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The Relationship Between Actual and Perceived Risk in Building Contracts in Kenya

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Abstract

The success of any project critically depends on the extent to which inherent risks are identified, analysed, allocated to the parties and managed. Sound analysis of the potential impact of risk in turn depends on the analyst's perception of the risk, which perception may or may not be closer to the risk impact. The work presented in this paper is an evaluation of perceptions of risk factors that significantly contribute to variations in cost performance. Findings indicate an unprecedented change in the level of risk between contract commencement and completion for three factors that were initially not perceived as significant, with the quantity surveyors having the correct perception of only three factors. The findings demonstrate a clear distinction between factors forming the basis upon which quantity surveyors develop their cost management strategy and actual factors as they materialise during project execution. They also reflect the uncertainty within which Kenya's building projects are executed, pointing out the difficulties experienced in forecasting the frequency and potential impact of risk factors on cost performance. These findings shall help all practitioners involved in construction management in developing a sound risk management framework to aid in reducing the impact of these factors on cost.

Key words: cost significance, risk identification, risk management

INTRODUCTION

Flanagan & Norman (2002:1) have indicated that the construction industry is subject to more risk and uncertainty than many other industries. This uncertainty arises from operations undertaken in the open environment subject to harsh weather conditions as opposed to the ideal manufacturing environment. Further, cost and time estimates are prepared before construction commences and the quality of the final product remains uncertain until completion of the facility. The uncertainty is attributed to lack of adequate information about risks inherent in the industry. An understanding of the risk factors inherent in projects undertaken is paramount to enable clients, professionals and contractors make informed decisions that will help in increasing the chances of project success. This understanding is best achieved by identifying risk factors arising during the building process. Among the most critical risk factors are those relating to cost performance of the building contract. Identification of such risks is therefore important in improving cost performance of projects. Flanagan & Norman (2002:5) noted that once a risk is identified and defined, it ceases to be a risk: it becomes a management problem. Identified risks should be analysed or evaluated to establish their significance for the purpose of making decisions on allocation. Rahman & Kumaraswamy (2004:178) indicate that construction risks are often project specific and are allocated to different parties through contract conditions.

THE PROBLEM

Thomas, *et al.*, (2003: 394) citing Walker & Smith (1995) and Tah & Carr (1999) reveal that the success of a project is very much dependent on the extent to which the risks involved can be measured, understood, reported, communicated and allocated to the appropriate parties. Agreeing that the criticality of risk is often perceived differently by the project participants based on their involvement, capability of management and level of investment and return from the project, the authors note that when risk criticality and capability of its management are perceived differently, then risk allocation becomes a difficult task. Incorrect perception of how risk should be assigned has often resulted in owners paying more than necessary for many projects, due to bid contingencies and unanticipated involvement in dispute resolution by the owner's staff, consultants and attorneys (Bhuta, 1992: 25; American Council of Engineering Companies & Associated General Contractors of America, 1998:4). According to Rahman & Kumaraswamy (2001), unclear and unfair risk allocation, poor communications, unrealistic time and quality targets by clients and uncontrollable external events are common causes of claims. Megens (1997) argues that the contractual misallocation of risks is the leading cause of construction disputes while Bhuta (1992:25) adds that improper allocation of risk causes additional costs by delaying project completion and use, and that it increases

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the project's volatility. These risks have become the object of attention in construction because many projects have failed to meet time, cost and quality targets (Smith, 1999:3; Kartam & Kartam, 2001), with developers demanding their right to expect timely project completion and within budget despite increasing complexity of projects (Institute of Quantity Surveyors of Kenya, 2000: 11). Molenaar (2005) citing Flyvbjerg, *et al.*, (2004) reveals in a study of 258 infrastructure projects across 20 nations, and spanning a time period of more than 70 years that project costs are underestimated in approximately 90% of the projects, and the actual costs average 28% higher than estimated. Mbatha (1986) and Talukhaba (1988) established that 53.7% of projects initiated in Kenya have a chance of cost overrun within a magnitude of 20.7% while Gichunge (2000: 158) found that the mean percentage cost overrun in 37 projects executed between 1990 and 1999 was 16.6% and ranged between -27% and 107%. The objective of this paper is to establish the relationship between perceived and actual significance of cost-risk factors in Kenya. It takes cognisance of Renn's (1998) foresight of improving our knowledge of the links between risk perception, attitudes towards risk objects and actual behaviour.

