

EFFECT OF PERFORMANCE BASED CONTRACTING ON PERFORMANCE OF ROAD AGENCIES IN KENYA

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Abstract: *The study sought to determine the effect of performance based contracting on performance of road agencies in Kenya. Typically, road agencies (RA) are entrusted with responsibility of managing road assets but a large portion of the road network in Kenya are either in poor or failed condition which calls for the need to put pressure on the road agencies to improve their efficiency in management of roads. To meet the growing demand for improved conditions of road assets, road agencies have been making deliberate effort to gradually move away from employing traditional engineering approach in favor of a contracting model where payments to the contractor are linked to achieving or exceeding performance goals stated in the contract; also known as performance based contracting(PBC). The study was guided by goal setting theory and it adopted a correlation survey design with a study population of 120 employees selected purposively from the four road agencies in Kenya and who were directly involved in project implementation. The results showed that $R^2 = 0.832$ meaning that performance based contracting(PBC) elements altogether explained 83.2% of road agency performance in Kenya and that PBC is a positive and significant predictor of road agency performance. The study recommends the interrogation of the implementation of PBC in other sectors to realise improved outcomes.*

Keywords: Performance Based Contracting, Performance goals, Road agency, Road assets

1. INTRODUCTION

Performance-based contracting (PBC) is a type of contract in which payment for deliverables is explicitly linked to the contractor's successfully meeting or exceeding certain clearly defined performance indicators. (Stankevic, Qureshi and Queiroz, 2005). It involves an important shift away from more traditional approaches to the delivery and maintenance of road infrastructure and associated services by a shift from the situation where the client has responsibility for the design and supervision of construction and maintenance activities, to a focus upon the key outcomes that the client wishes to achieve and incentivizing the achievement of those outcomes.

Payments made to the contractors are not based on quantities of works measured by unit prices for work "inputs" or physical works, but on measured 'outputs' reflecting the specified and target conditions of the roads under contract. Sultana (2013), however asserted that the traditional method of maintenance contracts have been widely recognized as ineffective and expensive as client (the road authority) has to supervise and pay both consultant and contractor. Sultana (2013) highlighted the problems associated with traditional method, for instance, the common problems observed were escalation of cost and time, poor-quality of work and inadequate motivation of contractors, no clear risk sharing between the road agency and the contractor, and delay in project completion. Anastasopoulos *et al.*(2009) also pointed out that in traditional method-based contracts, the road agency specifies techniques, materials, methods, quantities, along with the time period for the contract. In contrast, in PBC, the road agency specifies minimum performance measures to be met or exceeded along the contract period.

The main aspect of PBC is that contractors are paid based on the result achieved and not by following any specified method of performing the work. Therefore, contractors are paid based on how well they meet the specified performance goals. Contrary to traditional method of contracting out road maintenance based on work procedure and materials to be used rather than result oriented very much limiting the contractor in application of new technology (Zietlow, 2005). Payments to contractors are made in installments, usually monthly. Incentives and penalties can be introduced and consist of increases or decreases of a payment due to their exceeding or not meeting the specified performance goal (Ozbek *et al.*; 2011). Consequently, PBC define success in terms of how well the contractor meets the set performance goals. The intent of PBC is to encourage contractor innovation and improve quality by encouraging value engineering and improved efficiency (Segal *et al.*; 2003, Gupta *et al.*; 2011). It gives room for long term planning by providing the contractor with enough time horizon to deploy new technologies and recover cost of research.

Performance based contract within the road sector can be pure or hybrid. Pure PBC is whereby all maintenance is paid out to contractor upon meeting set output indicators. Hybrid PBC combines the features of both method and performance-based contracts. Some services are paid on unit rate basis while others are linked to meeting performance indicators. The level of complexity of PBC can range from simple to comprehensive depending on the number of assets and the range of services included. A simple PBC cover a single service e.g. only drainage or street light maintenance. These kinds of contracts are awarded for relatively long period of time. A comprehensive PBC would typically cover all road assets and comprises full range of services needed to manage and maintain the contracted road corridor. Such services would include re-servicing, re-gravelling etc.

(Stankevich, Qureshi & Queiroz, 2005). According to Zietlow (2005), the main reasons for implementing PBC are; reduce maintenance costs through application of efficient and effective technologies, provide transparency for road users, road agencies, and contractors, improve control and improve overall road condition.

