Integration of Management Information Systems for Effective Construction Projects Monitoring and Control in Kenya

Patience Nafula Wanjala, Gwaya Abednego, Diang'a Stephen

Abstract: ***Although monitoring and control of construction projects is carried out in Kenya, outcomes show that the process is not effective, [1]. The research adopts the contingency theory which argues that there's no one best way for leadership or organization and that the design of the organization and its subsystems must fit with the environment, [2]. It therefore looks at the present environment which is an ICT oriented one and tries to use it to bridge the gap between monitoring and control of a construction project and its effectiveness by incorporating MIS. Literature was briefly reviewed on the project based nature of the construction industry, why Monitoring and Control was necessary, the challenges it faced that led to it being ineffective and how MIS could help improve its effectiveness. A survey research design was adopted with the use of questionnaires. A sample size of 70 project managers registered with ICPMK was issued with the questionnaires. Out of the 70, 57 were responsive. The analysis in this article dwells more on assessing the significance of monitoring and control of construction projects in Kenya, objective one. Analysis showed that Monitoring and Control was very significant to Kenyan construction projects and was not dependant on the level of experience neither the value of project nor the construction sector handled. It was therefore recommended that Monitoring and Control be performed for all construction projects in Kenya.***

Index Terms: Control, Effective, Integration, MIS, Monitoring.

I. INTRODUCTION

A construction project entails a major capital investment therefore the product should be able to meet its stated objectives within the constraints specified by the owner and relevant regulations. To achieve this, a continuous positive and accurate way of checking the project's progress is necessary, right from the project's inception to its completion, [3]. These progressive checks entail Monitoring and control. Mwangu and Iravo state that monitoring and control help in ensuring the project remains on course according to the specified constraints. They form the determinants of the project's success, [1]. A Construction Project Manager is tasked with the role of primarily overseeing the overall success of the project in terms of meeting the set targets in a safe, correct and cost effective manner, [4]. He/she therefore has the duty of constantly checking the project's progress and taking any corrective action where necessary to ensure there's control in the execution of the project in order to meet its target. Regular visits to the project site for follow up reasons and regular analysis of progress report for verification purpose becomes necessary. Correct information is required and should be given and obtained at the right time and manner by all the relevant players in a construction project. It has however come to many researchers' knowledge that the mode of collecting and communicating the necessary information is not correct. Further, the information is mostly incomplete or altered hence not very relevant. These render the Monitoring and Control process ineffective. Management Information System is therefore intended to make the process effective by providing sufficient and accurate statement of the current state of the project [5]

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II. BACKGROUND

The output of the Kenya's construction industry rose from 5.8% in 2013 to 13.1% in 2014, contributing 4.8% of Kenya's Domestic Product, (Statistics K. N., Economic Survey 2015). The expansion is attributed to growth in property development and ongoing mega infrastructure in the country. The government and private investors are reported to be increasing investments in infrastructure and housing, [6]. However, enormous challenges in quality assurance of collapsing under-construction buildings, misuse of funds allocated for certain projects and erection of buildings on public utility spaces and road reserves were noted, [6]. This was attributed to the complex nature of the industry characterized by diverse processes and numerous players at various stages. Also the traditional design-bid-build construction delivery method that is practiced in Kenya for public projects as stipulated in The Public Procurement and Disposal Act 2010, [7] is associated with many fragmentation problems, [8], like isolation of professionals and lack of co-ordination between design and construction, [9]. Effective monitoring and control was therefore necessary to improve coordination thus curb the challenges.

The study objectives were to establish the significance of monitoring and control of Kenyan construction projects, to explore the challenges facing monitoring and control process in Kenya, to establish the roles of MIS in curbing those changes and to develop an appropriate MIS usage strategy for effective monitoring and control of construction projects in Kenya. The study would be significant to the Ministry of Planning and National Development which was tasked by the government of Kenya to design an appropriate framework for monitoring, controlling and evaluation of construction projects in the National Development Program, to the project managers whose task was primarily overseeing the overall success of the project, to the client and all other project stakeholders through realization of the overall objectives of the project and to the entire population through economic growth cognate to a stable construction industry. The study focused on the Kenyan construction projects.