LITERATURE REVIEW

Coburn, *et al.*, (1994: 15) observe that decisions are made and actions are taken according to the way risks are perceived. Risk perception refers to the way in which individuals intuitively see and judge the level of risk associated with a particular exposure or hazard (Thomas, *et al.*, 2003:394). In this paper, risk perception refers to the way contracting parties interpret cost risk factors in terms of the effect these risk factors are likely to have on the contract sum. Such interpretation arises from the wording of contract conditions and may result in changes to the contract sum. The possible effect of the foregoing interpretation manifests itself in time and cost overruns. These overruns imply that decisions made about risk factors at the beginning of the building contract and those arising during contract execution are inconsistent with actual outcomes of the factors. Jaafari (2001:93) attributes this to the fact that individual managers and/or organisations get locked into a situation where a cascade of sub-optimal decisions are made over time to force an earlier sub-optimal decision to work, adding that personal ego and preoccupation with maintenance of individual's power position may blind the manager to make questionable choices and stay with these right through to the end. Diallo & Thuillier (2004: 22) assert that group members and leaders, especially in a systematic project management context behave on the basis of their own perceptions more than on the basis of facts. The authors' evaluation of the perceptions of African project co-ordinators on the success dimensions of international development projects concludes that perceptions are the very basis upon which these co-ordinators make their decisions. The most critical of these decisions involves allocating risks in building contracts. One of the initial stages in the risk allocation process is risk identification. The process isolates significant risks from the insignificant ones. The importance of this stage is reinforced in the work of Gichunge (2000: 196) in which he sought ways of improving risk management in Kenya. He reports that more than 50% of the 83 respondents were of the opinion that the method of risk management in building projects could be improved by instituting a better method of risk identification in the industry. These findings were consistent with the work of Talukhaba (1999: 232-238), which recommended review of the contract between clients and contractors to apportion the risks appropriately and re-examination of the conditions to reflect the current changes in the industry by considering current good construction practice. Other studies (Kangari, 1995; Ahmed, *et al*, 1999; Kartam & Kartam, 2001; Rahman & Kumaraswamy, 2002; and Andi, 2006) have analysed risk factors from a very general perspective. Kangari (1995) found that the most important risks in the US construction industry included safety, quality of work, defective design, labour and equipment productivity, contractor competence and delayed payment. Ahmed, *et al*, (1999) established that the most important risks as perceived by Hong Kong contractors and owners included safety, quality of work, financial failure and delays in resolving contractual disputes. Kartam & Kartam (2001) reported that the ten most significant risks contributing to delays in Kuwaiti construction industry include financial failure; delayed payment on contract; labour, material and equipment availability; defective design; co-ordination with subcontractors; productivity of labour and equipment; contractor competence; actual quantities of work; quality of work and accuracy of project programme. Andi (2006) concluded that the most severe and frequent risks include changes in work, defective design, delayed payment on contract, deficiencies in specifications and drawings, poor performance of suppliers and subcontractors and safety. Other studies including Rahman & Kumaraswamy (2002) concentrated on the allocation of risks between the owner and the contractor. Of more interest to this paper is the work that examined causes of cost overruns in Nigeria (Aniekwu & Okpala, 1988; Dlakwa &

Culpin, 1990) and in Indonesia (Kaming, *et al,* 1997), comparison of owner's and contractor's perception of the importance of construction risks (Ahmed, *et al,* 1999) and analysis of time and cost risks in Kenya (Gichunge, 2000).The researches have not examined the way practitioners perceive the significance of factors on cost performance and whether there is any significant difference between such perception and actual significance of the factors.

