

ASOCSA2010-20

# Causes of project cost overruns within the Ghanaian road construction sector

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## ABSTRACT AND KEYWORDS

### Purpose of the study

The purpose of this paper is to assess the main factors that influence the project cost overruns within the Ghanaian road construction sector and to examine their relative importance.

### Design/methodology/approach

A survey of randomly selected samples via email resulted in 34 responses comprising 4 consultants, 23 clients (private and public) and 7 contractors drawn from Ghana Highway Authority, Department of feeder roads; and the Department of urban roads. The survey included 13 project cost overrun variables. The data was subjected to descriptive statistics analysis and subsequently the total scores were determined which enabled the ranking of the factors and establishing the level of importance.

### Findings

The empirical analysis found the following factors of; delays in monthly payments to contractors; variations; inflation, and schedule slippage as significantly important. Other factors which appeared as not very important but of concern are poor communication; technical complexity / size of projects; force majeure; and dispute. Project management practices such as partnering and value management were not all that popular within the Ghanaian road construction sector. The study also found that risk

management and Total Quality Management (TQM) though popular were not being effectively applied.

### **Research limitations**

The relatively small sample size and usage of cross-sectional data made it difficult to generalise the findings. This study is focussed on public sector (government funded) projects limited to road construction where building was not included.

### **Practical Implications**

The paper provides an understanding of the factors affecting project cost overruns within the road construction sector in Ghana. The assessment of the application of modern day project management tools and techniques and practices would enhance and contribute towards the reduction of project overruns within the construction road sector.

### **Originality / value**

This study provides some insights and deepening the client's, contractors and consultants understanding of the factors causing project cost overruns in developing countries. The uptake of project management practices could contribute to the reduction of project overruns within the Ghanaian road construction sector.

### **Keywords**

**Construction Industry, Ghana, Partnering, TQM, Project cost overruns**

## **1. INTRODUCTION**

The road construction industry in Ghana contributes significantly to the development of the country's economy. Good and safe roads for instance, facilitate timely and smooth evacuation of cocoa which contributes to the country's economic backbone from the growing areas to the marketing centres or depots. The importance of the road sector in Ghana is further highlighted by the observations of Gidisu (2009) who noted that the road transport is significant in Ghana's economy as it is the most widely available form of transport in Ghana; it links all major cities, towns, villages; it also links agricultural production areas with local, regional and national markets, and carries in excess of 97% of all passenger and freight traffic. However, road condition survey data in Ghana over the years suggest that about 40 to 50% of the country's entire roads are in poor condition. Governments have therefore been trying to channel a lot of funds into the road sector with the view to maintaining or improving the state of the roads.

In Ghana, Donor agencies such as Danish International Development Agency (DANIDA) and the British Government have been helping in this regard. Unfortunately, most of these maintenance projects and indeed some development projects are bedevilled with time, quality and cost objectives of the client. This phenomenon is not peculiar to the road sector alone. Indeed the building industry and therefore the entire construction industry in the country are affected by this problem.

The success of every construction project can be defined as meeting the goals and objectives of the client as specified in the project plan. A project is therefore said to be successful when it has accomplished the technical performance and been completed within schedule and budgeted cost. To ensure the success of projects, project management techniques and tools should be effectively utilised. Project management is about managing the resources, workers, money, equipment and machines, materials and methods to ensure projects success. Projects that are not managed effectively experience many cost overruns.

A project has defined phases that are interconnected: the conception or initiation phase, the planning/growth phase, the production/execution stage and the completion and the handover phases. Even though major causes of project cost overruns occur at the construction stage, this paper will not limit itself to this phase alone. Quality and time will also be integrated, as project cost overrun can not effectively be tackled in isolation from quality and time. This paper identifies and examines the causes of project cost overrun in the road construction sector in Ghana. In a preliminary investigation conducted by Berko (2007) in the road construction industry in Ghana for the purpose of this research, it was realised that almost all construction projects from 2003 to 2007 overran their cost. It is therefore necessary and important that research be carried out to help in efficient project management to reduce cost overrun. The rest of the study is structured as follows: Section two reviews the extant literature on factors causing project overruns and delays. Section three presents the methodological approach adopted whereas the presentation of the survey results and data analysis is presented in section four. The discussion of the findings is in section five. The conclusions and implications are drawn in section six.

