

Factors Affecting Site Supervision in the Ghanaian Construction Industry

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ABSTRACT

Successful delivery of construction of projects within the measurable tenets is driven by effective site supervision. Unfortunately, a consistent finding is that most construction works are not delivered on time and consequently, the construction setting in Ghana is inundated with a plethora of uncompleted projects. The dangerous and hazardous nature of construction activities even makes site supervision more challenging. Consequently, the prime aim of the study is to identify the factors affecting construction site supervision in Ghana. The study adopts a questionnaire survey approach to elicit information from the respondents, and out of the one hundred questionnaires administered seventy-six were retrieved. The data were analyzed using descriptive statistics and presented in tables. The study showed that favourable working conditions; commitment of all project participants; arrangement of site layout; top management support and indecisiveness of project participants were the most important factors affecting supervision of projects. This study is of immense significance to the construction industry since the findings of this study will enable stakeholders to ensure sites are supervised satisfactorily. It is recommended that coordination among project participants should be enhanced to promote better site supervision.

Keywords: Site Supervision, Construction Industry, Construction projects, Site

INTRODUCTION

The activities of the construction industry are fundamental to the attainment of the socio-economic development goals of providing shelter, infrastructure and employment (Anaman and Osei-Amponsah, 2007). In Ghana, the construction industry is helping to achieve socio-economic development goals, providing shelter, infrastructure and employment, and most importantly contributing significantly to the GDP of the country. From 2003 to 2008, the construction industry has consistently provided an average GDP growth of 6.1% to the economy (Danso, 2010).

Site supervision means the general direction, coordination and oversight of the on-site work processes (Mustapha, 1990). Supervision on housing construction sites involves: deciding when particular contractors or phases of the construction process can commence, and when it is necessary to suspend a process; providing the necessary coordination and general instruction for work associated with one process so as not to endanger persons engaged in other processes; upon becoming aware of a dangerous work practice or situation, issuing prompt directions necessary to safeguard site

personnel and/or the general public from harm, and monitoring the general conduct of work for compliance with the builder's and/or contractors' procedures and safe work method statements (Anaman and Osei-Amponsah, 2007).

For supervision to be effective, the supervisor should have clearly delegated authority of the builder to make prompt decisions on behalf of the builder and issue directions on matters that could adversely affect the health or safety of on-site personnel or the general public (Jordan *et al.*, 2004).

Site supervision is necessary to ensure work on site is carried out safely and without risks to health. In the construction industry, it is the site manager who plays the most important supervisory role on construction site (Styhre and Josephson, 2006). Improper construction site supervision has led to problems on site including collapse of trenches, structural collapse and injuries arising from falling objects like tools, debris and equipment. It has become increasingly clear the need for construction site supervisors to understand the requirements that have been established to supervise sites effectively (Danso, 2005). In this vein, this paper examines the causes of poor construction supervision in Ghana.

LITERATURE REVIEW

OVERVIEW OF THE GHANAIAN CONSTRUCTION INDUSTRY

In Ghana, the construction industry is huge and plays a crucial role in the economic development. Between 2000 and 2008, the government of Ghana identified construction as a priority sector for foreign and private investment as part of its vision to promote the private sector as the engine of growth. According to the World Bank (2003) as seen in Anvuur and Kumaraswamy (2006), an approximate annual value of public procurement for goods, works and consultant services amounted to US\$600 million. This represented about 10% of the country's GDP. This amount forms part of the bulk of the expenditure of all government agencies, namely, the Ministries, the assemblies, departments, institutions and other agencies. In 2006, the construction industry represented 8.6% of the national GDP which according to World Bank statistics stood at 10.6 billion USD as of 2005 (The World Bank, 2007). In that same year, the industry was recorded to have contributed 0.7% to GDP growth. According to Ghana Statistical Service (2011), by the end of the first quarter of 2011, the GDP estimated for 2010 was reported to be GH¢ 24,187.30 million. This meant that the GDP had increased by 7.7% over that estimated for 2009 (GH¢ 22,454.5 million).