RESEARCH METHOD

Administration of the research instrument

This research was conducted through a questionnaire survey of quantity surveying firms practising in Kenya.The study focused on the traditional procurement approach as it remains the most predominant method in Kenya. The choice of quantity surveyors was based on the premise that they are the custodians of cost management under this system. The questionnaire required respondents to give their perception on the significance of 30 risk factors on cost. The respondents were also required to give the actual frequency of the factors as well as the impact of the risk factors on the contract sum upon such occurrence in projects undertaken. Measurement of the three variables relied on a seven-point multiple rating scale. Actual significance index was established by multiplying the frequency with the impact.The factors were identified through literature review of previous studies undertaken by Aniekwu & Okpala (1988), Dlakwa & Culpin (1990), Walker (1994), Kangari (1995), Kaming, *et al,* (1997); Ahmed, *et al,* (1999), Gichunge (2000), Kartam & Kartam (2001), Rahman & Kumaraswamy (2002), and Andi (2006) and corroborated by an analysis of the Agreement and Conditions of Contract for Building Works published in 1999 by the Joint Building Council in Kenya. This corroboration was necessary to ensure that the variables picked actually contribute to changes in cost. An analysis of the register of quantity surveyors maintained by the Board of Registration of Architects and Quantity Surveyors indicated that there were 99 firms as at October 2005. Due to financial constraints, a sample of 53 firms was targeted. However, since twelve firms could not be traced, only 41 questionnaires were administered over a period of three months. Out of these, 34 questionnaires were returned, representing a response rate of 82.9%. This response rate was considered satisfactory. At least 67.6% of the respondents had more than 10 years of experience in building projects of various sizes.

Data Analysis

The primary objective was to establish whether actual risk significantly differs from perceived risk significance. This could effectively be undertaken by establishing whether there is a significant difference in the sample means between perceived and actual significance. The analysis procedure involved two stages. The first stage involved one-tailed *Z*-tests aimed at isolating the significant factors from the entire list of 30 factors for both perceived and actual risk indices. The *Z*-test is useful for testing the mean where the sample size exceeds 30 cases (Kothari, 2004: 198). The *p*-values of the mean were generated and used as the basis for isolating these factors. All factors whose *p*- values were less than 1% were picked as significant. During the second stage, the matched-pairs test was used to establish any significant difference between the actual and perceived mean. The matched-pairs test checks the significance of the differences between two continuous variables that were both provided by the same respondents in a better way by providing greater assurance of significance for the same data distributions than does ANOVA (Alreck & Settle, 1995: 332-3). It attempts to explain the differences between individual pairs in terms of differences caused by the factor under examination, while minimising variability from extraneous influences (Lapin, 1987: 352). Matched-pairs sampling is more efficient or powerful than a test of independence samples because it requires a much smaller sample size to provide similar protection against committing Type I and Type II errors. A two-tailed matched-pairs test was used to test such differences against the hypothesis that there is a significant difference between perceived and actual risk significance. All tests were conducted at a level of significance of 1%.

PERCEIVED AND ACTUAL SIGNIFICANCE

Table 1 shows the Z-test results for perceived significance and actual risk index for the 30 risk factors studied. It was established that the consultants perceived only 14 of these factors as being of cost significance as opposed to the 17 factors that were found to be significant. Six factors initially perceived to be significant had insignificant actual indices; while nine factors not initially perceived to be significant actually emerged significant. Only eight factors showed semblance in both perceived and actual mean indices.