III. LITERATURE REVIEW

A. Nature of the Construction Industry

The construction industry is project based in nature. Maserang defines a project as a planned undertaking of related activities to reach an objective that has a beginning and an end, (Maserang, 2002). Based on the characteristics of projects, it can be stated that each construction is therefore unique, has a unique objective, unique schedule, unique products, services and results, it is temporary, the complexity differs as well as the size, resources, and organization structure. Information and control systems are also unique to each construction project. For instance resources are temporarily assigned and associated with the project, when the project completes they are redeployed. The type of project (housing, roads, refurbishment) and type of client (public/private/mixed) experienced are other characteristics noted by other researchers, [10], [11].

The project based production has influenced the structure of the industry and its delivery system. It makes it a fragmented sector with different types of firms to the extent of being called organized chaos. As a result the level of complexity of the industry is relatively high leading to very low efficiency, [3].

Completing projects on time is an indicator of efficiency, but due to its nature the construction process is subject to many variables and unpredictable factors, which result from many sources such as the performance of parties, resources availability, environmental conditions, involvement of other parties, and contractual relations, [9]. The main challenge is that they hinder the completion of projects within the specified time, cost and scope. To minimize these challenges every team member needs to know, in a timely and accurate manner and from the onset of the project, the project's requirements, objectives, expectations and the scope. The project team should be able to link project goals and objectives to stakeholder needs. It should work across functional boundaries through development of work breakdown structures. The project's progress should be keenly followed to assess if all processes are currently in comparison with the initially set plans, if deadlines are being met, budgets are safely measured and followed and corrective action is being taken when necessary to control the execution of the project. In summary, checks and balances should be laid in place to ensure that the overall project objectives are achieved. Monitoring and control provide the required checks and balances, [12].

B. Monitoring and Control of Construction Projects

Monitoring is the process of supervising activities in progress to ensure they are on-course and on-schedule in meeting the objectives and performance target, [13]. Project control is process of ensuring that project objectives are met by monitoring and measuring progress regularly to identify variances from Plan, so that corrective action can be taken when necessary. Monitoring and Controlling the progress of a project is one of the most important management functions of project management because it is a determinant of project success, [1]. Its processes involve the observation of project execution so that potential problems can be identified in a timely manner. The key benefit is that project performance is observed and measured regularly to identify variances from the project management plan. Reviews and revisions should therefore be made to ensure the project creates deliverables in accordance with its objectives. A good Monitoring and Control system should have the following qualities, [14]; *Utility* - be able to serve the practical information needs of intended users; *Feasibility* - the methods, sequences, timing and processing procedures proposed should be realistic, prudent and cost effective; *Propriety* - be conducted legally, ethically and with due regard for the welfare of those affected by its results and *Accuracy*- its outputs reveal and convey technically adequate information.

C. Importance of Monitoring and Control to Kenya

The Kenyan Construction industry like anywhere in the world it is complex. Reports on delayed works, poor workmanship, cost overruns, compromised quality, disputes among the project team, uncontrolled scope are common challenges cited in the Kenyan construction sector, [6]. Deloitte report talks of construction projects that are funded by the government being at a high risk of stalling mainly because of ineffective monitoring,[15]. Like all other countries, Kenya attributes the failure of any of its construction project to performance failure. Performance failure arises due to incompetent designers/contractors, poor estimation and change management, social and technological issues, site related issues and improper techniques and tools, [16]. It can be curbed by a proper monitoring and control system. Navon states that a control system is an important element to identify factors affecting project effort, [17]. He further states that modern construction management requires up-to-date, relevant, and accurate feedback information from the site regarding the actual productivity.

Traditionally a successful construction project was defined as that which met the triple constraint of time, cost and scope/quality, [18].

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It not only became a framework for project managers to evaluate and balance these competing demands but also a way to track and monitor projects. Over time, it has also become a *de facto* method to define and measure project success, [19].

