019) emphasized the role of financial resources and stakeholder involvement in project implementation in non-governmental organizations. According to Githenya and Ngugi (2018), they identified project software development and performance of SMS as a controlling plan for programming languages, project platform, project quality assurance, project team motivation, and project management competency as critical factors in the implementation of housing projects.

Despite the existing literature on factors influencing project implementation, there is limited research specifically addressing software development projects in the context of SMEs operating in Nairobi City County. This study aims to fill this research gap by examining the determinants that influence software development project outcomes and their subsequent impact on SME performance in this specific context (Githenya & Ngugi, 2018). By building upon the findings of previous studies and focusing on the unique challenges and opportunities faced by SMEs in Nairobi City County, this research seeks to provide valuable insights and practical recommendations to optimize software development processes and enhance overall performance in this dynamic business landscape (Smith, 2021).In view of the foregoing this study is done in the Kenya Context so as to bridge the gap in project software development and performance of SMS in Nairobi City County, Kenya

Objectives of the Study

i. To examine the effect of project programming languages on performance of SMEs in Nairobi City County, Kenya
ii. To the effect of project platforms on performance of SMEs in Nairobi City County, Kenya

Theoretical Review

Situational Leadership

Situational Leadership Theory by Paul Hersey and Ken Blanchard (1969) suggests that effective leadership depends on matching the leadership style to the readiness level of the followers. The

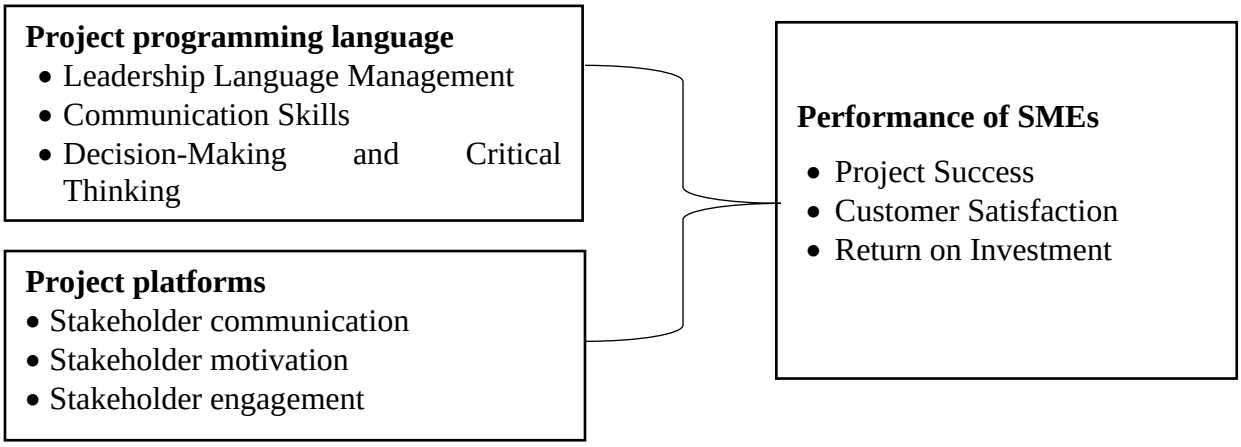
theory proposes four leadership styles: telling, selling, participating, and delegating, which vary based on the level of guidance and support provided by the leader.

The present study utilized Situational Leadership Theory to examine the relationship between Programing languages and effective stakeholder management. By assessing the readiness level of stakeholders and understanding their needs, project managers can adapt their leadership style accordingly, providing the appropriate level of guidance and support to foster effective stakeholder engagement and satisfaction (David Gewirtz, 2017).

Stakeholder Theory

Stakeholder Theory by Edward Freeman (1984) argues that organizations should consider the interests of all stakeholders, including individuals or groups that can affect or are affected by the organization's actions. It emphasizes the importance of managing relationships with stakeholders and maintaining a balance of interests. The present study applied Stakeholder Theory to investigate the relationship between stakeholder management and project success. By identifying and analyzing stakeholders, project managers can prioritize their interests and develop strategies to engage and manage them effectively throughout the project lifecycle.

Conceptual Framework



Project Programming Language

A programming language is a collection of instructions used to create various kinds of outputs from a computer. They are often divided into two major categories, low level and high level. A low level language is machine readable form such as machine code which contains binary code (Gichoya, 2017). High level language is human readable form such as Java, and C. Low level language are platform dependent meaning they can run on the same hardware and configuration while high level is platform independent as they can run on different hardware and configuration. From the first high level programming languages of the early 1960s developed to the hundreds of choices in 2018, there have been many languages with diverse functionality and usage. New languages are created to increase functionality, to better performance, or solve current problems. How do these languages compare to the older ones? What have they improved? What is it that the developers, that will utilize these languages, really want in the future? As a vast amount of languages have appeared, researching to see why some reach popularity and why some fall in the cracks provide a good historical understanding of the state they are in (Nyanje & Wanyoike, 2016).

