A Framework for Construction Supply Chain Management in Kenya: A Case for Targeted Construction Completion Time

Grace Wangari Karanja, Abednego Gwaya, Wanyona Githae

Abstract: *The Kenyan Construction industry is crucial for the growth of the country's economy. According to S.D Khutale et al. 2013 output from the Kenyan construction industry is a major and integral part of the nations GDP. The Kenyan National Bureau of statistics (2014) recorded the Gross domestic Product (GDP) for years 2010, 2011 and 2012 was 4.5%, 4.3% and 4.8% respectively. The construction industry is increasingly becoming competitive hence focus is increasingly being on improving performance. Based on these observations and government reports, kimondo et al.(2015) proposed construction supply chain management as a solution to the perennial problem of failure to meet target completion time on construction projects. A survey approach covering 140 randomly selected construction sites whose companies were duly registered by NCA in Nairobi was used. The findings revealed a positive and significant relationship between CSC practices, CSC characteristics, CSC outcomes, CSCM frameworks and targeted project completion time. Based on the findings, the study concluded that construction supply chain management influences the performance of targeted project completion time for construction firms within Nairobi County. The study developed a framework and recommended that construction firms work by adopting the framework to improve on their attributes; and ensure that their outcomes are successful hence meeting the construction project targeted time. Finally, the study recommended that similar studies should be conducted in other Counties for comparison purposes.*

Keywords: Construction supply chain, Construction Supply chain Management, Construction Project, Targeted ompletion time.

I. INTRODUCTION

The construction sector plays an important role in the national economy through strengthening and enabling other sectors. Construction provides basic amenities and infrastructures that support social development. In Kenya according to the Economic Survey (2014), on page 21 the contribution of construction activities to the gross domestic product has been on the rise hence indicating an increase in construction. Despite the construction industry's important contribution, the industry is still saddled with serious problems one of them being in inability meet target completion as reported by Wachira (1996), Talukhaba

Revised Version Manuscript Received on August 02, 2017
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(1999), Masu (2000), Wanyona (2005) as referred to by Gwaya *et al*., (2014). There are many cases of construction project failures related to late target completion in Kenya where several construction projects fail to meet their time schedule demands. Examples according GOK (2013) report on construction projects that have failed to meet time schedule public projects such as the Thika super highway which was realised a year later than the expected target completion. Records from the Ministry of Planning (2010) as stated by Kimemia (2015) indicate that the Multinational: Arusha – Holili/Taveta – Voi Road missed the target completion by almost 3 years. The Kenyan vision 2030 may be greatly affected by this trend where projects are not completed on target and it is acknowledged by vision 2030 Kenya under the infrastructure sector of the economic pillar, Republic of Kenya (2007). Previous findings Kimondo, et al (2015), Niemeyer & Rawadi (2011) as reported by Kimondo, et al (2015), and O'Brien, (2008) suggest effects on project duration of construction projects by the construction supply chain impaling that the extent to which construction supply chain management affects the targeted completion time of projects is not clear.

II. LITERATURE REVIEW

A. Global Overview; Construction Supply Chain

According to Benton (2010) processes used to organize the labor, materials, equipment, and financial resources needed to produce a product are core to achieving and meeting the set budgetary and scheduling goals of any project. Globally the characteristics of construction supply chain are usually similar and may be identified as: one time one of a kind projects, short term relationship and usually created through competitive bidding. They also consist of supply chain members namely: architects and engineers, main contractors, specialty subcontractors, and material suppliers that come together one time to build a single project for a specific owner.

B. The Kenyan construction industry & construction supply chain

Mutua, (2013) observed that in Kenya over a hundred a million Dollars of public funds was lost as a result of increased public expenditure on completion of stalled building projects. A report compiled by the Ministry of Public Works (2005) on projects status indicated that by the end of the year 2002 there were 197 stalled public building projects scattered across the country.

Outa Michael Ochieng et al., (2015) identified project cost estimation as having a great influence on the chances of timely completion of Kenya government building construction projects. However there are fewer research findings on the use of supply chain management and its influence on project performance. In his investigations Kimondo et al, (2015) proposed that supply chain management in construction has a positive impact on construction project performance.