Factors with significant mean actual and perceived index

The eight factors with significant mean actual

TABLE 1

Risk Factors and their Perceived and Actual Significance Indices

Variables	Mean perceived index	Sig.	Mean actual index	Sig.
Extra work	3.9412	0.0015*	5.8618	0.0000*
Design and specification changes	4.2121	0.0016*	5.3969	0.0000*
Extended or reduced contract period	4.2727	0.0000*	4.9249	0.0000*
Delays in preparing detailed drawings	3.9118	0.0217	4.7359	0.0000*
Delayed payment	3.9091	0.0207	4.6130	0.0000*
Late instructions	3.9394	0.0174	4.5901	0.0000*
Price fluctuations	3.2121	0.1635	4.4586	0.0000*
Financial failure of contracting party	3.5882	0.1230	4.0971	0.0028*
Nominated subcontractors and suppliers	2.9063	0.0011*	4.0932	0.0017*
Defective materials or work	3.2941	0.5000	4.0610	0.0038*
Shortage of main contractor's materials	3.0882	0.1423	4.0173	0.0078*
Third party delays	3.2727	0.3821	3.9733	0.0150
Delayed dispute resolution	3.4242	0.4052	3.9681	0.0144
Differing underground conditions	3.8529	0.0329	3.9096	0.0281
Permits and approvals	2.8438	0.0091*	3.8715	0.0436
Inclement/ unpredictable weather conditions	2.5152	0.0000*	3.7502	0.1762
Delays arising from client-supplied items	3.2424	0.4761	3.6236	0.3372
Labour and equipment availability	2.3750	0.0000*	3.6197	0.4129
Productivity of labour and equipment	2.4545	0.0000*	3.6048	0.4483
Inaccurate quantities	3.4706	0.1660	3.6026	0.4721
Defective design	3.2941	0.3300	3.5783	0.4721
Discrepancies in contract documents	2.8788	0.0985	3.5066	0.2119
Complexities relating to project type	2.5806	0.0000*	3.4326	0.2061
Delays in interpreting contract documents	2.3030	0.0000*	3.3704	0.1357
Complexities arising from design buildability	2.8788	0.0485	3.2595	0.0029*
Site access or possession problems	2.4375	0.0000*	3.1165	0.0000*
Complexities arising from construction method	2.5000	0.0000*	3.1014	0.0000*
Complexities arising from site location or site conditions	2.9706	0.0668	3.0809	0.0000*
Acts of God	2.2813	0.0000*	3.0791	0.0000*
Changes in laws and regulations	2.1471	0.0000*	3.0043	0.0000*

*Significant at 1% level of significance

Source: Field Survey, 2006

and perceived index include extra work, design and specification changes, changes to the contract period, nominated subcontractors and suppliers, site access or possession problems, complexities arising from the construction method, acts of God and changes in laws and regulations. The JBC conditions of contract currently in use in the country give the client powers to sanction limited additional work during contract execution. The cost of such work is generally financed using the contingency sum. It is therefore not surprising that 91.2% of the respondents reported that the cost arising from extra work was met by the client. However, the significance of the factor implies that the contingency sum included in the bills of quantities is inadequate, and should be increased. Gichunge (2000) established that extra work was the most frequent factor with the highest cost severity in Kenya. Abwunza (2006) also recommended that contingency sums for large projects be increased from the current 2.5-5% to 14% while those for smaller projects be increased from 10% to 20-21%. The factor has the highest risk impact on construction in Indonesia (Andi, 2006) and is ranked third in its contribution to cost overruns in Nigeria (Aniekwu & Okpala, 1988). Under the typical traditional procurement system, where designs should be completed before construction commences, it is not uncommon for construction to commence before designs are fully completed. Design changes; therefore, tend to predominate during the construction process.

From Table 1 above, this factor ranked second, with 67.6% of the respondents suggesting that the factor was allocated to the client and 32.4% suggesting that had been shared. Andi (2006) ranked specification and drawings deficiencies among the top ten risks in Indonesia based on the risks' level of impact on construction. As Table 1 shows, extended or reduced contract period had the highest mean perception index but was ranked third based on its actual index. Perceived risk significance of the factor explains over 62% of variations in cost risk in building projects in Kenya (Abwunza, 2006). 91.2% of the respondents felt that duration-related cost was shared between the contractor and the client, depending on the extent to which the party contributed to the variation. Delay has been cited as a significant factor contributing to cost overruns in Nigeria (Aniekwu & Okpala, 1988; Dlakwa & Culpin, 1990). Flyvbjerg, *et al,* (2004) also came up with similar findings for a survey of 258 infrastructure projects across 20 nations. The contribution of nominated subcontractors and suppliers was ranked ninth based on actual index. Adjustment of prime cost sums for works undertaken by nominated subcontractors and suppliers would result from inaccurate estimates as provided by service engineers. Quantity surveyors ordinarily rely on sums received from the engineers, yet they have to accept responsibility for the cost estimates. It is therefore not surprising that they perceive the factor as a significant contributor to cost risk. Site access and possession delay is directly related to the client as he determines from the outset where the project is to be located. It may lead to claims for loss and expense from the contractor. Complexities arising from construction method is related to the contractor's past experience and familiarity with technologies appropriate for the project. Changes in laws and regulations are created or enforced by such bodies as local and statutory authorities, all of which are empowered to inspect and approve drawings and work done. The unpredictable organisation behaviour of these authorities complicates the ability of quantity surveyors to understand their potential impact on cost performance. This logical argument also applies to acts of God which ranked among the least significant factors.