FACTORS AFFECTING PROJECT SITE SUPERVISION

In the construction industry, unlike the manufacturing industry, projects differ and every project is unique in nature hindering the process of standardization (Ahuja and Thiruvengadam, 2004). Consequently, monitoring and scheduling of projects is also affected (Bohn, 2009; Woodhill, 2000). The success of a project invariably depends on the level of supervision of the project or the managerial skills of the project manager or the site supervisor (Zwikael, 2009). Project supervision somewhat can make or unmake a project. Hence, Project supervisor's competence is a crucial factor affecting site supervision. A good supervisor needs to be able to 'make things happen' when confronted by obstacles. Some people refer to this as having 'problem-solving skills' but it's also about being innovative and thinking 'outside the square' – being creative and seeing solutions others just don't (see Thomas and Zavrski, 1999). Also, Top management support is an important factor in construction site supervision. Managers' skill and attitudes have a crucial bearing on supervision. In many organizations, efficiency of supervision is low even though the latest technology and trained manpower are made available (Bohn, 2009). Poor supervision is because of inefficient and indifferent management. Experienced and committed managers can obtain surprising results from average people. Employees' job performance depends on their ability and willingness to work. Management is the catalyst to create both. Advanced technology requires knowledgeable laborers who, in turn, work productively under professionally qualified managers. It is only through sound management that optimum utilization of human and technical resources can be secured (Sambasivan and Soon, 2007). The factors of poor site supervision are discussed under the following headings as listed below.

Site Coordination among project participants

Coordination among project participants affects supervision. Owing to that NG and Price (2010) conducted an investigation into the causes of poor site coordination. The study identified among other things that supervisors are unable to effectively and efficiently perform their functions because of poor site coordination. Internal and external interactions among project participants are crucial factors in site supervision. Internal interaction deals with the interaction among the project participants on site while external deals with interaction including project participants who are not present on the construction site. To accomplish substantial productivity through effective supervision, every member of a crew requires adequate space to perform tasks without being affected with/by the other crew members (NG and Price, 2010). When more

labourers are allotted to perform particular tasks in a fixed amount of space, it is probable that interference and lack of cooperation may occur, thus decreasing productivity (Thomas and Zavrski, 1999).

Conflict among project participants

Conflict among project participants affects site supervision. Given the expense and disruption caused to a contract or an on-going project and the damage to relationships between participants involved in a project, conflicts are not beneficial to a project (Sambasivan and Soon, 2007). Accordingly, Fugar and Agyakwah-Baah (2010) observed that the conditions of contract incorporated in construction contracts to harmonize and bring sanctity to contractual relationships is not understood and some parties, surprisingly, are not familiar with it.

Ignorance and Lack of Knowledge

Supervisor's ignorance and lack of knowledge also affects site supervision. Common sense has it that lack of sufficient knowledge on the part of a supervisor may lead to inefficient supervision on site. When the contractor or consultant is not well versed in an area on the construction process, decisions may be taken that will lead to wrong works being executed and thereby poor supervision (Thomas and Zavrski, 1999).

Climatic Conditions

Harsh climatic conditions on site affect supervision (Fugar and Agyakwah-Baah, 2010). Weather conditions are significant factors to consider for completion of any construction project. Adverse winter weather, such as winds and rains, reduce productivity, particularly for external works such as formworks, T-shape works, concrete casting, external plastering, external painting, and external tiling. Adverse weather sometimes stops the work totally (Sanders and Thomas, 1991).

Variation Orders

Unfortunately, because construction projects involve complex operations which cannot be accurately determined in advance, variation orders occur (Harthi, 2005). Arguably, variation orders cannot be avoided completely (Mohamed, 2001). However, in as much as changes are inevitable on projects (Hanna et al., 2004; Hanna et al., 2002), unexpected change which occurs throughout the life cycle of the project hinders the success of the project to a significant degree; and changes of this nature affect the three bottom-line framework of project success (Ismail et al., 2012; Senaratne and Sexton, 2009). Variation when occurs on a project affects construction project supervision. Understanding the

driving forces of these changes is of priority if site supervision will achieve the necessary results.

Site Layout

Site layout also affects construction contracts. Site layout can be defined as site space allocation for material storage, working areas, units of accommodation, plant positions, general circulation areas, and also access and egress for deliveries and emergency services (Tommelein et al., 1992 cited from Samdani et al., n.d.). The building site has to be carefully controlled so that the operatives of construction have the right machinery in the most advantageous position. These will ensure an effective supervision and thus enhance efficiency (Samdani et al., n.d.)

Polat and Arditi (2005) identified the following also as other factors affecting construction site supervision: Favorable working conditions, commitment of all project participants, owner's competence, availability of trained resources, regular budget update, indecisiveness of project participants, negative attitude of project participants, hostile socio economic environment, owner's incompetence, faulty project conceptualization, improper tendering process and bad weather condition.