C. Construction and construction process in Kenya

The construction sector in the Kenyan society is characterized by the economic activity of building and civil engineering activity that results in the provision of infrastructure, industry, housing and social amenities. According to Kenya National Bureau of Statistics (KNBS) economic survey of 2015 infrastructure development in building and construction remains a priority area for both the national and county governments in Kenya. In 2014, the construction industry registered an .accelerated growth of 13.1 per cent compared to a revised growth of 5.8 per cent in 2013 KNBS, (2015). Peter (2000) highlighted the construction process in Kenya with reference to hazina estate identified the different aspects of the process. He further identified industry players as Clients, Consultants, Contractors, and Material suppliers, Local Authorities (current day county authorities), Financiers and Project Managers and added the different aspects of the construction process from concept to close out of the project

D. Construction Supply Chain (CSC) and Construction Supply Chain Frameworks

Construction supply chain concept has been adopted from the manufacturing industry. Supply chain management (SCM) is a concept that has flourished in manufacturing, originating from Just-In-Time (JIT) production and logistics. Since construction projects are unique and one of a kind in nature each client represents a separate customer with unique requirements that are expected to be achieved by the construction supply chain. In Kenya the Construction team forms the construction supply chain. Therefore a typical supply chain for any given construction project could include the following actors architects and engineers, main contractors, subcontractors who carry out specialist services such as electrical works information and communications technology(ICT) among others, and material suppliers that come together one time to build a that one unique project for a specific owner. According to O'Brien et al. (2002) traditional SCM models were developed for a process-based production management and their transposition in the construction sector is not immediate and structured yet. Magalhães-Mendese et al., (2012) proposed a construction supply chain model that concentrated on six main components that are information flow of legal nature, project information flow, material matrix, construction site, labour flow and workflow that resulted in a methodology to quantify the impact of supply chain delays.

III. THEORETICAL FRAMEWORK

According to William, (2006) a theoretical framework introduces and describes the theories that attempt to explain the research problem understudy with a keen focus on the specific variables being sought in the study. Therefore this section comprises the underlying theory to support the analysis. Construction supply-chain management offers new approaches and new paradigms to increase the speed of executing construction projects, O'Brien (1999) and takes into consideration the production activities of independent production units (clients consultants, contractor, subcontractors and suppliers in construction) and seeks global optimization of these activities.

IV. RESEARCH METHODOLOGY

A randomly selected sample size of 140 members from the National Construction Authority (NCA) register was utilized out of a target population of 1798 registered building contractors. This research adopted a quantitative and qualitative survey research design. The study applied census sampling to sample all the individuals involved in the supply chain of the companies in the registration categories NCA1 to NCA5 because these five categories are all assumed to have some sort of defined supply chain in their construction sites and hence formed important respondents for the study. The main instrument in Data collection was through administration of questionnaires to employees in charge of the supply chain of the construction companies. Both quantitative and qualitative approaches were used for data analysis. The Statistical Package for Social Sciences (SPSS version 21) was used to run descriptive statistics such as frequency, mean, percentages and standard deviation, so as to present the quantitative data in form of tables, frequency tables, pie charts and graphs based on the major research questions. Inferential statistics used both correlation and regression analysis where correlation was used to establish the inter-relation with the variables while regression was used to find out the strength between the independent and dependent variable. The qualitative data generated from open ended questions was categorized in themes in accordance with research objectives and reported in narrative form along with quantitative presentation. The qualitative data was used to reinforce the quantitative data. Descriptive analysis using percentages and mean was used to help to understand and interpret variables

V. Data PRESENTATION AND ANALYSIS OF RESULTS

A. CSC Practices

Existing CSC practices in the construction industry was determined from respondents. Based on their experience, the respondents were asked to rate the word(s) or phase that best describe construction supply chain management definition. The ranking for the response was rated on a five likert scale as presented in table 1. Majority of 50.6% of the respondents rated Strategic Suppliers Management as normal 24.7% rated Strategic Suppliers Management as less frequently while 24.7% rated Strategic

Suppliers Management as frequently. The average mean of the responses was 3.00 which denote that majority of the respondents rated Strategic Suppliers Management as normal;