Project Platform

Product platforms have proved to be an effective strategy for designing and manufacturing products in companies that provide different products for different customer needs. By designing

common parts and creating product families, these companies have increased the profitability of their product lines leveraging economies of scale by increasing the volume of common parts and by sharing the development costs and investment among different products (Githenya & Ngugi, 2018). However, managing common designs in product family development is not a trivial task. Product commonality usually decreases over time, a phenomenon called divergence, usually present in the development of complex products like automobiles. Furthermore, all the products from the product family will be designed in a product development project; whether they are executed in a major project or in individual projects depend on the complexity and scope of the product. A usual practice has been to develop these products in different projects due to limited availability of resources, creating an additional challenge for managing these common designs because of their different lifecycles, usually contributing to increase divergence (Oduor, Sang, Mwangi & Keru, 2022)

Empirical Review

Project Programming Language

Many professional programmers have had little formal education in computer science; rather, they have developed their programming skills independently or through in house training programs. Such training programs often limit instruction to one or two languages that are directly relevant to the current projects of the organization (Ongeri & Osoro, 2021). Many other programmers received their formal training years ago. The languages they learned then are no longer used, and many features now available in programming languages were not widely known at the time. The result is that many programmers, when given a choice of languages for a new project, use the language with which they are most familiar, even if it is poorly suited for the project at hand. If these programmers were familiar with a wider range of languages and language constructs, they would be better able to choose the language with the features that best address the problem. Some of the features of one language often can be simulated in another language (Royce, 1970).

However, it is preferable to use a feature whose design has been integrated into a language than to use a simulation of that feature, which is often less elegant, more cumbersome, and less safe. Increased ability to learn new languages (Ongeri & Osoro, 2021). Computer programming is still a relatively young discipline, and design methodologies, software development tools, and programming languages are still in a state of continuous evolution. This makes software development an exciting profession, but it also means that continuous learning is essential. The process of learning a new programming language can be lengthy and difficult, especially for someone who is comfortable with only one or two languages and has never examined programming language concepts in general. Once a thorough understanding of the fundamental concepts of languages is acquired, it becomes far easier to see how these concepts are incorporated into the design of the language being learned. For example, programmers who understand the concepts of object-oriented programming will have a much easier time learning Java (Arnold et al., 2006) than those who have never used those concepts. The same phenomenon occurs in natural languages. The better you know the grammar of your native language, the easier it is to learn a second language. Furthermore, learning a second language has the benefit of teaching you more about your first language.

Developers in all the IT fields are the target audience for these languages so their opinion should be of the highest interest to the language developers, knowing what their user base want will help in bringing quality, features, functionality, and fixing older problems (Ongeri & Osoro, 2021). This is important to allow the evolution of programming languages to head the direction we need it to go. The goal is to provide a small base of information where developers have stated what they expect and want from a language and how they work with them. This is highly important for someone creating a language due to the direct opinion they can focus their work on making the

improvements that are necessary to please their user base. We expect to have a collection of information from our survey data and be able to find a common consensus as to what factors, needs, or wants that developers wish to see in the future (Royce, 1970).

Project Platforms

Project management is "the application of knowledge, skills, tools and techniques to project activities to meet the project requirements." The effectiveness of project management is critical in assuring the success of any substantial activity (Ongeri & Osoro, 2021). Areas of responsibility for the person handling the project include planning, control and implementation. A project should be initiated with a feasibility study, where a clear definition of the goals and ultimate benefits need to be determined. Senior managers' support for projects is important so as to ensure authority and direction throughout the project's progress and, also to ensure that the goals of the organization are effectively achieved in this process. Knowledge, skills, goals and personalities are the factors that need to be considered within project management. The project manager and his/her team should collectively possess the necessary and requisite interpersonal and technical skills to facilitate control over the various activities within the project (Royce, 1970).