According to Pinard (2015), the poor results of road agencies have called into question their capacity for undertaking road asset management. Roads continue to deteriorate prematurely and have to be rebuilt long before their design life. This implies that despite the road agencies implementing road asset management, the provided performance still fall way back below the expected service level. Greenwood, Porter, & Henning (2012) however suggested in their review paper of how performance based contracting delivers good asset management in Auckland, New Zealand and they asserted that performance based contracting is a better way of delivering good road asset management though this has not been empirically tested. The study therefore sought to test empirically the role of performance based contracting in delivering a better road asset management.

Conceptual Framework

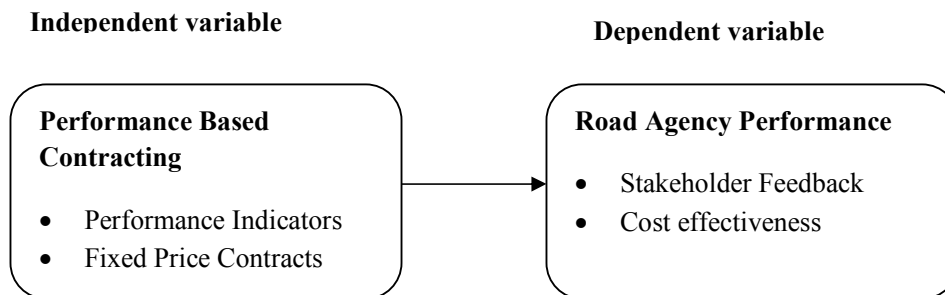


Fig 1: Expected interaction Between Performance Based Contracting and Road Agency Performance

The framework depicts the interaction of the independent variable; Performance Based contracting and dependent variable; road agency performance measured in terms of stakeholder feedback and cost effectiveness. It is expected that when a road agency uses performance based contracting in road assets management, the overall performance of the agency would improve in terms of stakeholder satisfaction in terms of improved overall road condition and cost reduction (Greenwood, 2012). This would also help the road agencies in the fulfillment of their core mandate. The framework is modified from Zietlow (2005) who posited that performance based management results in cutting cost, and improving road quality thereby satisfying the road stakeholders.

2. LITERATURE REVIEW

2.1 Theoretical Literature Review

This review explored theoretical foundations and concepts of the study. It advanced the theory that guides the study, defines concepts and variables and gives dimensions of the variables. According to Kerlinger (1973), a theory is set of interrelated constructs, concepts, definitions, and propositions that present a systematic view of phenomena specifying relations among variables, with the purpose of explaining and predicting the phenomena. The concepts of performance based contracting in road assets management is anchored in the goal setting theory as explained below.

2.1.1 Goal -Setting Theory

Goal-setting theory as developed by Latham and Locke (1994) states that motivation and performance are higher when individuals set specific goals, when goals are difficult but accepted and when there is a feedback on performance (Armstrong, 2005).

A goal is the aim of an action or task that a person consciously desires to achieve or obtain (Locke & Latham, 2002; Locke & Latham, 2006). Goal setting involves the conscious process of establishing levels of performance in order to obtain desirable outcomes. This goal setting theory simply states that the source of motivation is the desire and intention to reach a goal (PSU WC, 2015). If individuals or teams find that their current performance is not achieving desired goals, they typically become motivated to increase effort or change their strategy (Locke & Latham, 2006). Locke and Latham(2006) further stated that "the goal setting theory was based on the premise that much of human action is purposeful, in that it is directed by conscious goals".The decision to set a goal results from dissatisfaction with current performance levels. Setting a goal should include setting a structure that directs actions and behaviors which improve the unsatisfactory performance. Setting a goal will change a person's behavior in order to work towards achieving the set goal. Goal-setting theory predicts that people will channel effort toward accomplishing their goals, which will in turn affect performance (Locke & Latham, 1990)

According to Saleemi (2006) goal-setting theory postulates that employees are evaluated on the basis of their performance in the achievement of agreed goals or objectives. Locke (2009) argued that difficult specific goals lead to significantly higher performance than easy goals. Difficult goals also energize them because they work harder to attain them. Latham *et al.* (2002) argued that high goals lead to high performance, which in turn leads to rewards. According to Saleemi (2006), the theory emphasizes employees discussing the targets to be accomplished and the period with their managers. Participation in goal setting is essential as a means of agreeing to the setting of higher goals (Armstrong, 2005).