However the answers were varied as shown by a standard deviation of 0.71.Further, 63% of the respondents rated manage the sourcing, flow, control of resource*s* as normal, 12.30% less frequently, 12.30% frequently and 12.30% very frequently. The average mean of the responses was 3.25 which denote that majority of the respondents rated manage the sourcing, flow, control of resources as normal; however the answers were varied as shown by a standard deviation of 0.83. In addition, 73.30% of the respondents rated value addition as frequently while 12.30% stated normal and very frequently respectively. The average mean of the responses was 4.00 which denote that majority of the respondents rated value addition as frequently; however the answers were varied as shown by a standard deviation of 0.50. Results further indicated that majority of 50.6% of the respondents rated Integrated activities bringing product as frequently while 49.40% rated very frequently. The average mean of the responses was 4.49 which denote that majority of the respondents rated Integrated activities bringing product as frequently; however the answers were varied as shown by a standard deviation of 0.50. Lastly, results indicated that majority of 50.6% of the respondents rated Tool for better project management as very frequently, 37% stated frequently while 12.3% stated normal. The average mean of the responses was 4.38 which denote that majority of the respondents rated Integrated activities bringing product as frequently; however the answers were varied as shown by a standard deviation of 0.7.

Table 1: CSCM Definitions

Definitions	seldom	less frequently	normal	frequently	very frequently	Mean	Std. Dev
Strategic Suppliers Management	0.00%	24.70%	50.60%	24.70%	0.00%	3.00	0.71
manage the sourcing, flow, control of resources	0.00%	12.30%	63.00%	12.30%	12.30%	3.25	0.83
Value addition	0.00%	0.00%	12.30%	75.30%	12.30%	4.00	0.50
Integrated activities bringing product	0.00%	0.00%	0.00%	50.60%	49.40%	4.49	0.50
Tool for better project management	0.00%	0.00%	12.30%	37.00%	50.60%	4.38	0.70
Average						3.8	0.65

the results herein imply that the practise through the understanding of CSCM is integrated activities bring product which had the highest mean and least standard deviation. Manage the sourceing, flow and control of resources and strategic supplies management are least identified with CSCM practises respectively with the lowest means and hence implying a problem with control of resources, information for this reason the need for a new approach towards CSCM and change the way that CSCM is currently practised.

B. CSC Characteristics

The study sort to establish the characteristics of existing CSCs. The respondents were asked to indicate the extent to which the following characteristics affect successful CSC practices. The ranking for the responses was rated on a five likert scale as presented in table 2. Majority of 63% of the respondents rated Top management support as very effective while 37% rated it as effective. 50.6% rated Reliable delivery dates as very effective while 49.4% rated it as effective. 50.6% rated accurate order fulfillment as effective while 49.4% rated it as very effective. 50.6% rated lead time as effective while 24.7% rated it as normal and very effective respectively. Further, results indicate that 75.3% of the respondents rated Reducing bureaucracy and paperwork as normal while 12.3% rated it as effective and very effective respectively. 49.4% rated Level of complaint/returns as very effective, 25.9% rated it as normal while 24.7% rated it as effective. 63% of the respondent rated Fast order cycle time as effective while 37% rated it as very effective. Flexibility of the supply where appropriately chain, was rated as effective by 75.3% while 24.7% rated it as very effective. 50.6% rated Reliability of supply as effective while 49.6% rated it as every effective. Results further indicate that 63% of the respondent rated as effective free flow of information, 24.7% rated it as normal while 12.3% rated it as very effective. 63% rated early warning signs through Critical path method (CPM) as effective, 24.7% rated it as normal while 12.3% rated it as very effective. 63% rated more frequent meetings as normal, 24.7% rated it as effective while 12.3% rated it as less effective. 49.4% rated Joint project planning as effective, 25.9% rated it as normal while 24.7% rated it as very effective. Majority of 50.6% of the respondents rated as effective Simplify the whole construction process, 37% rated it as every effective while 12.3% rated it as effective. Creating standardization of processes was rated as effective and very effective by 37% of the respondents respectively while 25.9% rated it as normal. 50.6% rated as effective improved communication while 24.7% rated it as normal and very effective respectively. Improved payment systems (such as Mpesa, mobile banking among others) was rated very effective by 38.3% of the respondents, 37% rated it effective while 24.7% rated it normal. Lastly, 50.6% rated Deciding on the production schedule while 49.4% rated it effective. The overall mean of the responses was 4.07 which indicate that majority of the respondents rated as effective the various characteristics. Additionally, the standard deviation of 0.62 indicates that the responses were varied. The results herein also imply that the various

characteristics influence construction supply chain practices where top management was ranked highest followed by reliable delivery dates,

Then accurate order fulfillment and reliability of supply respectively as the characteristic that influences CSCM Practices.