The stages of implementation must be articulated at the project planning phase. Disaggregating the stages at its early point assists in the successful development of the project by providing a number of milestones that need to be accomplished for completion. In addition to planning, the control of the evolving project is also a prerequisite for its success (Ongeri & Osoro, 2021). Control requires adequate monitoring and feedback mechanisms by which senior management and project managers can compare progress against initial projections at each stage of the project. Monitoring and feedback also enables the project manager to anticipate problems and therefore take preemptive and corrective measures for the benefit of the project. Projects normally involve the introduction of a new system of some kind and, in almost all cases, new methods and ways of doing things. This impacts the work of others: the "users". User interaction is an important factor in the success of projects and, indeed, the degree of user involvement can influence the extent of support for the project or its implementation plan. A project manager is the one who is responsible for establishing a communication in between the project team and the user. Thus one of the most essential quality of the project manager is that of being a good communicator, not just within the project team itself, but with the rest of the organization and outside world as well (Royce, 1970).

RESEARCH METHODOLOGY

The study adopted descriptive research design. The design was selected for this study because it can provide numeric description of the population and describe events as they are, as they were or as they will be (Kombo & Trump, 2020). In this study the unit of analysis was 56 Software Development Companies in Nairobi city County while the unit of observation was Proprietors of software development companies. The sample frame for this study consisted of 112 employees. The study hence targeted 112 respondents. The study used primary data that was gathered by use of structured questionnaires and captured through a 5-point Likert scale type and interview schedule. The Likert scale with closed and open question guide was distributed to the respondents after approval to collect data. The purpose of the study was explained and consent to participate in the study was sought. Dates and venues for administering the questionnaires in consultation with the potential subjects were set. Drop-and-pick-later method of questionnaire administering was implored with explanations of how to fill them. Data was then coded and classified in terms of similarities then tabulated. Descriptive statistics such as percentages, means and standard deviations were used to analyze quantitative data. SPSS version 28 program was also used to analyze quantitative data and results presented in form of charts, graphs and frequency tables for easier interpretation.

RESEARCH FINDINGS AND DISCUSSIONS

Response rate

The sample size of study was 112 respondents. The pilot test respondents were 10% of the total hence 11 respondents. The researcher distributed 101 questionnaires to the respondents and 86 were successfully filled and returned. Thus, the response rate was 85.1% which a very good response rate for analysis.

Descriptive Analysis of the Variables of the Study

Project Programming Language

The statements relating to project programming Language on the performance of small and medium enterprises in Nairobi city county, Kenya are presented in Table 1. Findings show that the respondents agreed that proper coordination is affecting performances of SMS in Nairobi City County, Kenya (m=4.15) and proper guidelines is affecting performances of SMS in Nairobi City County, Kenya (m=4.12). Respondents further strongly agreed that proper arrangement is affecting performances of SMS in Nairobi City County, Kenya (m=4.15). findings imply that the language used to program affect its performance. The language used to develop a program must be understood clearly by the developer, the project team, and the target audience. Findings support Githenya and Ngugi (2018) that programmers can increase the range of their software development thought processes by learning new language constructs. Learning the capabilities of other languages does not help a programmer who is forced to use a language that lacks those capabilities.

Table 1: Process Management

Key: 1-Strongly disagree, 2-Disagree, 3-Not sure, 4-Agree, 5-Strongly agree

Statements	SD		D		N		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
Proper coordination is affecting performances of SMS in Nairobi City County, Kenya	9	10.5	5	5.8	3	3.5	16	18.6	53	16.1	4.15
Proper arrangement is affecting performances of SMS in Nairobi City County, Kenya	2	2.3	3	3.5	6	7.0	24	27.9	51	59.3	4.38
Proper guidelines are affecting performances of SMS in Nairobi City County, Kenya	4	4.7	8	9.3	4	4.7	28	32.6	42	48.8	4.12

Project Platforms

The statements concerning the influence project platforms on the performance of small and medium enterprises in Nairobi city county, Kenya are presented in Table 2. Findings show that the respondents strongly agreed that inadequate systems is affecting performances of SMS in Nairobi City County, Kenya (m=4.22). Respondents further agreed that the management trust is affecting performances of SMS in Nairobi City County, Kenya (m=4.13) and individual participation is affecting performances of SMS in Nairobi City County, Kenya (m=4.07). Findings imply that there may be inadequate systems that affect SME performance. There could also be low stakeholder participation that affect SME performance. This happens when the clients are not involved in development of the projects. Results also imply that management trust with the staff affect SME performance. Results concur with Ongeri and Osoro (2021) that project manager is the one who is responsible for establishing a communication in between the project team and the user.

Monitoring and feedback enables the project manager to anticipate problems and therefore take preemptive and corrective measures for the benefit of the project.