## 2. LITERATURE REVIEW

Although there is ample literature on project cost overruns within the construction industry, the review of the literature revealed that very few studies have been conducted within the Ghanaian road construction sector. Some example within the African context that have examined the project overruns and delays within the construction industry can be found in Odeyinka and Yusuf, (1997); Frimpong et al. (2003); Berko, (2007); Agyakwa-Baah, (2007); Agyakwa-Baah, (2009); Aje, Odusami and

Ogunsemi, (2009). For example Frimpong, Oluwoye, and Crawford (2003) identified the main causes of delay and cost overruns included the following: monthly payment difficulties from agencies; poor contractor management; material procurement; poor technical performances; and escalation of material prices. The study by Odeyinka and Yusuf, (1997) revealed that seven out of ten projects surveyed in Nigeria suffered delays in their execution. Aje et al. (2009) identified contractors' management capability had significant impact on cost and time of building projects. Lack of appreciation and execution of risk by contractors can lead to project delays as identified by Hassanein and Afify (2007). Dada and Jagboro (2007) surveyed the impact of risk on project cost overruns in the Nigerian construction industry and identified finance and political influence as the main risk factors.

Other studies in sub-Saharan Africa such as one done by Manelele and Muya (2008) also identified the following six categories of critical risks: project initiation; community contribution and participation; budget and finance; skilled labour; materials procurement and technical supervision. Enshassi, Al-Najjar, and Kumaraswamy (2009) within the Gaza strip identified four main causes of time delays as strikes and border closures; material-related factors; lack of materials in markets; and delays in material delivery to the site. Three main causes for cost overruns: price fluctuations of construction materials; contractor delays in materials and equipment delivery; and inflation. Denini (2009) identified 80 delay factors and categorized them into the following 8 major groups of related delay factors: owners, designers, consultants, contractors, materials, manpower, electrical & mechanical (E&M), and external.

Kaming, Olomolaiye, Holt, and Harris, (1997) identified inflation, underestimating and schedule slippage as among the main factors influencing project cost overrun in high rise buildings in Indonesia. Frimpong et al. (2003) ranked the factors according to their relative importance as delays in the monthly progress payment to contractors, poor contract management, material procurement inflation, and acknowledged force majeure as an important factor. Both Merewitz (1973) and Flyvberg, Skamris Holm, and Buhl (2003) attributed cost overruns mainly to schedule slippage whilst Carpenter (1973) concluded that about 2/3 of project cost overrun can be attributed to design errors and omissions. Vijayamohan and Kannan (2001) acknowledged that variations, delays in monthly payment to contractors and lack of project knowledge were the main causes of project cost overrun. Mansfield, Ogwu, and Doran (1994) who researched causes of delay in construction projects in Nigeria mentioned delayed progress payment, poor contract management and shortage of materials. Government interference, poor communication and force majeure which were not among the top factors by their ranking but are very significant also conformed to the existing knowledge on this research topic. Within South Africa, Okumbe and Verster (2008) study who highlighted the causes of delays and their consequences found the following among other

contributory factors as: late preparation of payment certificates, late processing by Project quantity surveyors, claiming problems; consultant's inefficiency and lack of professionalism by the government employees among other factors. Other studies such as Oladapo (2007); Arain and Pheng (2005) also identified variations as having significant effect on cost and time overruns.

### 3. RESEARCH METHODOLOGY

To assess the factors leading to project cost overruns (over budget) within the Ghanaian road construction sector, the specific methodology of this study is based on a literature review, 7 telephone interviews comprising 4 personnel from the Ghana Highway Authority, 2 from the Department of Feeder roads and 1 contractor were also conducted and a questionnaire survey. The following section briefly describes the sample and measurement instrument as employed in the study.