Duggal however says that although the triple constraint is necessary, it is not enough, [19]. He therefore goes ahead to list other factors contributing to project success as Stakeholder and customer satisfaction, meeting business case objectives, customer / end-user adoption, quality of delivery,

meeting governance criteria, benefits realization and safety. Effective monitoring and control is necessary to achieve all the above success factors, [12]. Monitoring is useful in establishing the need to take corrective action while control helps in taking corrective actions immediately a deviation occurs to mitigate potential damage to ongoing project.

In Kenya the procedure of monitoring and control gives a periodic check of the project progress to ensure each of the project's success factor is met. The procedure involves issuing of updated progress reports affecting each sector of the project on an agreed periodic time, for example on a monthly basis. These reports discuss the current status of the project against the planned outcome at that time hence helps in detecting any deviation. They majorly highlight the constructability challenges, quality issues, test results, contract changes like modification of designs and changes in quantity; they also show issues that were pending from previous reports. Photos may be attached to demonstrate the real state of the construction. If up-to-date, relevant, and accurate feedback information from the site regarding the actual productivity is given, tracking the actual performance of the project is possible. In case of any deviation a corrective action is immediately employed to bring the project back on track. This way the overall objective of the project will be easily met.

D. Monitoring and Control Process

Monitoring and Control process classically involved three stages; Measuring the state of the system, Comparing these measurements with the desired state of the system and finally taking corrective action to return the system to its desired state or to minimize some loss function, [20]. Ogata confirms that this only works if the system is stable, responds quickly to changes and is relatively insensitive to small amounts of noise and measurements inaccuracies. However, time lags in such systems have been shown to degrade performance. Putting into consideration the nature of the construction industry, the above cycle might not apply for construction projects. Saad therefore proposes the following steps; Plan making, Plan implementation, Monitoring and recording the actual output, Reporting the actual and planned parameters and their variations and Taking action, [21]. The first four steps constitute monitoring while the last is control. Monitoring and control process therefore involve activities such as Monitoring and Controlling project work, Integrated Change Control, Scope Verification, Scope Control, Schedule Control, Cost Control, Quality Control, Managing Project Team, Risk Control, Contract Administration, Procurement Administration and Performance Reporting.

E. Monitoring and Control Tools and Techniques

Monitoring and Control techniques are split into three areas, [22]: Project plan monitoring - it is monitoring the project milestones, project tolerance and performing a Pareto analysis, Project budget monitoring and control and Project regular status and or stage reporting and monitoring - requires the project team reports and trend reports. The tools used fall into four general categories, [23] as shown on table(i):

Table i: Monitoring and Control Tools and Techniques;
Source; Author, 2016.

Category	Monitoring and Control Activity applicable	Techniques used
Project Communication	• Monitoring and Control of Project work • Scope verification • Contract Administration • Procurement Administration	• Pulse Meetings • Variance Reports • Program Reviews
Analysis of project performance to determine if change is necessary	• Cost Control • Schedule Control • Performing Quality Control • Managing Project team • Risk control	• Technical Reviews • Activity based ratios • Project Forecasting • Problem Solving • Leading Parameter
Reporting on project performance	Performance Reporting	• Project Management Information System • Management Reviews • Dashboards
Management of Project Change	Integrated change Control	• Change Request Form • Change Management Log

F. Challenges facing Monitoring and Control Process

The current practice of project control is entirely dependent on cost, schedule, and quality reports and personnel performance reviews, [1]. However proper monitoring and control should involve more than looking into cost, schedule and time. Control action is based on information given. In 2005, the Government of Kenya through the Ministry of Planning and National Development commissioned work on the design of an appropriate framework for monitoring, controlling and evaluation in the National Development Program, [1].

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This is an indication that the current process was not satisfactory. A number of factors may hinder a project manager from performing effective monitoring and control of projects.