Table 2: Project Platforms

Key: 1-Strongly disagree, 2-Disagree, 3-Not sure, 4-Agree, 5-Strongly agree

Statements	SD		D		N		A		SA		M
	F	%	F	%	F	%	F	%	F	%	
Inadequate systems is affecting performances of SMS in Nairobi City County, Kenya	7	8.1	1	1.2	5	5.8	26	30.2	47	54.7	4.22
Individual participation is affecting performances of SMS in Nairobi City County, Kenya	3	3.5	3	3.5	7	8.1	45	52.3	28	32.6	4.07
Management trust is affecting performances of SMS in Nairobi City County, Kenya	3	3.5	12	14.0	5	5.8	17	19.8	49	57.0	4.13

Inferential Analysis

Correlation Analysis

The results in Table 3 show that; there is a strong significant relationship between programing languages and SME performance (r=0.629, p=0.000), a strong significant relationship between project platform and SME performance (r=0.578, p=0.000. Findings are in consistent with Mahianyu and Njeru (2016) who found that top management involvement and effective communication significantly influence project implementation.

Table 3: Summary of Pearson's Correlations

Variables		Performance	Program language	Project platform
Performance	Pearson Correlation	1		
	Sig. (2-tailed)			
Program language	Pearson Correlation	.629**	1	
	Sig. (2-tailed)	.000		
Project platform	Pearson Correlation	.578**	.301	1
	Sig. (2-tailed)	.000	.042	

Regression Analysis

Table 4 Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.894[a]	.798	.784	.721

Table 5 Analysis of Variance

	Sum of Squares	d.f	Mean Square	F	Sig.
Regression	177.762	4	1.941	88.280	.000[b]
44.690	46.079	82	0.024		
.506	223.841	86			

Table 6 Regression of Beta Coefficient and Significance

	Unstandardized Coefficients		Standardized Coefficients		
	β	Std. Error	Beta	t	Sig.
(Constant)	5.613	.411		13.515	.000
Programing languages	.612	.080	.515	7.611	.000
Project platform	.368	.076	.301	4.728	.000

Results in Table 3 show that; there is a strong significant relationship between programing languages and SME performance (r=0.629, p=0.000), a strong significant relationship between project platform and SME performance (r=0.578, p=0.000).

The results for model one indicated that there was a positive correlation between the independent variables on performance of software development SMEs in Nairobi County. The model one had a coefficient of determination of 0.798 leading to the conclusion that 79.8% of the variance in the performance of software development SMEs was a result of changes in the project software developments. Therefore, other project software developments that were not part of this study contribute to 20.2% of performance of software development SMEs. The F value of 88.23 (88%) is significant at the 0.05 significance level.

Findings show that holding all other factors at constant zero, performance of SMEs in Nairobi City County, Kenya would be 5.603. Findings also shows that a unit increase in programing languages results in a 0.602 change in SME performance, a unit increase in project platform results in a 0.367 change in SME performance. All the variables had caused a significant change on SME performance ($p<0.05$). findings are in agreement with Githenya and Ngugi (2018) that project software development affect performance of SMS as a controlling plan for programming languages, project platform, project quality assurance, project team motivation, and project management competency as critical factors in the implementation of housing projects. The F value of 90.886 is significant at the 0.05 significance level. The t statistics shows that knowledge sharing (4.510), knowledge acquisition (2.010) and knowledge creation had the least effect of institution performance (1.006).

Conclusion

The languages in which software programs are develops determines the performance of the projects. Communication skills are also essential in development of software projects. Different methods of communication can be used among the project team. Improving the means of communication channels increases the quality of overall project implementation. The change can be attained through facilitating the use of printing channels such as memos, notices, letters, brochures, newsletters, reports, policy manuals, annual reports and posters and the use of better electronic channels.

Findings showed that project developers involved stakeholders in all project phases. Key stakeholders were identified and requested to assist in identifying the most suitable location of project. During this stage, conflicts may arise as different stakeholders had varying opinion particularly at the community level where everyone would like to have the project initiated in their locality. If these conflicts were not addressed on time then the project would not be sustainable, as the team would not collaborate to oversee project success. When stakeholders participate in project implementation, they feel the sense of project ownership and hence provided solutions to any implementation challenge that may arise.

Recommendations of the Study

The software developers should ensure that they use languages that are understood by the users. The Apps should accommodate both English and Kiswahili languages that are the most commonly used languages in Kenya. There should also be proper coordination of the words to enhance and packing of the software programs to enhance ease of use.

The software development companies should carry out market surveys to understand the needs of their customers. They should also involve the stakeholders to ensure that they design programs that suit the needs of the target market. The Apps should also be compatible with the gadgets that are commonly used in the market for easier accessibility. Engagement of stakeholders should not be restricted to a few stages of project, but should be consolidated throughout. This study advises project managers to involve stakeholders in the various phases of identifying a project, such as the review of a phase, in order to provide meaningful feedback to the project's sponsor on the direction the project is taking

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