Table 2: Characteristics of CSCs

Characteristics	not effective	less effective	normal	effective	very effective	Mean	Std. Dev
Top management support	0.00%	0.00%	0.00%	37.00%	63.00%	4.63	0.49
Reliable delivery dates	0.00%	0.00%	0.00%	49.40%	50.60%	4.51	0.50
Accurate order fulfillment	0.00%	0.00%	0.00%	50.60%	49.40%	4.49	0.50
Lead Time	0.00%	0.00%	24.70%	50.60%	24.70%	4.00	0.71
Reducing bureaucracy and paperwork	0.00%	0.00%	75.30%	12.30%	12.30%	3.37	0.70
Level of complaint / returns	0.00%	0.00%	25.90%	24.70%	49.40%	4.23	0.84
Fast order cycle time	0.00%	0.00%	0.00%	63.00%	37.00%	4.37	0.49
Flexibility of the supp where appropriately chain	0.00%	0.00%	0.00%	75.30%	24.70%	4.25	0.43
Reliability of supply	0.00%	0.00%	0.00%	50.60%	49.40%	4.49	0.50
Free flow of information	0.00%	0.00%	24.70%	63.00%	12.30%	3.88	0.60
Early warning signs through Critical path method (CPM)	0.00%	0.00%	24.70%	63.00%	12.30%	3.88	0.60
More frequent meetings	0.00%	12.30%	63.00%	24.70%	0.00%	3.12	0.60
Joint project planning	0.00%	0.00%	25.90%	49.40%	24.70%	3.99	0.72
Simplify the whole construction process	0.00%	0.00%	12.30%	50.60%	37.00%	4.25	0.66
Creating standardisation of processes	0.00%	0.00%	25.90%	37.00%	37.00%	4.11	0.79
Improved communication	0.00%	0.00%	24.70%	50.60%	24.70%	4.00	0.71
Improved payment systems (such as Mpesa, mobile banking among others)	0.00%	0.00%	24.70%	37.00%	38.30%	4.14	0.79
Deciding on the production schedule	0.00%	0.00%	50.60%	49.40%	0.00%	3.49	0.50
Average						**4.07**	**0.62**

C. CSCM Outcomes

The study results on investigating outcomes on response of CSCM to meet construction demands of the project the results were ranked on a five likert scale as presented in table 3. 49.5% of the respondents ranked Policy- management support as important and very important respectively while 1.2% ranked it as normal. 49.4% ranked Effect supply chain complexity as important, 25.9% ranked it as very important while 24.7% ranked it as normal. 50.6% ranked speed as very important while 49.4% ranked it as important. 75.3% ranked quality as very important while 12.3% ranked it as normal and important respectively. Timeliness was ranked as very important by 50.6% of the respondents, 37% ranked it as important while 12.3% ranked it as normal. Further, results indicate that 87.7% of the respondents ranked Target on objectives as very important while 12.3% ranked it as important. 75.3% ranked Client Satisfaction as very important while 24.7% ranked it as important. 37% ranked Better relations as important and very important respectively while 25.9% ranked it as normal. nformation/Communication was ranked as important by38.3% of the respondents, 37% ranked it as very important while 24.7% ranked it as important. 37% ranked Better relations as important and very important respectively while 25.9% ranked it as normal. Information/Communication was ranked as important by 38.3% of the respondents, 37% ranked it as very important while 24.7% ranked it as normal. In addition, results reveal that 38.3% of the respondents ranked Finances (also ease of paying by Mpesa, M-banking)

as important, 37% ranked it as normal while 4.75% ranked it as very important. 50.6% ranked Effective planning as important, 37% ranked it as very important while 12.3% ranked it as normal. 61.7% ranked Material & services availability.

 as important while 39.3% ranked it as very important. Lastly, 37% of the respondents ranked Complexity of the supply chain as very important, 24.7% ranked it as important while

12.3% ranked it as normal. The overall mean of the responses was 4.30 which indicate that majority of the respondents rated as important the various CSCM successful outcomes. Additionally, the standard deviation of 0.69 indicates that the responses were varied. The results in table3 below imply that the various CSCM successful outcomes influence targeted project completion time.