The theory is applied in performance contracting when heads negotiate and set targets for their respective sections. This is expected to be cascaded down at different levels of road agency hierarchies, which gives road maintenance contracts to contractors who are able to meet specific set performance goals. This study borrows from the goal setting theory in that the road agency provides to the contractors road performance targets, which they have to meet in order to be paid.

If the contractors fail to maintain the roads to the expected standards then they forego the payment regardless of how much input they have made in the road construction and maintenance.

2.2 The Concept of Performance Based Road Maintenance Contracts

According to Dave (2009), performance based contracting or output based maintenance contracts refers to competitive contracting process resulting in a contractual relationship where payments are made for measured output instead of the traditional way where the measurement and payment reflects the quantity of inputs. Under a traditional input-based contract the private contractor gets paid for each repaired pothole, whereas under an output-based contract the contractor gets paid for each length of road it maintains at the required condition. Performance-based contracting (PBC) can also be defined as a type of contract in which payment for the deliverable is explicitly linked to the contractor's successfully meeting or exceeding certain clearly defined performance indicators (Sultana, *et al.*, 2013).

The main aspect of PBC is that contractors are paid based on the end result achieved and not by following any specified method of performing the work. Therefore, contractors are paid based on how well they meet the specified performance goals. Payments to contractors are made in installments, usually monthly. Incentives and penalties can be introduced and consist of increases or decreases of a payment due to their exceeding or not meeting the specified performance goal (Ozbek *et al.*, 2010; Gupta *et al.*, 2011). Consequently, the PBC define success in terms of how well the contractor meets the set performance goals. The intent of PBC is to encourage contractor innovation and improve quality by encouraging value engineering and improved efficiency (Segal *et al.* 2003; Gupta *et al.*, 2011). PBC gives a contractor a long term planning and provides enough time horizon to deploy new technologies.

According to Jica (2016), contractors compete among each other during the tendering process, by proposing fixed lump-sum prices per km per month for bringing the road to required service levels and then maintaining it for a specified period of time. Payments made to the contractors are not based on quantities of works measured by unit prices for work "inputs" or physical works, but measured on 'outputs' reflecting the specified and target conditions of the roads under contract.

Output-based maintenance contracts also known as have several benefits over traditional input-based contracts. By paying contractors based on the level of service they deliver, output-based contracts provide a clear financial incentive for contractors to meet performance standards(Kariuki, 2014).Private contractors are also incentivized to improve their efficiency and minimize waste because they are paid at a set level for performance, not based on the value of the inputs used. Output-based contracts therefore encourage contractors to develop innovative solutions to realize the output standards while minimizing the inputs.

2.3 Empirical literature Review

Sultana, Rahman, & Chowdhury (2013) did a review of performance-based maintenance of road infrastructure by contracting. In their study, they highlighted issues of interest to road authorities in the context of saving maintenance costs and managing contracting times effectively. The purpose of the paper was to carry out a comprehensive state of the art review of the literature that has been

conducted in the recent years. The paper analyzed the literature on PBMC and presented examples of developed and developing countries that have been successfully maintaining their road network systems using PBMC as their preferred method of contracting. The study concluded that PBC has a potential of reducing maintenance costs, increasing the quality of works and reducing the chance of corruption in the long run in developing countries are the challenging issues for PBMC, which needs more attention.

Susanti, Wirahadikusumah, Soemardi, & Sutrisno (2016) investigated the impact of performance based contract implementation on national road maintenance project to road functional performance in Indonesia. This study aimed to measure the impact of PBC implementation on the national road maintenance project in Indonesia with the type of flexible pavement. The impact of PBC was focused on the functional performance, which was measured using a model of IIRMS and expressed in the international roughness index (IRI) value. The case study was conducted on one of the PBC pilot projects that were in the segment of northern coast of West Java. The results showed that the implementation of PBC for national road maintenance projects proven to ensure the quality and road service performance for the long term.

Takim & Akintoye (2002) conducted a study on performance indicators for successful construction project performance in the United Kingdom. The study identified key performance indicators that were to be used as parameters for benchmarking projects, in order to achieve a good performance. The study identified seven project performance indicators, namely: construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service; and three company performance indicators, namely: safety, profitability and productivity. The study affirmed that successful construction project performance can be achieved if these performance indicators are taken care of.