METHODOLOGY

This study employed the quantitative research approach for the collection of primary data. The primary data collection instrument involved the use of structured questionnaire survey administered to D3K3 Contractors of the Ghanaian construction industry to obtain precise information needed for hypothesis testing (Danesh et al., 2012). A total number of one hundred (100) questionnaires were distributed to contractors in Kumasi and Accra through snowballing sampling. Out of the 76 questionnaires retrieved, 66 were considered responsive resulting in a 66% responsive rate. The questionnaire comprised of demographic information and factors that affect site supervision. For the evaluation of the factors that affect site supervision, respondents were asked to score factors, based on their experience, the level of influence of each of the identified factors on a five-point Likert scale where 1= Not very influential 2= Not influential 3= Neutral 4= Influential 5= Very influential.

The data on demographics were analyzed using largely descriptive statistics and was presented in tables and charts. From the contractors' viewpoint, the one-sample T-test was used to test whether mean score of a factor is significantly above the average score of 3.0 at 5% significance level (Ofori *et al.*, 2002).

RESULTS AND DISCUSSION

Demographic

Figure 1 shows the level of experience of the contractors that participated in the survey. Experience is directly related to supervision, thus the higher the level of experience the better informed the respondents in given responses. The experience of the respondents in the context of this study is determined as the number of years of practice and active involvement in supervision in the construction industry. From Figure 1, 9% of the respondents had less than 2 years of experience, 30% had 3-5 years of experience, 35% had 6-10 years of experience, 15% had 11-15 years of experience and 11% had over 15 years of experience. The results show that 61% of the respondents had worked over 5 years and their views were considered significant to the study.

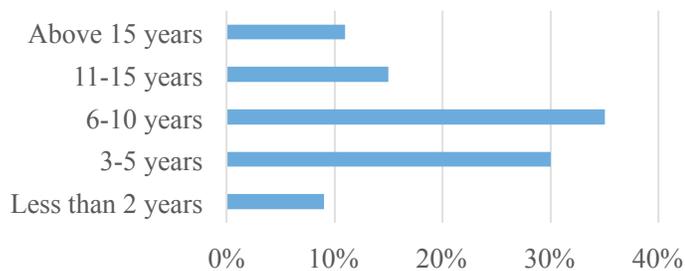


Fig. 1 Respondents' level of experience

The number of projects undertaken or engaged by contractors have greater impacts on their attitudes towards site supervision. The study further sought to ascertain the number of projects undertaken by the contractors and their views are presented in Table 1. The results in Table 1 shows that, 21 of the respondents had undertaken 1-5 projects in the last 5 years, 26 had undertaken 6-10 projects, 11 had undertaken 11-15 projects while 18 had undertaken above 16 projects. The results show that because the respondents had undertaken series of projects, it could be said that they were experienced in the issues of site supervision.

Table 1 The number of projects undertaken by respondents

No. of projects	Frequency	Percent
1-5 projects	21	27.6
6-10 projects	26	34.2
11-15 projects	11	14.5

Above 16 projects	18	23.7
Total	76	100.0

Identified factors affecting construction site supervision

Table 3 summarizes the factors affecting site supervision of projects in Kumasi. For this study, a factor is deemed significant when it has a mean value of 3.0 or more. All the factors considered in the study had mean values above 3.0 and were therefore considered as significant factors that influence construction site supervision. The results further show that ‘unfavourable working conditions’, ‘lack of commitment of all project participants’, ‘Supervisors’ competence’, ‘lack of top management support’ and ‘indecisiveness of project participants’ are the five most significant factors that influence construction site supervision in Ghana. The other factors include ‘negative attitudes of project participants’, ‘conflicts among project participants’, ‘bad weather conditions’ and ‘aggressive competitions during tendering’.

Working conditions relate to both the working environment and remuneration. However, the latter has generated a lot of interest (Fugar and Agyakwah-Baah, 2010; Alaghbari et al., 2007; Frimpong and Oluwoye, 2003; Assaf et al., 1995). For instance, Fugar and Agyakwah-Baah (2010) identified financial problems as a major cause of delay of construction activities. Prior to that, other studies have established that financial difficulties which influence working conditions of site impact on the delivery of projects. Studies by Alaghbari et al. (2007), Frimpong and Oluwoye (2003) and Assaf et al. (1995) confirmed the above assertion. Notwithstanding, the small relative studies in the area of the working environment have been found to impact on site supervision. The need for a healthy environment is imperative to sustainable development (Forastieri, n.d.). Poor working environment and often very unsatisfactory provision of welfare facilities all impact on the quality of life of workers and thus supervision (Forastieri, n.d.). It was therefore not surprising that this study identified favourable working conditions as a major factor influencing site supervision (refer to table 3).

Coordination among project team and the level of commitment are imperative for any project to be successful. Coordination and commitment are expected to improve performance in a number of ways. Timely communication can generate quick response minimizing delays. Typically, the study identified that the lack of commitment among project participants affects site supervision.