Factors whose actual index emerged significant

Under this category are listed nine factors that had significant actual index but their perceived index remained insignificant. These include delays in preparing detailed drawings, delayed payment, late instructions, price fluctuations, financial failure of contracting party, defective materials or work, shortage of main contractor's materials, complexities arising from design buildability and complexities arising from site location or site conditions. Delays in preparing detailed drawings and late instructions generally result in claims against the client as a penalty for his agents' ineptitude. Some instructions arrive after the work against which they are to be implemented is already executed; resulting in demolition of such works at the client's cost. Delay in preparing detailed drawings was ranked fourth while late instructions emerged sixth based on actual index. However, with respect to allocation, 57.6% of the respondents suggested that the effect of late instructions was allocated to the client while 30.3% felt that the cost effect was shared. 48.5% felt that the cost effect of delays in preparing detailed drawings was allocated to the client while 45.5% suggested that it was shared. Delayed payment generally attracts interest at prevailing market rates. The factor explains about 28% of variations in building cost performance in Kenya (Abwunza, 2006) and ranked fifth and sixth respectively based on actual and perceived mean indices. The significance of the factor is attributed to the high interest rates that dominated the country's economy between 1990 and 2003. The period saw the government increase its borrowing from the domestic market following withdrawal of donor funding, pushing up interest rates beyond 25%. The high interest rates made it difficult for clients to access credit for construction finance, resulting into delayed payment. 55.9% and 26.5% of the respondents indicated that the cost effect of the factor was borne by the client and the contractor respectively. The factor is listed among the top ten risk factors impacting on construction in Indonesia (Andi, 2006). Price fluctuations were particularly evident in the mid 1990s and after 2003 respectively during which periods the prices of cement and steel rose sharply, adversely affecting not only fluctuating price contracts but also fixed price contracts as contractors had to negotiate for payment of ex-gratia claims. The significance of the factor points to the difficulties associated with making predictions of price movements of materials, explaining why 65.6% of the respondents indicated that its cost effect was shared while 21.9% and 12.5% indicated that the cost was borne by the client and the contractor respectively. The factor has the highest cost severity in Indonesia (Kaming, *et al,* 1997) and is the leading contributor to cost overruns in Nigeria (Aniekwu & Okpala, 1988; Mansfield, *et al,* 1994). Another factor under this category is financial failure of the contracting party, which ranked eighth overall. Financial failure of a contracting party plays a very crucial role in influencing the ability of the contracting party to perform his contractual obligations. Turbulent economic times experienced in Kenya in the 1990s and early 2000s posed a serious financial threat to contracting parties. This resulted into stalling of many projects due to financial failure, adversely affected not only the public sector as a result of withheld donor fiscal support, but also the private sector due to the high interest rates charged by lending institutions. Depending on the party's contribution to the factor, 76.5% of the respondents indicated that its cost effect was shared. The contractor's supervisory skills play a key role in defects that are likely to be detected in his materials or work done. This factor ranked tenth while shortage of the main contractor's materials ranked eleventh. When the contractor is unable to get the specified material from the market, he is required to notify the architect, who may issue instructions for an alternative material. The alternative may prove to be more expensive or cheaper than the initially specified material, resulting into cost changes. Complexities arising from design buildability was listed among the factors with the least contribution to cost changes. The fact that the factor's actual index is significant implies that designers may be confident about their designs, yet these designs may pose a great challenge to the contractor when he moves to site. The contribution of the contractor to the design process can therefore play a crucial role in reducing the significance of the factor. Predicting the potential impact of complexities arising from site location or site conditions is more complicated as the design team cannot predict the behavioural characteristics of the neighbourhood. However, it ranked among the least significant factors. Walker (1994) observed that the risks associated with the factor including demolition or restoration works, water table/flooding problems, underground services and problems associated with supporting adjacent properties are outside the control of the construction management team.