#### 3.1 Sample

In order to satisfy the aims and objectives of the research a total of 51 questionnaires together with covering letters were sent to professionals active in the Ghanaian road construction sector through using an embedded e-mail survey because of its notable benefits (Dommeyer and Moriarty, 2000) and as opined by Jackson and DeCormier (1999), cheap and quick means of communicating with clients and customers. A total of 34 responses were received. This represents a response rate of 66.6%. Boyer et al. (2002) also found electronic surveys are generally comparable to surveys in most respects. The essence of the covering letter was to explain the rationale of the study and also assure the respondents of anonymity. (Denscombe, 2007). Table 3.1 presents the summary of the questionnaire distribution, their responses and respondents demographics.

**Table 3.1** Questionnaire distribution and their responses

<b>Sector of respondents</b>	<b>Questionnaire distribution</b>			<b>Profile of respondents</b>	
	Sent	Returned	% Returned	%	Cumulative percentage
Client	32	23	71.9	67.6	67.6
Consultants	8	4	50.0	11.7	79.3
Contractors	11	7	63.6	20.7	100.0
<b>Total</b>	<b>51</b>	<b>34</b>	<b>66.7</b>	<b>100.00</b>	

The majority (67.64%) of the respondents were practising with the client through Ghana highway authority (12), Departments of feeder roads (6) and urban roads (5).

Table 3.2 presents the demographics of the respondents by designation. The majority (20) of the respondents were professions of with the Quantity surveyors (32.35 percent) comprising the majority of the total respondents. The remainder were (11) 26.47% project engineers with 27% directors and 15% chief executives.

**Table 3.2:** Characteristics of respondents based on designation

<i>Designation</i>	Frequency	Percentage	Cumulative percentage
Chief Executive	5	14.71	14.71
Directors	9	26.47	41.18
Quantity Surveyors	11	32.35	73.53
Project Engineers	9	26.47	<b>100.0</b>
<b>Total</b>	<b>34</b>	<b>100.0</b>	

Relative to the experience in construction work, all the respondents had a substantial amount of experience in the industry ranging from fifteen years to twenty five years and most of them were directly involved in the management of construction projects of average value above £ 1200k. The background of the respondents supports the notion that they were involved with running of projects at both operational and strategic levels, therefore had some knowledge of issues related to project cost overruns. This also enhances the internal data validity (Bing *et al.* 2005).

### 3.2 The instrument

The questionnaire distributed comprised two sections. The first section sought the background information about the respondents. The second part was made up of the 14 factors identified from literature as causing project overruns cost overruns. Respondents were then invited to rate the levels of importance of these factors according to a four-point Likert scale (1 =not important; 2 = important; 3 = very important; and 4 = most important). Total scores were used as a basis for ranking the factors.

## 4. SURVEY RESULTS & DATA ANALYSIS

The primary purpose of this research was descriptive as the study aimed at identifying the main factors that cause project cost overruns. The appropriate data analysis for this type of research was to report descriptive statistics such as the total scores and frequencies which enabled the ranking of these factors. Therefore *Statistical Package for Social Sciences* (SPSS) computer program version 17.0.0 was used to analyses the data generated by the research question. The total score for each factor, representing its relative importance was calculated using the following equation.

Total score =  $\sum (WL)$ .....**Equation 1.0**

Where: W = Frequency of a level of importance of a particular factor

L = Value attached to the level of importance (min =1; max =4)

An illustration of how equation 1.0 was applied can be demonstrated for the client's scoring of the 'underestimating' factors as follows: where 11 respondents said it was important, 10 said it was very important and 2 said it was most important the calculation was done as follows.

Total score for underestimating= (11x2) + (10x3) + (2x4) = 60

A summary of all the 14 factors and their rankings including total scores are shown are in Table 4.1.

The five most important factors agreed by the clients, consultants and contractors as causing project cost overruns were (see Table 4.1) delays in payment, variations, inflation, schedule slippage, and lack of project knowledge. All of the three parties (clients, consultants and contractors) ranked delays (total score = 113) first. Variations to the original scope of work came next with a score of 104. Inflation came out as the third significant factor with a score of 101.