Table 3: CSCM successful outcomes

Outcomes	Unimportant	less important	normal	Important	very important	Mean	Std. Dev
Policy- management support	0.00%	0.00%	1.20%	49.40%	49.40%	4.48	0.527
Effect supply chain complexity	0.00%	0.00%	24.70%	49.40%	25.90%	4.01	0.716
Speed	0.00%	0.00%	0.00%	49.40%	50.60%	4.51	0.503
Quality	0.00%	0.00%	12.30%	12.30%	75.30%	4.63	0.697
Timeliness	0.00%	0.00%	12.30%	37.00%	50.60%	4.38	0.699
Target on objectives	0.00%	0.00%	0.00%	12.30%	87.70%	4.88	0.331
Client Satisfaction	0.00%	0.00%	0.00%	24.70%	75.30%	4.75	0.434
Better relations	0.00%	0.00%	25.90%	37.00%	37.00%	4.11	0.791
Information / Communication	0.00%	0.00%	24.70%	38.30%	37.00%	4.12	0.781
Finances (also ease of paying by Mpesa, M-banking)	0.00%	0.00%	37.00%	38.30%	24.70%	3.88	0.781
Effective planning	0.00%	0.00%	12.30%	50.60%	37.00%	4.25	0.662
Material & services availability	0.00%	0.00%	0.00%	61.70%	38.30%	4.38	0.489
Complexity of the supply chain	25.90%	0.00%	12.30%	24.70%	37.00%	3.47	1.605
Average						**4.30**	**0.69**

Target time on objectives and client satisfaction have the highest mean respectively suggesting s that they are ranked highest outcomes affected by target completion time. They also have the lowest deviation respectively implying that the CSCM should not depart from this outcomes to achieve target completion time hence met the objective of the this thesis

D. CSCM Framework

The objective of the study was to establish a CSCM framework, towards achieving targeted project completion time for construction projects in Kenya. The respondents were asked to give their score on the effectiveness of existing CSCM frameworks used in the industry. Results were presented in table 4.

Table 4: CSCM Frameworks

Frameworks	Mean	Std. Dev
Standard Contracting / Public Procurement Oversight Authority (PPOA)	4.75	0.83
SMART best practice: specific, measurable, achievable, realistic and time-bound.	7.4	1.506
Project Supply Chain Method Concept (PSCM) based on Establish, Clarify, Analyse, Select activate, Start-up, Improve.	7.4	1.329
Supply-chain operations reference model SCOR based on plan, source, make, deliver, and return.	6.77	1.306
Process Classification Framework (PCF) based on benchmarking.	7.26	1.716
Public-Private Partnership (PPP) / private finance initiative (PFI)	7.15	1.776
Average	**6.79**	**1.41**

Results in table 4 reveal that on Standard Contracting / Public Procurement Oversight Authority (PPOA), the average mean of the responses was 3.75 which denote that majority of the respondents rated the framework 41-50%; however the

answers were varied as shown by a standard deviation of 0.83. On SMART best practice: specific, measurable,

achievable, realistic and time-bound, the average mean of the responses was 7.4 which denote that majority of the respondents rated the framework 61-70%; however the answers were varied as shown by a standard deviation of 1.51. Further, on Project Supply Chain Method Concept (PSCM) based on Establish,