Factors perceived to be significant

The six factors that were perceived to be significant but had insignificant actual mean indices include permits and approvals, inclement weather, productivity and availability of labour and equipment, complexities relating to project type and delays in interpreting contract documents. Permits and approvals emerged fifth among the factors with significant perception indices. The emerging role of the contractor during the construction phase of the contract manifests itself in the occurrence of the labour and equipment-related factors: availability and productivity. Low productivity of labour and equipment could be due to delayed payment on contract, while non-availability of the same could be as a result of high labour and equipment mobility during periods of high construction activity.The factors ranked among the last three significant factors based on their actual cost effect, with over 82% of the respondents reported that the cost effect of factors was allocated to the contractor as these variables are directly within his control. Finally, his familiarity with the type of work undertaken also significantly influences the contractor's ability to successfully handle the work, explaining the significance of complexities relating to project type. Inclement weather is generally unpredictable, hence the quantity surveyors' significance of the perception of the factor. The factor is best taken care of by extension of time. However, costs associated with this factor do not significantly contribute to changes in cost in Kenya, yet the factor explains about 32.4% of variations in cost overruns in Indonesia (Kaming, *et al,* 1997). Finally, among the factors with the least perception indices, delay in interpreting contract documents generally attracts claims from the contractors as these delays tie his labour and equipment on site.

THE RELATIONSHIP BETWEEN PERCEIVED AND ACTUAL SIGNIFICANCE

Following results displayed in Table 1 above, it was essential to establish whether there exists any significant difference between the perceived and actual significance of the 23 significant factors. Table 2 shows the matched-pairs t-test results for differences between perception and significance mean indices. The results show that there is a significant difference in the mean indices at 1% level of significance for 14 out of the 23 significant factors analysed. These include extra work, design and specification changes, delays in preparing detailed drawings, price fluctuations, nominated subcontractors and suppliers, shortage of main contractor's materials, permits and approvals, inclement or unpredictable weather conditions, complexities relating to project type, delays in interpreting contract documents, Acts of God, changes in laws and regulations, labour and equipment availability and productivity of labour and equipment. The significant difference implies that it is essentially difficult to predict the potential impact of the risk factors on cost performance of building projects.

Inability to predict the potential impact of extra work and design and specification changes rests in the consultants' inability to fully analyse the clients' brief. It is also attributed to inability of the client to fully crystallise his ideas during the tender documentation stage, a factor that is quite difficult to model. Significant differences arising from delays in preparing detailed drawings could be attributed to ineptitude of the design consultants as well as the client's rush to tender, adversely affecting the designers' ability to complete their work. Permits and approvals are attributed to unpredictable legal and institutional environments in which projects are executed in Kenya. Local authorities present formidable

TABLE 2

Matched-pairs t-test results for perception and actual risk indices

Risk perception index and actual risk index of:	t	Sig. (2-tailed)
Extra work	-6.015	**.000***
Design and specification changes	-4.017	**.000***
Delays in preparing detailed drawings	-3.238	**.003***
Late instructions	-2.415	.022
Nominated subcontractors and suppliers	-5.548	**.000***
Price fluctuations	-5.783	**.000***
Delayed payment	-2.673	.012
Permits and approvals	-4.647	**.000***
Shortage of main contractor's materials	-3.603	**.001***
Labour and equipment availability	-5.227	**.000***
Productivity of labour and equipment	-5.314	**.000***
Defective materials or work	-2.884	.007
Extended or reduced contract period	-2.691	.011
Financial failure of contracting party	-1.428	.163
Inclement/ unpredictable weather conditions	-5.125	**.000***
Complexities relating to project type	-3.091	**.004***
Delays in interpreting contract documents	-3.904	**.000***
Complexities arising from design buildability	-1.400	.171
Site access or possession problems	-3.039	.005
Complexities arising from construction method	-2.276	.029
Complexities arising from site location or site conditions	-.376	.709
Acts of God	-3.274	**.003***
Changes in laws and regulations	-3.804	**.001***