Ford, (Ford, 2004) highlights items such as unrealistic deadlines where he notes that most timelines would slip due to factors beyond ones control, communication deficit where not adequate information is provided when required, scope changes, resource competition, uncertain dependencies where the team makes a mistake of trusting someone's assessment, insufficient team skills based on the fact that most team members.

will be assigned based on their availability and Lack of accountability. He also adds the aspect of not involving the end user hence failure in getting their input during critical moments which can help in control process.

Z. Wang, [24] cites the greatest challenges facing Monitoring and Control process as collection and provision of access to large amount of relevant information on time and communication design of the collected information, which he calls the display. The two challenges often lead to collection of only a small amount of information at a wrong time. In addition, the communication of the information collected is often faulty leading to distortion. The recipient is therefore unlikely to act as they should have had the information been correct.

Bohn notes that although Monitoring and Control of the performance of construction projects plays a major role in a project's success it is often a difficult and complicated task due to the constantly changing job site environment, [25]. He further argues that although project controlling is one of the most variable and time consuming task of construction project, it is still being carried out manually.

Raja noted that although construction is intensely an information processing industry, [26], the knowledge mainly resides within the minds of the individuals and an intend behind a decision not properly document. Data might also be saved in details but more often than not it is not properly compiled and collated.

Xerox, [27] states that information generated within an organizational setting is poorly captured and in many instances the volume of meaningful knowledge exiting in the organization on a daily basis exceeds that available for immediate use within the organization. Nigel states that the information provided is rarely available in a format that is suitable for all users, [28]. Further Yaseen and Raimar point out that insufficient information about the current progress and necessary changes in the process flow realized in project execution are a major hindrance to the efficient Monitoring and Control of construction projects, [29]. They talk of the incompetence of the manual process of collecting information during project execution. They state that planning in construction is inefficient due to insufficient information about the current process and necessary changes in the process flow realized in project execution.

All these challenges link to two major items; the information and communication. It is evident that the mode of collecting and passing on information is not correct. Also the information collected is mostly incomplete and not communicated on time rendering the entire process of Monitoring and Control ineffective.

G. MIS in the Construction Industry

Literature reveals that information and communication are major challenges to monitoring and control process of construction projects. Navon, (2008), states that modern construction management requires up-to-date, relevant and accurate feedback information from site regarding the actual productivity. This research looked into the integration of MIS into the process as a possible solution.

MIS is an acronym of Management Information Systems defined as a computer-based systems that provides information needed for effective management, [30]. According to Gupta, [31] it is a system comprising of all components that collect, manipulate and disseminate data or information and usually has hardware, software, people, communication systems like telephone and data itself.

Three distinct stages of the development and use of Information technology in the construction industry can be cited. Until the 1970s, products were directly being used to improve the efficiency in manual processes of information manipulation at operation level, thereafter standalone packages were introduced. The third stage began around 1990 where the development included the integration of stand-alone systems into strategic electronic platforms, [32]. These platforms were used for real-time structured data exchange and to maintain supply chain relationships. They are information systems that hold, manage and use data for a variety of management functions.

Gibson and Bell recognized MIS as not only an automation tool of engineering and construction tasks but also an enabler of effective project management, [33]. Breu [34]talked about information management in construction and discussed the existing solutions; Chassiakos, [35] discussed the use of computers for information management and communication and further presented the key elements of information management process in construction. Later some researchers, [36] proposed the development of an internet based system that performs the functions of data exchange, emailing information exchange, internet chat, live video-cam, search engines and auxiliary services. Bjork and his team, [37] also made efforts by bringing a different approach in integration of computer systems into construction by presenting a document management system in which documents are to be managed in a digital manner hence avoiding the management of information within documents and databases.

However, MIS in the construction industry is still immature regardless of the efforts made to incorporate it. Jung and Gibson, [38] attributes this to the subjective and comprehensive nature of MIS where he states construction firms would rather not spend on it. The comprehensive nature leads to the following; makes it highly sensitive hence requires constant monitoring, makes budgeting for it difficult, the quality of outputs is governed by quality of inputs, lack of flexibility to update itself, effectiveness decreases in case of frequent changes of users and it takes into account only qualitative factors and ignores non-qualitative factors like morale of workers, attitude of workers, and so on.