**Table 4.1:** Comparison of total scores and ranking by all the groups

Factor	Full Sample (n=34)		Clients (n=23)		Contractors (n=7)		Consultants (n=4)	
	Total	R	Total	R	Total	R	Total	R
Underestimating	88	5	60	7	17	6	11	2
Delays in monthly payment	113	1	77	1	24	1	12	1
Inflation	101	3	70	4	21	2	10	3
Design errors & omissions	82	6	62	6	13	10	7	6
Disputes	37	13	25	12	7	12	5	6
Low tender price	80	7	51	10	21	2	9	4
Poor communication	76	9	52	9	16	7	8	5
Schedule slippage	96	4	72	3	20	3	11	2
Variations	104	2	74	2	19	4	10	3
Lack of project knowledge	88	5	66	5	13	10	9	4
Labour productivity	75	10	50	11	18	5	7	6
Force majeure	73	11	51	10	14	9	8	5
Technical complexity/size of project	44	12	24	13	15	8	5	7
Government interference	79	8	56	8	12	11	9	4

Note\*: R = Ranking

The following subsection presents a discussion on the total scores and ranking of importance of the factors according to the different groupings.

Schedule slippage, lack of project knowledge, underestimating and design errors followed in that order. It is important to note that even though labour productivity and government interference do not seem to be very

important by the overall ranking (Table 4.1), they feature prominently in the rankings by contractors and consultants. Whilst labour productivity is ranked 10th, contractors and consultants rank it 5th and 6th respectively (Table 4.1).

Government interference is ranked 4th by the consultant. The following factors of low tender price, poor communication, force majeure technical complexity of projects although least ranked by the respondents could still be argued to be very significant. It is interesting to note that force majeure is ranked very low by all the groups. Dispute is the least important factor in the ranking.

#### 4.1 Level of familiarity of project management techniques and practices

In order to ascertain the level of familiarity of project management techniques and practices, respondents were asked to indicate their familiarity with the techniques and practices. The summary of the responses according to the frequencies and rankings are presented in Table 4.2

Risk Management was ranked as the most known management practice with 28 (82.35%) indicating being familiar with the concept while 8.8% were very familiar. On the contrary, Partnering appeared to be the least popular within the Ghanaian road construction sector as evidenced by a majority 31 (91.11%) indicating not being familiar with the concept.

**Table 4.2:** Level of familiarity of Project Management Practice

<b>Project Management Techniques and Practices</b>	<b>Not familiar</b>	<b>Familiar</b>	<b>Very familiar</b>	<b>Total</b>	<b>Rank</b>
Partnering	31	3	-	34	4
Total Quality Management (TQM)	4	22	4	34	2
Risk management	3	28	3	34	1
Value Management	19	11	4	34	3

Value management was next to Partnering in terms of least popularity with nineteen respondents comprising 5 contractors and 14 from the client side not being familiar with the concept. Total Quality Management (TQM) was second relative familiarity among the respondents.

#### 4.2 Usage of information technology in project planning and control

In order to ascertain the importance of information technology in risk assessment activities, and project planning and control, respondents were asked to indicate the frequency of usage. The summary of the responses according to the frequencies and rankings are presented in Table 4.3

**Table 4.3** Use of computers in project planning and control

Proceedings 5<sup>th</sup> Built Environment Conference  
Causes of project cost overruns within the  
Ghanaian road construction sector

18-20 July 2010  
Durban, South Africa  
ISBN: 978-0-620-46703-2

Usage	Clients (n=23)	Consultants (n=4)	Contractors (n=7)	Total	Percentage
Number of Responses					
Never used it	-	-	2	2	5.88
Rarely	-	-	3	3	8.82
Quite often	14	3	2	19	55.88
Very often	9	1	-	10	29.42
<b>Total</b>	<b>23</b>	<b>4</b>	<b>7</b>	<b>34</b>	<b>100.0</b>

It is quite clear that from the results that computer usage is quite popular within the Ghanaian road construction sector with the majority (19) 56% of the respondents quite often using computer and 10 (29%) very often use this tool. Only a minority (2) 5.9% stated that they never used computers. Relative to the sector, it is evident that the utilisation of computers was more prevalent among the clients and consultants than the contractors.