Schoenmaker & de Bruijn (2016) investigated the complexity in performance-based contracts for road maintenance. The purpose of this paper was to answer the question of how to achieve as much as possible the expected advantages of PBC while limiting the possible disadvantages and explore how PBC of maintenance can be improved. This study investigated the strategies of the English Highways Agency and the Dutch government when outsourcing the maintenance of their existing road infrastructures and the effects of their strategies. The paper found out that road agencies should focus on the process of interaction of the main actors involved, rather than the performance measurement systems (PMS) itself. It recommended that the road agencies should adjust their governance to the degree of uncertainty. PBC requires an informed and knowledgeable principal.

Glas & Kleemann (2017) did a study on performance-based contracting: Contextual factors and the degree of buyer supplier integration in Germany. This paper aimed to provide a deeper understanding of the contextual factors of PBC and how providers assess them. This paper conducted a multiple-case study evaluation and analyzed data from 21 cases. Risks, opportunities and contextual factors were identified through interviews, and the case data were analyzed with several methods, including border count and cross-tabulation. The results showed that the most important factors of PBC are clear responsibilities, clear performance indicators, transparent

measurement, cooperative culture and a precise utilization profile of core assets. Surprisingly, incentives were of minor perceived relevance. The analysis supported the differentiation of PBC into two subcategories: lean (low integrated) and customized (high integrated) PBC.

Sultana, Rahman & Chowdhury (2012) did an investigation on performance based maintenance of road infrastructure by contracting: A challenge for developing countries. The paper discussed and analyzed the problems and difficulties in the successful implementation of PBMC in developing countries. The study concluded that a strong road infrastructure system is the backbone of poverty eradication and maintaining a sustainable socio- economic structure in developing countries. It found out further that PBMC is a new concept designed to resolve the problems related to traditional methods of contracting and has significant potential to improve the maintenance and management of road infrastructure.

Anastasopoulos, Mc Cullouch, Gkritza, Mannering & Sinha (2009) did a research on cost savings analysis of performance-based contracts for highway maintenance operations. The paper presented a methodology to estimate the likelihood and amount of cost savings associated with the application of PBC for highway maintenance operations. Using data on maintenance contracts from around the world, it developed models that can be used to compare several contracting methods and include variables such as contract duration, activity type, and contract size. The results revealed that large projects with strong competition, long duration and extension periods, long outsourced road sections that incorporate crack sealing, pothole repair, illumination repair/maintenance, and mowing activities, favor outsourcing under PBC.

Radović, Mirković, Šešlija & Peško (2014) focused on output and performance based road maintenance contracting in Serbia. The paper described the main features of contract work for road maintenance and improvement under the output and performance-based contracting for roads (OPBC). Experiences in the application of such contracts for the roads were reviewed. The results showed that Road agencies that have adopted an OPBC approach have achieved cost savings from 10 % to 40 % compared to traditional method-based contracts. It also found out that during the period 2004 – 2008, Serbia implemented the output performance-based maintenance Contract (OPBC) for routine road maintenance pilot project within transport rehabilitation project financed by World Bank.

Iimi & Gericke (2017) did an investigation on output-and performance-based road contracts and agricultural production: evidence from Zambia. The paper examined the impacts of output- and performance-based road contracts on agricultural production where output- and performance-based road contracts are an instrument to ensure the sustainability of road maintenance. The results showed that the contracts have a significant impact on crop production. The paper also found that the measured impacts are associated with actual road maintenance works, regardless of contractual methods. Any road work can improve people's connectivity, even if it is not an output- and performance-based road contracts. The impact of the contracts is catalytic: more road works were implemented on contract roads than non-contract roads. This was an important contribution to the

sustainability of road maintenance. Finally, road improvement works were found to facilitate farmers' market participation, but the impact seemed weak.

Lancelot (2010) did an investigation on performance based contracts in the road sector: towards improved efficiency in the management of maintenance and rehabilitation-Brazil's experience. The study aimed at providing feedback on Brazil's successful experience in using performance based contracts in the rehabilitation and maintenance of the road networks. It highlighted the context which led to the introduction of PBC in the road sector and the strategic orientations adopted in their structuring. It also provided an evaluation of the positive achievements resulting from these contracts. The results of the study showed that the evaluation, comparing objectively performance based contracts to the traditional input-admeasurements approach, shows that PBC brought an overall improved efficiency to the road sector, which translated to better road conditions at lower costs for the governments and reduced management burdens on the administrations.