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H. Role of MIS in achieving effective Monitoring and Control of construction projects

The benefits gained from MIS according to (Singh, 2010) are as follows: Facilitates planning by improving the quality of plans and providing relevant information about the site, resources etc, for sound decision-making, Minimizes information overload by summarizing data hence avoids confusion arising from mixed up detailed facts, Encourages decentralization since there is a system for monitoring operations at lower levels by measuring performance and making necessary.

changes in the organizational plans and procedures, Brings coordination by facilitating integration of specialized activities and keeping each department aware of the problems and requirements of other departments. It connects all decision centres in the organization, Makes control easier by serving as a link between managerial planning and control. It improves the ability of management to evaluate and improve performance. The use of computers has increased the data processing and storage capabilities and reduced the cost and it assembles, process, stores, retrieves, evaluates and disseminates the information. These benefits form the roles MIS plays in achieving effective Monitoring and Control bearing in mind that monitoring and control offer checks for all key parameters like cost, schedule, quality, risks, project team and stakeholders to help identify any deviations hence take timely corrective actions where necessary. Information on the development process is therefore needed. This calls for centralized information systems that are accessible to all parties in a construction project. [32] states that the centralized information systems are powerful tools in the quest to improve efficiency and to enhance the flow of information within the construction industry. Research shows that with an MIS, every person knows the employees they have authority over and the work they are responsible for hence making tracking of work progress easier, [39]. MIS collects and processes data at all levels of a project, processes it into information, stores them (data and information) and finally produces output that aid in decision making, planning, program implementation and control.

According to [31] MIS mainly play two major roles; *Functional support role* – involves collecting, recording, storing and basic processing of data. *Communication Decision support system role* – it is based on the fact that communication is a key element in building a competitive environment. The two roles are achieved through performance of functions such as Planning and scheduling, Budgeting, Work authorization, Tracking resource usage, Work control, Control of changes and Communicating all functions.

It should be appreciated that with MIS any progress, changes or modification can be recorded and disseminated in a timely manner to all parties within the system hence a timely reaction is made based on an up to date information.

The procedure for Monitoring and control involves issuing of updated progress reports that affect each sector. These reports are the products of MIS. The reports include summary reports, trend reports, drill-down reports, exception reports, on-demand reports, key performance indicator reports, schedule reports and Ad-hoc reports.

IV. RESEARCH METHODOLOGY

This research used a mixed method strategy where both qualitative and quantitative approaches complemented each other. It employed the survey research design with data collected through self-administered questionnaires that aimed at establishing the level of application of Monitoring and control of construction projects in Kenya, the challenges facing the process, integration of MIS into the process as a possible solution to the challenges and getting views on the best MIS usage strategy. The variables were the Monitoring and Control process and MIS. The target population was construction project managers in Kenya while the sampling frame was a list of Project Managers who had registered with ICPMK as from September, 2016. The membership list obtained from their website (http://www.icpmk.co.ke) showed that eighty five (85) project managers had registered. A sample size of 70 was obtained based on the statistical

formula; $n = N*X / (X + N - 1)$, (1)

where: n – sample size, N – total population size which is 85, $X = Z_{\alpha/2}^2 * p*(1-p) / MOE^2$ and $Z_{\alpha/2}^2$ – the critical value of the Normal distribution at $\alpha/2$ (for this research at confidence level of 95%, α was 0.05 and the critical value was 1.96), p - the sample proportion (for this research it was 50%), MOE – the margin of error (for this research it was + or – 5%).

Probability sampling was employed with the use of simple random sampling. Both Qualitative and Quantitative data were used. Quantification of data was achieved by the use of a five points likert scale. Qualitative data was obtained by use of an open question at the end of the questionnaire aiming at getting the opinion of respondents on the best MIS usage strategy for achieving effective monitoring and control of construction projects in Kenya. A pilot study was first conducted to establish the clarity and effectiveness of the questions in relation to the study objectives. Its findings were used to restructure the final questionnaire. Data analysis employed both qualitative and quantitative methods. Quantitative analysis was achieved through univariate (frequency distribution, central tendency and dispersion) and bivariate (Pearson's correlation) analyses. The qualitative analysis strategy used for this research was thematic analysis that emphasizes on pinpointing, examining and recording patterns (themes) within data. It was in line with the one unstructured question. The analyzed data was presented by use of both statistical and graphical techniques.