## 5. DISCUSSIONS

### 5. Overview of the Findings

The findings of the research showed that there are quite a number of important factors responsible for project cost overrun in the road construction industry in Ghana. The study established that project cost overruns are caused by factors inherent in technology and its management to those resulting from physical, social and financial environment. The most important factors include delays in monthly payment to contractors, variations, inflation, schedule slippage, underestimating, lack of project knowledge and design errors/omissions. The findings are very much similar to those identified in the literature review. The review of the literature acknowledged schedule slippage, delay in monthly payment to contractors, variations, complexity and size of projects, underestimating, lack of project knowledge and disputes as the most important factors. Dispute for instance is considered almost insignificant in the road construction industry in Ghana as a contributing factor to project cost overrun. The other area worth mentioning is the application of modern day project management tools and techniques and practices in the road construction sector Ghana.

#### 5.1 Discussions on the rankings

##### 5.1.1 Delays of monthly payment to contractors

The first most important factor agreed upon by all the groups as causing project cost overruns was delays in monthly payment to contractors. This finding is consistent with literature in developing economics (Agyakwa-Baah, 2007; Adams, 2008; Okumbe and Vester, 2008; Agyakwa-Baah, Proceedings 5<sup>th</sup> Built Environment Conference 18-20 July 2010 Durban, South Africa Causes of project cost overruns within the Ghanaian road construction sector ISBN: 978-0-620-46703-2

2009; and Denini, 2009). Despite the majority of funds been budgeted for in Ghana either through foreign assistance, or domestically generated funds, there is still regular delay of payment to contractors as a result of bureaucracy in government departments and obvious delays in the release of funds from the donor agencies. Most road contractors in Ghana are not well resourced to fund the projects on their own and therefore abandon the projects during this period of delay. This often results in deterioration of some completed sections which are repaired at additional cost when the contractors resume work.

#### 5.1.2 Variations

The second most important factor identified as contributing to project overruns was that of variations. This finding is also consistent with literature in developing economics as Oladapo (2007) indicated changes in specifications and scope as one of the prevalent sources of variation. The variations results in additional payments to contractors which themselves attract further payment as interest as in most cases, payment for contractors on these additional works are delayed. Arain and Pheng (2005) study also found variations as contributing to increases in project costs and additional payments for contractors

#### 5.1.3 Inflation

The third most important factor identified as contributing to project overruns was that of inflation. This finding is also consistent with literature in developing economics as Agyakwa-Baah (2007; 2009), Frimpong *et al* (2003); Denini, (2009). Cost overrun due to inflation comes about as a result of currency instability. Currently there is stability in the currency, but again the oil hikes still keep project cost overruns very high. Between 2001 and 2007, the cost of fuel in Ghana increased by as much as 280%. Fluctuation in price in one project was about 300% between 2001 and 2007 so one can appreciate the effect of the oil hikes. Frimpong *et al.* (2003) attributes the high inflation to demand exceeding supply.

#### 5.1.4 Schedule slippage

Schedule slippage and its attendant extension of time are synonymous with cost overrun. Schedule slippage in the road sector in Ghana can mainly be attributed to delays in monthly payment to contractors and variations as highlighted above and poor project management on the part of most contractors. Ogunlana *et al* (2002) postulate that in developing countries, many contractors are entrepreneurs whose focus is mainly to make money at the expense of good management. In construction, the cost of materials, equipment and workforce man-hours are directly related. Schedule slippage or delays result in cost escalation because of increases in material cost due to inflation, salaries and other related costs.