Clarify, Analyse, Select activate, Start-up, Improve, the average mean of the responses was 7.4 which denote that majority of the respondents rated the framework 61-70%; however the answers were varied as shown by a standard deviation of 1.33. On Supply-chain operations reference model SCOR based on plan, source, make, deliver, and return, the average mean of the responses was 6.77 which denote that majority of the respondents rated the framework 61-70%; however the answers were varied as shown by a standard deviation of 1.31. On Process Classification Framework (PCF) based on benchmarking, the average mean of the responses was 7.26 which denote that majority of the respondents rated the framework 61-70%; however the answers were varied as shown by a standard deviation of 1.72. Lastly, on Public-Private Partnership (PPP) / private finance initiative (PFI), the average mean of the responses was 7.15 which denote that majority of the respondents rated

the framework 61-70%; however the answers were varied as shown by a standard deviation of 1.78. The overall mean of the responses was 6.79 which indicate that majority of the respondents rated the various frameworks 61-70%. Additionally, the standard deviation of 1.41 indicates that the responses were varied. The results herein imply that CSCM frameworks play an important role in influencing project target completion time.

Further, respondents were asked to give their views concerning CSCM. Majority of the respondents felt that Suppliers should gauge prices of materials based on retailing material prices; Its good for clients to cooperate with the contractors in terms of understanding challenges; both the suppliers and the clients should work together to integrate cash flow of a project with respect to supply factors; and that Suppliers should respect the agreements put in place.

In addition, the respondents noted that Suppliers should be alive to the fact that fluctuating prices interfere with operations of companies; there should wide consultation between suppliers and contractors to ensure efficiency and suppliers and creditors should be patient sometimes more so when it comes to payments. Frameworks from standard contracting were ranked highest

E. Correlation Analysis

Table 5: Correlation Matrix

		Completion Time	CSC Practices	Characteristics	Outcomes	Framework
Completion Time	Pearson Correlation	1.000				
	Sig. (2-tailed)					
CSC Practices	Pearson Correlation	.655**	1.000			
	Sig. (2-tailed)	0.000				
Characteristics	Pearson Correlation	.669**	.493**	1.000		
	Sig. (2-tailed)	0.000	0.000			
Outcomes	Pearson Correlation	.511**	.546**	.284*	1.000	
	Sig. (2-tailed)	0.000	0.000	0.010		
Framework	Pearson Correlation	.822**	.572**	.526**	.709**	1.000
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
** Correlation is significant at the 0.01 level (2-tailed).						

Table 5 below presents the results of the correlation analysis. The results revealed that CSC practices and targeted project completion time are positively and significantly associated (r=0.655, p=0.000). The table further indicated that CSC characteristics and targeted project completion time are positively and significantly associated (r=0.669, p=0.000). It was further established that CSCM successful outcomes and targeted project completion time are positively and significantly associated (r=0.511, p=0.000). Finally, results showed that CSCM frameworks and targeted project completion time are positively and significantly associated (r=0.822, p=0.000). This implies that CSC practices, CSC characteristics, CSCM successful outcomes, CSCM frameworks and targeted project completion time change in the same direction.

F. Regression Analysis

The results presented in table 6 present the fitness of the regression model in explaining the study phenomena.

CSC practices, CSC characteristics, CSCM successful outcomes and CSCM frameworks were found to be satisfactory variables in explaining targeted project completion time. This is supported by coefficient of determination also known as the R square of 79%. This means that CSC practices, CSC characteristics, CSCM successful outcomes and CSCM frameworks explain 79% of the variations in the dependent variable which is targeted construction project completion time. This results further means that the model applied to link the relationship between the variables was satisfactory.

Table 6: Model Fitness

| Indicator	Coefficient
R	0.889
R Square	0.79

Table 7 provides the results on the analysis of the variance (ANOVA). The results indicate that the overall model was statistically significant. Further, the results imply that the independent variables are good predictors of targeted construction project completion time. This was supported by an F statistic of 71.560 and the reported p value (0.000) which was less than the conventional probability of 0.05 significance level.

Table 7: Analysis of Variance

Indicator	Sum of Squares	df	Mean Square	F	Sig.
Regression	11.370	4	2.843	71.560	0.000
Residual	3.019	76	0.040		
Total	14.389	80			