V. RESEARCH RESULTS AND FINDINGS

To assess the significance of Monitoring and Control of construction projects in Kenya it was necessary to find out the characteristics of Kenyan construction projects and their success measure. It was also important to find out if monitoring and control was understood, how often it was performed and finally if it had been significant to the projects it had been employed.

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Bivariate analysis was conducted to assess the relationship between the level of experience as project managers in the construction industry and the understanding of monitoring and control of the projects; relationship between the value of projects and the construction sector handled and the level of performance of monitoring and control. Out of the seventy (70) questionnaires administered sixty were returned, of those fifty seven (57) were fully filled and usable thus responsive while three (3) had many blank spaces hence rejected. This was a response rate of 81%. Analysis was done based on a five point likert scale of frequency where; 1 denoted Never, 2-Seldom, 3-Sometimes, 4-Often, 5-Always.

Table ii shows a common mode of 5. This indicates that majority of projects handled 'Always' experienced the listed characteristics. An average mean of 4.26 indicate that most of the projects handled by the respondents had the listed characteristics with the most being the Unique Size and Unique Resources with a mean of 4.63 and standard deviation of less than 1.0. Less than half of the responses (only three) had standard deviation greater than 1.00 indicating that the level of agreement among the respondents on the characteristics of construction projects was high. Information and control systems was ranked number 9 while organization structure had the lowest mean of 3.74.

Table ii: Assessment of characteristics of Construction Projects handled. Source: Field data, 2017

Characteristic	Mean	Std deviation	Mode	Ranking
Objective: Each project is unique and has a specific goal to reach	4.47	0.868	5	5
Schedule: Point in time in which they must be accomplished	4.53	0.710	5	4
Complexity: consists of a number of associated activities contributing to the project as a whole.	4.35	0.954	5	6
Complexity: involves different professionals from different departments	4.54	0.709	5	3
Complexity: technological requirements	3.75	0.931	4	10
Size: each project has unique value, floor area, height	4.63	0.672	5	1
Nature of the task: a unique step by step plan of action is required	4.28	0.978	5	7
Resources: Labour, personnel, equipment, materials, facilities, etc.	4.63	0.698	5	1
Organization Structure: 'meshing' of project requirements into the existing organization.	3.74	1.009	4	11
Location: specific location, special weather and environmental concerns.	4.00	1.052	5	8
Information and Control Systems: must be structured to handle problems through the typical lines of authority	3.95	1.059	5	9
Average Mean	**4.26**			

Table iii: Assessment of Successful Project. Source: Field data, 2017

	Mean	Std. Deviation	Mode	Ranking
One that met the constraint of Time	4.12	0.965	5	3
One that met the constraint of Cost	3.91	1.074	5	7
One that met the constraint of Scope	3.74	1.203	5	10
One that met the constraint of Quality	4.33	0.988	5	1
Stakeholder satisfaction	4.09	0.872	4	5
Customer satisfaction	4.14	0.972	5	2
One that met the business core objectives	4.07	0.961	5	6
One that met the user-end adoption	3.91	1.005	4	7
One that met the government criteria	3.51	1.241	5	11
One that followed all the safety regulations	3.75	1.090	5	9
One whose benefits are realized	4.12	1.053	5	3
Average Mean	**4.00**			

On success factors, Table iii above shows common mode of 5 on all but two options indicating that majority of the options were 'Always' considered for a successful project. An average mean of 4.00 stresses the high level of agreement on all the options contributing to the success of construction projects. The highest feature was Quality with a mean of 4.33 followed by customer satisfaction at a mean of 4.14. The least preferred feature was a project meeting government criteria with a mean of 3.51. Six items out of eleven had standard deviation of more than 1.00 showing that majority of the responses were varied. Apart from the listed options one respondent said they also considered projects that are collaborative in nature and meets consultants' satisfaction to be successful.