#### 5.1.5 Lack of project knowledge/underestimating/design errors and

### *omissions*

Lack of project knowledge, underestimating and errors/omissions are interrelated. Most projects are hurriedly arranged as a result of either political pressure or to utilise funds which need to be spent within a time frame. Project preparation is most often not adequate because the Project Manager and his team have little time to package projects. Consequently designs are associated with errors and omissions which are varied at the construction stage at additional cost. Even where projects have been adequately engineered, the funds may not be readily available. At the time the funds are available, the intervention would have become obsolete. Detailed estimates are often completely absent and in their place are project comparison estimates which are not reliable. Another issue affecting accurate estimating in the industry is the over reliance on "price adjusted factors". These factors are established factors that had been developed from cost indices several years back. Billed rates for each item of construction are therefore adjusted with these factors primarily based on the current or a projected economic situation in the country. However, prices over time in the country get distorted thereby affecting the accuracy of bill estimates. In their desperate move to ensure accuracy in their estimates project administrators allow for "Contingencies" which themselves turn out to be unrealistic.

#### *5.1.6 Low tender price/ Labour productivity*

Low tender price and labour productivity were ranked very high by the contractors. Contractors in Ghana have the culture of submitting low bids. This tendency is due to the fact that contractors see their offer as the most important criterion for the evaluation of tenders. They lack the competence to appreciate the consequence of their actions and will therefore go all lengths to submit the lowest bid. This finding is also consistent with literature in developing countries (Hassanien and Affify, 2007; Berko, 2007). For example, Berko (2007) established that, contractors in Ghana pay very low salaries to their workers which are even delayed sometimes. Their workers are hence de-motivated to perform.

#### *5.1.7 Government interference*

The fourth most significant factor according to the consultants was government interference. This is due to cheaper negotiations by governments on development projects which are mostly handled by consultants on behalf of the clients. Consultants and clients are thus compelled by pressure from the government to throw away realistic figures because a cheaper price has been promised by a contractor. This finding also confirms those of Dada and Jagboro (2007) who identified political influence as one of the main factors contributing to project cost overruns.

#### 5.1.8 *Other Factors.*

Other factors which appeared as not very important but of concern are poor communication, technical complexity and size of projects, force majeure and dispute. Dispute was the least factor according to the ranking. The reason is that, in Ghana, there is the culture of blinding people “litigants” for pursuing their legitimate rights. This culture is also deeply rooted in the construction industry. Contractors for “fear” of being sidelined for future awards prefer not to become involved in any conflict with clients. This finding is also consistent with literature in developing economics as Agyakwa-Baah (2009) opined, contractors also feared being blacklisted when payment was delayed. Some local contractors do not even feel comfortable in putting in claims for interest on late payments.

#### 5.2.8 *Force majeure.*

Force majeure refers to those circumstances beyond the control of either the client or the contractor. This includes war, strike, riot, crime and the act of God such as flooding. War, riot and crime are social issues that can not be said to be on extensive scale in Ghana. Even where they do occur, their effects on construction are insignificant. Strikes in Ghana are mostly common with public sector workers. It is rare with private sector workers and therefore the road construction industry where the actual works are executed by private contractors. Even though rain or flooding may stop construction activities, its effects are not considerable.

#### 5.2.9 *Shortage of materials*

Shortage of construction materials was mentioned in the interview as one of the factors. The main materials for the construction of roads in Ghana are Bitumen, cement, fine aggregate (sand) and coarse aggregate popularly known as chippings. The total cost of road projects are therefore largely determined by the cost of these materials. Unfortunately, the processing industry is not adequate enough to support this extensive road works in the country. The consequence is demand exceeding supply which eventually leads to an increase in the price of chippings. Secondary, some projects experience delays because of this shortage.

#### 5.2.11 *Project Management practices*

The unfamiliarity and ineffective use of modern day project management practices stems from the fact that the industry has a culture of resisting change. Again, the bureaucracy in this sector which is publicly controlled makes it difficult for a change to take effect readily. This finding is also consistent with literature in developing economics (Aje et al, 2009; Agyakwa-Baah, 2009; Hassanien and Afify, 2007) who found lack of familiarity of project management techniques as contributing to delays.