From the correlation results, the study concluded that there is a positive and significant association between CSC practices, characteristics, CSCM outcomes and frameworks and targeted project completion time. The findings revealed that target construction project completion time is influenced by construction supply chain management. Based on the findings, CSC practices have an impact on target project completion time. This implies that improvement in CSC practices characteristics, successful outcomes and CSCM frameworks will lead achieving target completion of projects for the Kenyan construction industry. When asked to give their views concerning CSCM in Kenya the respondents felt that Suppliers should gauge prices of materials based on retailing material prices; Its good for clients to cooperate with the contractors in terms of understanding challenges; both the suppliers and the clients should work together to integrate cash flow and there should wide consultation between suppliers and contractors to ensure efficiency and suppliers of a project with respect to supply factors. From the findings a frame work has been developed that comprises of a five component flow diagram with five stages that monitor the project with respect to the target completion time. The framework proposed incorporates the construction site and workflow similar to the findings and framework developed by Jorge et al. (2012). The findings by Jorge et al. (2012 concluded that the Construction supply chain has an impact on delays; the largest contributor was the construction site, followed by the workflow. The objective of the descriptive framework developed is to provide a roadmap for members of CSCM to realizing operational excellence so that collectively the construction project can realize benefits of improved performance on targeted completion of projects. The descriptive CSCM framework proposed shall have benefits and positive influence on the targeted completion time for Kenyan industry. The CMSM framework developed herein addresses the area of construction site and workflow and their relationship with target time.
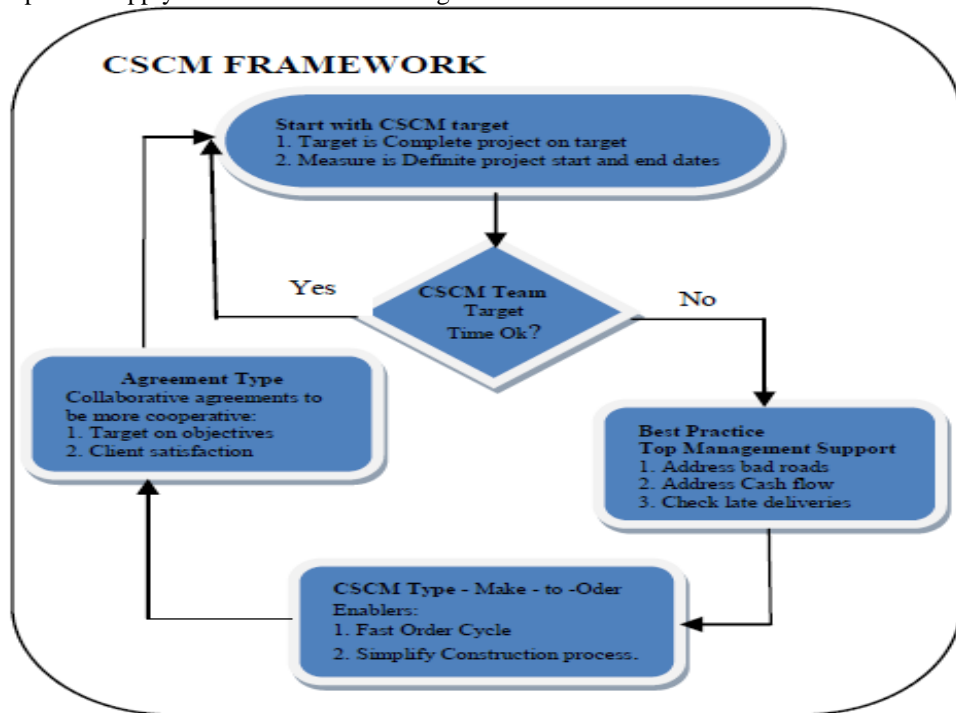
CSCM Target completion time framework (Author 2017)

The framework is based on the findings of the study and proposes a real time interaction within the CSC, the CSCM team and the project's targeted completion time. The first stage of interaction with the framework is to set the projects target in this case the target completion time for the project. The CSCM team makes a decision based on continuous monitoring of the target completion time of the project. Based on the research findings show best practice is incorporating top management, using a make to order CSC and incorporating cooperation in the supplier agreements to achieve target time in construction projects.

Based on the findings the study recommends that there should be a shift in the patterns of CSCM for construction firms in Kenya if they hope to achieve target completion for their construction projects.

VI. CONCLUSION

In particular, the target completion time is influenced by CSC practices, characteristics, successful outcomes and CSCM frameworks for the Kenyan Construction Industry. These variable can be monitor within one framework continuously to ensure that target time on projects is achieved.

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