*Significant at 1% level of significance

Source: Field Survey, 2006

challenges and can be quite unpredictable in their behaviour on approval and inspection of works. The contributing role of labour and equipment availability and productivity points out that the contractor's role in project execution through management of his manpower and machines can easily compromise the client's cost objective. Any contractor whose past management record remains unclear poses a cost risk to the project, calling for proper screening to ensure that only those contractors who can effectively deliver are allowed to participate in the tendering process. Co-ordination of nominated suppliers and subcontractors is a factor related to the main contractor and his organisational and management skills. Predicting such behaviour can be a daunting task for a consultant dealing with a new contractor. The manner in which the contractor motivates his labourers determines their productivity and availability, especially during periods of high construction activity. Productivity and availability of equipment depends on the contractor's equipment policy with respect to hiring, ownership and maintenance of the equipment. Shortage of the main contractor's materials and inclement weather are external risks, the former largely determined by market fundamentals and stability, and the latter remaining largely unpredictable.

The results in Table 2 shows that while quantity surveyors have the correct perception of the significance of extra work, design and specification changes, nominated subcontractors and suppliers, Acts of God and changes in laws and regulations, they are unable to make more precise predictions of the actual significance of the factors. The t-test statistics reveal that there is a significant difference between the perceived and the actual mean index for these five factors. The quantity surveyors' much lower perceptions of the significance of the factors cannot be relied on in predicting the high frequency and impact of the factors on the contract sum. Three factors initially perceived not to be significant but emerged as significant cost factors were picked by the t-test statistics as having significant differences between their actual mean and perception indices.

These include price fluctuations, shortage of main contractor's materials, and delays in preparing detailed drawings. Significant differences in the mean indices were also observed between six factors initially perceived to be significant but had insignificant actual indices. These include permits and approvals, inclement weather, availability and productivity of labour and equipment, complexities relating to project type and delays in interpreting contract documents.

The former factors suggest that the respondents' view of the factors could be an underestimation of the likely impact of the factor on project cost while the latter set implies sufficient allowances are made in the contract to cater for the potential impact of the factors. The three factors that did not realise significant t-test statistics but were initially perceived as significant include extended or reduced contract period, site access or possession problems and complexities relating to the construction method. This implies that the quantity surveyors' perceptions are closer to the actual significance indices of the factors. They are therefore capable of making more accurate predictions of the frequency and impact of the factors.

CONCLUSIONS

Many building projects experience cost overruns. These overruns are attributable to a variety of factors. The findings presented in this paper point these overruns to differences arising between perceived and actual significance of factors associated with cost risk. Out of thirty factors analysed, seventeen were found to significantly contribute to cost changes, yet only fourteen were perceived to. Differences were observed between factors perceived to be significant and those that actually emerged with significant indices. It is evident from the foregoing discussion that out of all the 23 significant factors, quantity surveyors have the correct perception of only three factors: changes to the contract period, site access and related possession problems and complexities arising from the selected construction method. Six factors initially perceived to be significant but lacking significant results in their actual indices realised significant differences in their means, implying either an overestimation of their likely impact on cost, or more stringent mitigation measures are put in place to cushion against their impact on cost. These findings demonstrate a clear distinction between factors forming the basis upon which quantity surveyors develop their cost management strategy and actual factors as they materialise during project execution. That nine additional factors not initially perceived to be significant materialise as significant in their effect on cost performance is an indicator of the uncertainty within which Kenya's building projects are executed, pointing out the difficulties experienced in forecasting the potential impact of risk factors on cost performance in developing countries. The additional factors imply that building projects are executed in an environment in which they are exposed to more cost risk factors than it is perceived by quantity surveyors. The quantity surveyors' prediction of the impact of the risk factors on cost was reliable for only three out of the seventeen significant factors. That some of the factors with low perception indices generally have higher mean actual risk values could be the contributing explanation for the recurrent cost changes in many building projects undertaken in the country. For such cost changes to be effectively reduced to manageable levels, the consultants' attention is drawn to the fact their efforts should be geared towards controlling the possible effect of all the 17 factors whose actual mean values were found to be significant. It is expected that these findings should help in changing the risk attitude of not only the quantity surveyors but also other consultants, clients and contractors on the significance of the nine factors that are perceived as being of no significant contribution to cost risk.

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