Kashiwagi, Bari & Sullivan (2003) carried out a study on application of performance based system in the pavement contracting in America. This study aimed at establishing the efficiency of performance based contracting in pavement management in America. The study was motivated by the low bid contracting system which had difficulty in addressing performance issues. The current contracting practices in the pavement industry were critically investigated and were ranked according to their mode of practice. The results showed that performance information procurement system (PIPS) and design-build-maintain (operate) came out as the two highest ranking contracting systems, respectively. The study envisioned that the pavement industry could improve paving quality by continuing to test and implement best-value systems.

From the review above, it is clear that no attempt has been made in terms of an empirical study to link performance based contracting in road maintenance contracts to road agency performance. Even though road agencies in Kenya are moving away from traditional contracting methods to PBC which is theorised to be cost effective and makes road assets to last longer, no work has been done to validate or contradict this theory. Whereas Sultana, Rahman, & Chowdhury (2013) only highlighted issues of interest to road authorities concerning PBC like time and cost saving, Susanti, *et al* (2016) only looked at PBC implementation on national road maintenance in Indonesia. Takim & Akintoye (2002) on the other hand focussed on performance indicators for successful construction project performance in the United Kingdom but they failed to link project performance to PBC. Further Schoenmaker & de Bruijn (2016) merely investigated complexity in PBC and how it can be improved but they never attempted to link PBC to contractor performance or agency performance. Glas & Kleemann (2017) examined the degree of buyer- supplier integration and contextual factors of PBC in Germany while Sultana, Rahman & Chowdhury (2012) discussed the problems and difficulties in successful implementation of PBC in developing countries but they failed to highlight the advantages that accrue to its implementation.

Moreover, Anastasopoulos *et al* (2009) did a cost saving analysis of PBC for highway maintenance operations but were not clear on how costs are saved whether its from the client side or contractor side. Radović *et al* (2014) only described the main features of contract work under PBC while Iimi & Gericke (2017) highlighted the impact of performance based road contracts on agricultural production and they argued that PBC has a significant impact on crop production. Lancelot (2010) on the other hand examined PBC in Brazil and merely provided feedback on Brazil's successful experience in using PBC by concluding that PBC brought an overall improved efficiency to the road sector. Finally, Kashiwagi, Bari & Sullivan (2003) examined the application of PBC in pavement contracting in America and its efficiency but they did not attempt to link the efficiency to road agency performance which is the main focus of the current study. There is therefore a missing link between PBC in road maintenance projects and road agency performance which the study seeks to establish.

3. METHODOLOGY

3.1 Research Design

The study adopted a correlational survey design. The design was expected to test the hypotheses and meet the objectives of the study. According to Nachmias and Nachmias (2008), a correlational survey design is most suitable in a research aimed at establishing a problem and to obtain information concerning the current status of a phenomenon (PBC) in order to describe what exists with respect to the variables or conditions in a situation; it can also be used to identify the characteristics of a phenomenon or explore possible correlations among two or more phenomena. Correlational approach was used as the study sought to examine the extent to which two or more variables relate.

3.2 Population

The population of this study comprised of 250 employees drawn from procurement, Finance and engineering departments of Kenya National Highways Authority (KeNHA), Kenya Rural Roads Authority (KeRRA), and Kenya Urban Roads Authority (KURA) who are involved in project implementation. This included resident engineers and their assistants, procurement officers and their assistants and finance officers and their assistants in every region and the headquarters. The staff selected were expected to be best placed to articulate issues in the study as they have the conceptual view of their respective organizations (Elbanna and Child, 2007), a view supported by Hambrick and Mason (1984) arguing that organization strategy is shaped by perceptions and opinions of its leadership.

3.3 Sampling Technique

A purposive sampling approach was adopted since the units of study were not many instead they were concentrated thereby favouring costs, time and other resources (Sekaran, 2016; Saunders *et al.*, 2009).

3.4 Sources of Data

Both primary and secondary data was used. The researcher gathered secondary data from KeNHA, KeRRA and KURA internal records and reports. Primary data was obtained from the particular staff involved in project implementation. Primary data was collected using structured questionnaire which were administered using trained research assistants.

3.5 Data Analysis

Data collected through the questionnaires was synthesized and coded, attaching scores to qualitative descriptions and analysed using multiple regression analysis. The model used in the regression is shown below:

$$Y = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \varepsilon$$

Where:

Y = Dependent variable (Operational Performance of Road agencies)

X₁ = Performance indicators

X₂ = Fixed price contracts

4. RESULTS AND DISCUSSION

4.1 Effect of Performance Based Contracting on Performance of Road Agencies in Kenya

The study sought to determine the effect of performance based contracting on the performance of road agencies in Kenya. It conceptualised that road agency performance in Kenya is a function of performance based contracting (PBC) which was measured in terms of performance indicators and fixed price contracts. Similarly, a multiple regression was hypothesised and the construct scores were estimated by obtaining the average response score of all items per case under each construct.