## 6. CONCLUSIONS

This study investigated the main factors that influence the causes of project cost overruns within the Ghanaian road construction sector and sought to examine their relative importance. The study established that completion of road projects in Ghana within client objectives and especially within the budgeted cost has been and continues to be a problem for both the Government and its road agencies. It was established that both the Government and road agencies are regarded as being ineffective and corrupt from the general public and especially the political opponents of the ruling government. The causes of project cost overruns as identified from the review of the literature are not different from those factors pertaining in the road sector in Ghana. The main conclusions from the survey established that all the three groups, clients, contractors and contractors identified delays to monthly payments to contractors as the most important factor influencing project cost overrun. The above issues thus make it almost impossible for road projects in Ghana to be executed within the budgeted cost and time.

Whilst clients and contractors ranked force majeure very low, consultants ranked it very highly. Labour productivity was identified as unimportant by the clients but acknowledged by contractors and consultants as an important factor. The study also found that modern day practices such as Partnering, Risk management and Total Quality Management (TQM) were either not practised in Ghana or effectively not implemented. Furthermore the utilisation of such practices was minimal within the road construction projects.

### 6.1 Contributions and managerial implications

Some limitations of the research need to be acknowledged. The sample size (n=34) is relatively small, comparable to other studies. This means that the findings presented are not generalisable to the wider population of Ghanaian construction industry.

## 7. REFERENCES

- Adams, F.K. (2008) "Risk perception and Bayesian analysis of international construction contract risks: The case of payment delays in a developing economy", *International Journal of Project Management*, Vol 26, pp. 138-148.
- Agyakwa-Baah, A. (2007), "Stakeholders' perception of the causes of delay on construction projects", unpublished B.Sc. Project Dissertation, Kwame Nkrumah Universities of Science and Technology, Kumasi, Ghana.

- Agyakwa-Baah, A. (2009), "A Study into Risk Assessment and Management Practices within Ghanaian Medium and Large Construction Organisations", unpublished M.Sc. Dissertation, Built Environment Division, Sheffield Hallam University, Sheffield, U.K.
- Aje, O.I., Odusami, K.T. and Ogunsemi, D.R. (2009) "The impact of Contractors management capability on cost and time performance of construction projects in Nigeria", *Journal of Financial Management of Property and Construction*, Vol 14, Issue No. 1, pp. 171 – 187.
- Arain, F.M. and Pheng, L.S. (2005) "The potential effects of variation orders on institutional building projects", *Facilities*, Vol 23, No. 11/12, pp. 496-510.
- Berko, P. (2007), "Project cost overrun in the road construction industry in Ghana", unpublished M.Sc. Project Management Dissertation, Sheffield Hallam University, Sheffield, U.K.
- Bing, L., Akintoye, A. Edwards, P. J. and Hardcastle, C. (2005), "The Allocation of Risk in PPP/PFI Construction Projects in the UK", *International Journal of Project Management*, Vol. 23, pp. 25-35.
- Boyer, K.K., Olson, J.R. Calantone, R.J. and Jackson, E.C. (2002), "Print Versus electronic surveys: a comparison of two data collection methodologies", *Journal of Operations Management*, Vol. 20, pp. 357-373.
- Carpenter, J.L. (1973), "An Analysis of a Guaranteed Achievement Program to achieve Specific Educational objectives, or Performance Contracting, Chicago Style". Paper presented at American Educational Research Association Meeting, 25 February – 1<sup>st</sup> March 1973, New Orleans, Louisiana.
- Dada, J.O. and Jagboro, G.O. (2007) "An evaluation of the impact of risk on project cost overrun in the Nigerian construction industry", *Journal of Financial Management of Property and Construction*, Vol. 12, No. 1, pp. 37- 44.
- Denini, F. (2009) "Delays on large construction projects in Libya", In: Abu Bakar (ed.) *Proceedings of the 3<sup>rd</sup> International Conference on Built Environment in Development Countries (Sustainable Built Environment: Tomorrow's Agenda Today)*, 2 – 3<sup>rd</sup> December 2009, Penang, West Malaysia, Vol. 2, pp. 819-835.
- Denscombe, M. (2007) "The Good Research Guide", 3<sup>rd</sup> ed. Mc-Graw Hill, Open University Press.
- Dommeyer, C.J. and Moriarty, E. (2000) "Comparing two forms of an e-mail survey: embedded vs attached", *International Journal of Market Research*, Vol. 42, No. 1, pp. 39-50.