On the performance of monitoring and control, Table iv below shows an average mean of 4.07 indicating that majority of the respondents often or always performed the listed activities. A mode of 5 appears on all options (showing they were mostly always performed) except Procurement Administration (3 to indicate it was mostly performed sometimes), Scope Verification and Integrated Change Control with modes of 4 indicating they were mostly often performed. The highest was Cost Control with a mean of 4.47 while Integrated Change Control was the lowest with a mean of 3.40.

Table iv: Assessment of the level of performance of Monitoring and Control of Construction Projects. Source: Field data, 2017

	Mean	Std. Deviation	Mode	Ranking
Monitoring and Controlling the Project Work	4.37	0.879	5	2
Procurement Administration	3.53	1.037	3	11
Scope Verification	4.02	1.044	4	8
Scope Control	4.07	1.050	5	7
Schedule Control	4.25	0.872	5	4
Cost Control	4.47	0.782	5	1
Performance Quality Control	4.28	0.978	5	3
Managing the Project Team	4.23	0.824	5	5
Risk Control	4.00	0.982	5	9
Contract Administration	3.98	0.935	5	10
Integrated Change Control	3.40	1.083	4	12
Performance Reporting	4.21	1.081	5	6
Average Mean	**4.07**			

Table v: Assessment of the significance of Monitoring and Control of Construction Projects. Source: Field data, 2017

	Mean	Std. Deviation	Mode	Ranking
Aids in knowing the desired state of the project at any particular time	4.60	0.651	5	1
Helps in Measuring the state of the project at any particular time	4.54	0.600	5	2
Enables in Comparing the measurements with the desired state of the project	4.40	0.904	5	3
Enables the Taking of corrective action to return the project to its desired state	4.40	0.842	5	3
Helps meet the constraint of time	4.28	0.774	4	5
Helps meet the constraint of cost	4.23	0.945	5	7
Helps meet the constraint of scope	4.02	1.094	5	8
Helps meet the constraint of Quality	4.25	0.950	5	6
Average Mean	**4.34**			

On the significance of monitoring and control to construction projects, Table v above shows an average mean of 4.34 indicating a high level of agreement on the benefits Monitoring and Control of construction projects yield. A common mode of 5 indicates that most of the benefits were always significant to the projects handled by the respondents. M&C mostly helped in meeting the constraint of time often (mode of 4). A common standard deviation of less than 1 is an indicator of agreement. Among the respondents in rating their variables. A standard deviation of greater than 1 is seen on the variable of helping to meet the constraint of scope (1.094) an indication of variations among the respondents in rating this particular variable. The most significant benefit was that it aids in knowing the desired state of the project at any particular time ranked with a mean of 4.60 while the least significant was that it helped meet the constraint of scope ranked the eighth with a mean of 4.02.

In general the findings showed that M&C of construction projects was very well understood with an average mean of 4.025, often performed with an average mean of 4.07and was very significant with an average mean of 4.34. It was very significant especially in knowing the desired state of the project at any particular time, measuring the current state and comparing the measurements with the desired state in order to decide on the applicable action. The findings also showed that ones level of experience as a project manager had no effect on the understanding of M&C of construction projects. Also neither the value of the project nor the construction sector handled had any effect on performance of M&C of construction projects.

VI. CONCLUSION

Successful construction projects are not only determined by the traditional triple constraint of time, cost and scope/quality but by other factors too (customer satisfaction, benefits realization, stakeholder satisfaction, meeting business case objective, end user adoption, safety issues and meeting the government criteria) as shown by the field results giving a mean average of 4.00 for all the listed factors.

Monitoring and Control is very significant to Kenyan construction industry and its performance is neither dependant on the level of experience of the player in the industry, nor the construction sector handled, nor the value of the project handled.

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