Table 1: Effect of Performance Based contracting on Performance of Road Agencies in Kenya

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.				
	B	Std. Error	Beta						
(Constant)	1.639	.100		16.422	.000				
Performance indicators	.146	.036	.252	4.095	.000				
Fixed price contracts	.353	.031	.709	11.533	.000				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	R Square Change	F Change	df1	df2	Sig. F Change
1	.912 ^a	.832	.829	.18642	.832	250.391	2	101	.000

a. Predictors: (Constant), Performance indicators, Fixed price contracts
a. Dependent Variable: Road assets management

Source: Survey Data 2018

Results of the multiple regression analysis above indicate that the two constructs of performance based contracting studied were significant positive predictors of performance of road agencies in Kenya. In particular, performance indicators ($\beta = 0.252$, $p < 0.05$) and fixed price contracts ($\beta = 0.709$, $p < 0.05$); were found to positively and significantly influence road agency performance in Kenya. The β coefficients imply that for a unit standard deviation of performance indicators causes

0.162 standard deviations in performance of the road agencies. The same case applies fixed price contracts. R^2 is 0.832 meaning that performance indicators and fixed price contracts altogether predicts variance of road agency performance at 83.2%.

Similarly, the unstandardised coefficients for performance indicators and fixed price contracts were 0.146 and 0.353 respectively meaning that a unit percentage change in performance indicators is likely to lead to road agency performance by 0.146% while a unit percentage change in fixed price contracts is likely to lead to a change in road agency performance by 0.353%. The analytic model derived from this interaction is shown below:

Road agency performance = 1.639 + 0.146 performance indicators + 0.353 fixed price contracts

The results that the use of performance indicators and fixed price contracts are a positive and significant predictors of road agency performance are in agreement with the findings of the study by Takim & Akintoye (2002) on performance indicators for successful construction project performance in the United Kingdom. The study identified key performance indicators in the construction sector as construction cost, construction time, cost predictability, time predictability, defects, client satisfaction with the product and client satisfaction with the service; and three company performance indicators, namely: safety, profitability and productivity. The study affirmed that successful construction project performance can be achieved if these performance indicators are taken care of.

Similarly, the results that PBC is a positive and significant predictor of road agency performance concurred with the findings of a study by Sultana, Rahman, & Chowdhury (2013) who did a review of performance based maintenance of road infrastructure by contracting and they concluded that PBC has a potential of reducing maintenance costs, increasing the quality of works. Susanti *et al* (2016) also found out in their study that the implementation of PBC for national road maintenance projects proven to ensure the quality and road service performance for the long term. Similarly, Radović, Mirković, Šešlija & Peško (2014) in a survey of the output and performance based road maintenance contracting in Serbia, found out that Road agencies that have adopted an output and performance-based contracting for roads (OPBC) approach have achieved cost savings from 10 % to 40 % compared to traditional method-based contracts.

Further, Lancelot (2010) also concurred with the findings of this study in his investigation on performance based contracts in the road sector in Brazil. He found out that PBC brought an overall improved efficiency to the road sector, which translated to better road conditions at lower costs for the governments and reduced management burdens on the administrations or better quality.

5. CONCLUSION

From the findings of this study, it can be concluded that performance based contracting as a practice in road maintenance has a significant contribution to the performance of road agencies in Kenya. Similarly, performance indicators and fixed price contracts explain performance of road agencies (KeNHA, KERRA, KURA) either individually or combined. An enhancement in the

adoption and use of PBC by road agencies would ultimately lead to an improvement in the performance of road agencies in terms of attainment of expected deliverables at a reduced cost and within a short time.

6. FUTURE RESEARCH

Based on the conclusions aforementioned, this study establishes the foundations for numerous future conceptual and empirical research efforts. Other PBC other than performance indicators and fixed price contracts should be the focus of further conceptual research to establish the nature and strengths of their interrelationships with current study variables. It also is suggested to academicians to conduct similar studies using a different design from correlational survey such as longitudinal or panel designs. Future studies should investigate the same concept in other construction industries globally to test the consistency of the findings.

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