Site Layout refers to the arrangement of the site facilities, the tools and supporting utilities for optimum product flow (Samdani et al., n.d.). Thus poor arrangement of the site can obstruct workflow, hinder proper supervision, increase multiple handling and ultimately reduce productivity that results in project delays and failure (ibid). Surprisingly, site planning is often neglected and the attitude of engineers has been that it will correct itself as the work progresses (Samdani et al., n.d.). Strategic arrangement of facilities, including workers' accommodation, materials all have influence on site supervision (Hegazy and Elbeltagi, 1999) and in effect affect construction site supervision. Consequently, respondents were cognizant of these facts and ranked this factor as significant on workers supervision.

The level of authority exerted by site supervisors depends on the level of support of the top management. Site supervisors are able to discharge their duties efficiently and effectively if they are aware and cognizant of the fact that they have management support. More so, management is unlikely to interfere and hence terminate abruptly the duties of the site supervisor or disarm the supervisor to enable him adequately perform his functions.

Table 3 Descriptive statistics of factors affecting site supervision

	Mean	Std. Dev.	Ranking
<i>Unfavorable working conditions</i>	4.35	0.74	1 st
<i>Lack of commitment of all project participants</i>	3.91	0.84	2 nd
<i>Supervisors' competence</i>	3.84	0.92	3 rd
<i>Lack of top management support</i>	3.78	0.80	4 th
<i>Indecisiveness of project participants</i>	3.71	0.89	5 th
<i>Improper monitoring and feedback systems</i>	3.70	0.93	6 th
<i>Coordination among project participants</i>	3.70	0.92	7 th
<i>Negative attitude of project participants</i>	3.68	0.92	8 th
<i>Conflicts among project participants</i>	3.66	1.05	9 th
<i>Bad weather condition</i>	3.61	0.99	10 th
<i>Aggressive competition during tendering</i>	3.59	1.09	11 th
<i>Improper site layout</i>	3.45	0.89	12 th
<i>Improper tendering process</i>	3.30	0.98	13 th

Most often, construction projects bring together participants from diverse professional background involving Quantity Surveyors, Architects, and Engineers (Dada, 2013). Because of their diverse background, their point of contact may either be adversarial or harmony. However, often at times it tends to be adversarial resulting in conflicts ranging from design issues through to cash-flow issues. Dada (2013) studied conflicts among project participants and identified that such conflicts degenerate into unpleasant situations such as claims, lawsuit and project abandonment. This conflict has the tendency of impeding the successful supervision of construction works.

Since construction activities are carried out in the open area exposed to elements of weather, a lot of studies have been conducted to assess the influence of weather conditions on construction activities. Key amongst such studies include Subramani and Kavitha (2014), and Fugar and Agyakwah-Baah (2010). Both authors identified that there is a causal relationship between inclement weather and labour productivity and the relationship was found to be inverse. Generally, inclement weather conditions cannot be controlled by man. The findings largely agrees with Fugar and Agyakwah-Baah that identified bad weather condition as not significant to work progress and thus supervision of works.

Project supervisor's competence is a crucial factor affecting site supervision. A good supervisor needs is able to 'make things happen' when confronted by obstacles. Some people refer to this as having 'problem-solving skills' but it's also about being innovative and thinking 'outside the square'—being creative and seeing solutions others just don't see (Thomas *et al.*, 1999).

CONCLUSION

As aforementioned, the successful delivery of projects within cost, time and quality is hinged on proper supervision of works. Thus, this makes project supervision imperative to construction activities. However, several factors militate against the successful supervision of construction works. This study has identified key factors that influence site supervision in the Ghanaian Construction Industry. The challenge to construction contractors and clients is to identify ways to reduce the occurrence of such factors on projects. In that vein, the following recommendations are made:

- Working conditions of workers, especially the labourers and artisans must be improved to ensure that they adhere to site supervisor's instructions.
- Orderly arrangement of site resources influences supervision and coordination of activities. Hence, site must be well laid out to avoid multiple handling, to permit adequate resource and works flow.
- After project authorization, the site supervisor should be announced and authority conferred on him to supervise the project.