- Enshassi, A., Al-Najjar, J. and Kumaraswamy, M. (2009) "Delays and cost overruns in the construction projects in the Gaza strip", *Journal of Financial Management of Property and Construction*, Vol. 14, No. 2, pp. 126-151.
- Flyvberg, B., Skamris Holm, M.K. and Buhl, S.L. (2003) "How Common and How Large Are Cost Overruns in Transport Infrastructure Projects?" *Transport Reviews*, vol. 23, no. 1, January-March 2003, pp. 71-88
- Frimpong, Y., Oluwoye, J. and Crawford, L. (2003) "Causes of delay and Cost overruns in construction of groundwater projects in developing countries; Ghana as a case study", *International Journal of Project Management*, Vol 21, pp. 321 – 326.
- Gidisu, J. (2009) "Introductory Remarks by Hon. Joe Gidisu, Minister of Roads and Highways", *Transport and Sector Conference on Ghana's Oil and Gas Industry' 15 – 16<sup>th</sup> July 2009*, AICC, Accra, Ghana.
- Hassanein, AMR A.G. and Afify, Halaa M.F. (2007) "Risk management practices of contractors: A case study of power station projects in Egypt", *Journal of Financial Management of Property and Construction*, Vol 12, No. 3, pp. 164 – 179.
- Jackson, A. And DeCormier, R. (1999) "E-mail survey response rates: targeting increases response", *Marketing Intelligence & Planning*, Vol. 17, No. 3, pp. 135- 139.
- Kaming, P.F., Olomolaiye, P.O., Holt, G.D., Harris, F. (1997), "Factors influencing construction time and cost overruns on high-rise projects in Indonesia", *Construction Management and Economics*, Vol. 15 pp.83-94.
- Manelele, I. and Muya, M. (2008) "Risk Identification on community-based construction projects in Zambia", *Journal of Engineering, Design and Technology*, Vol. 6, No. 2, pp. 145 – 161.
- Mansfield, N.R., Ogwu, O.O. and Doran, T. (1994) "Causes of delay and cost overrun in Nigerian construction projects" *International Journal of Project Management*, Vol 12, No. 4, pp. 254-260.
- Merewitz, L. (1973) "*How do Urban Rapid Transit Projects Compare in Cost Estimate Experience?*", Reprint no 104, Berkeley: University of California Berkeley, Institute of Urban and Regional Development.
- Odeyinka, H.A. and Yusuf, A. (1997), "The causes and effects of construction delays on completion cost of housing project in Nigeria", *Financial Management Property Construction*, Vol. 2, pp. 31-44.
- Ogunlana, S.O., Siddiqui, Z., Yisa, S. and Olomolaiye, P. (2002), "Factors and procedures used in matching project managers to construction projects in Bangkok", *International Journal of Project Management*, Vol. 20, No. 5, pp. 385- 400.

- Okumbe, J.O. and Vesper, J.J.P. (2008), "Construction Industry Perspective on Causes and Effects of Delays in South Africa", *In Proceedings of the Construction and Building Research Conference (COBRA)*, 4 – 5 September 2008, Dublin Institute of Technology.
- Oladapo, A.A. (2007), "A quantitative assessment of the cost and time impact of variation orders on construction projects", *Journal of Engineering Design and Technology*, Vol. 5, No. 1, pp. 35 - 48.
- Vijayamohanan, P. and Kannan, K.P. (2001), "Time and Cost Over-runs of the Power Projects in Kerala", Working Paper No. 320