REFERENCES

- Alaghbari, W., Kadir, M.R.A., Salim, A., and Ernawati (2007). 'The significant factors causing delay of building construction projects in Malaysia.' *Engineering, Construction and Architectural Management*, **14** (2), 192-206
- Anaman K. A. and Osei-Amponsah C. (2007). Analysis of causality links between the growth of the construction industry and growth of the macro-economy in Ghana, *Construction Management & Economics*, Vol.25, pp. 951-961
- Anvuur, A., Kumaraswamy, M. (2006). Taking Forward Public Procurement Reforms in Ghana, CIB W107 Construction in Developing Economies International Symposium □ Construction in Developing Economies: New Issues and Challenges, January 18th - 20th; 2006 - Santiago, Chile.
- Assaf, S.A., Alkhail, M., and Al-Hazmi M. (1995). 'Causes of delay in large building construction projects.' *Journal of Management in Engineering*, ASCE, **11** (2), 45-40
- Bohn, S. J. (2009), "Benefits and Barriers of construction project monitoring using Hi-Resolution automated cameras" Unpublished thesis (MSc), Georgia Institute of Technology
- Danso, F. O. (2005). Improving Safety On Building Construction Site On KNUST Campus In Kumasi Ghana, Unpublished Thesis (BSc), Faculty Of Architecture And Building Technology, KNUST, Kumasi, Ghana
- Fitzgerald, B. and Howcroft, D. (1998). Towards dissolution of the IS research debates: from polarisation to polarity, *Journal of Information Technology*, vol. 13(4), pp. 313-326.
- Frimpong, Y. and Oluwoye, J. (2003). 'Significant factors causing delay and cost overruns in construction of groundwater projects in Ghana.' *Journal of Construction Research*, **1** (2), 175-87
- Ghana Statistical Service. (2011). National Account Statistics: Revised Gross Domestic Product.

- Hanna, A.S., Camlic, R., Peterson, P.A. and Lee, M. (2004), "Cumulative Effect of Project Changes for Electrical and Mechanical Construction", *Journal of Construction Engineering and Management*, Vol. 130, No. 6, pp.762-771
- Jordan, G., Surrridge, M., Mahoney, D., Thomas, S. and Jones, B (2004). *Mucky, Macho World?* University of Wolverhampton. Available at: http://asp2.wlv.ac.uk/webteam/international/cidt/cidt_WIC.pdf accessed 08/10/13.
- Mintzberg, H. (1979). *Structure in fives: Designing effective organizations*. Upper Saddle River, NJ: Prentice Hall.
- Mohamed, A.A. (2001). *Analysis and Management of Change Orders for combined Sewer over flow construction projects*, Dissertation, Wayne State University.
- Mustapha, F.H., (1990). *Who are the effective Site Managers and what skills do they bring to their work?* Unpublished Thesis (PhD), University of Bath, Bath.
- Naoum, S, G (2002). *Dissertation research and writing for construction students*, Butterworth Heinemann.
- Neuman, W. L. (2003). *Social research methods: Qualitative and quantitative approaches* (5th ed.) Boston: Allyn and Bacon.
- Polat, G., and Arditi, P. (2005). *The JIT Management System in developing countries*, *Construction Management and Economics*, Vol. 23, No. 7, pp. 697-712.
- Sambasivan, M. and Soon, Y.W. (2007). *Causes and effects of delays in Malaysian construction industry*, *International Journal of Project Management*, Vol. 25, No. 5, pp. 517-552.
- Samdani, S. A., Bhakal, L. and Singh, A. K. (n.d.). *Site Layout of Temporary Construction Facilities using Ant Colony Optimization*,
- Sanders, S. R. and Thomas, H. R. (1991). *Factors affecting masonry productivity.*" *Journal of Construction Engineering Management*, Vol. 117, No. 4, pp. 626-644.
- Senaratne, S. and Sexton, M.G. (2009), " Role of knowledge in managing construction project change", *Journal of Engineering, Construction and Architectural Management*, Vol. 16 No. 2 pp 186-7
- Thomas, H.R. and Zavrski, I. (1999), "Construction baseline productivity: theory and practices", *Journal of Construction Engineering and Management*, Vol. 125 No. 5, pp. 295-303.
- Tommelein, I. D., Levitt, R. E., and Rayes-Roth, B. (1992). *Site layout modeling: how can artificial intelligence help?* *Journal of Construction Engineering and Management*, Vol. 118, No. 3, pp. 595-611.
- Weston WW, Brown JB, Stewart MA (1989). *Patient-centred interviewing part I: understanding patients' experiences*. Can Fam Physician. Macdonald and Evans Ltd.

- Woodhill, J. (2000), Planning, Monitoring and Evaluating Programmes and Projects. The World Conservation Union (IUCN). pp. 1-4
- World Bank. (2007). World Development Report Report, Washington, DC: Ghana Country Department, The World Bank.
- Zwikael, O. (2009), "Critical planning processes in construction processes", Journal of Construction Innovation, Vol. 9 No.4 pp 372-375