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Effective Construction Site Management Practices in Swaziland

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Abstract

The construction site is seen as a key area where money is made or lost due to various activities. This calls for careful initiative and proper planning to improve their performances. The study investigated site management practices in Swaziland for effective project implementation. Data was collected through a structured questionnaire, aimed at 120 project managers, construction managers, consultants, and contractors in the Swaziland construction industry. Statistical Package for the Social Sciences (SPSS) version 22 through Varimax rotation was used for the data analysis. Findings show that the Government of Swaziland and the Construction Industry Council should introduce new construction procedures to minimize the repetition of problems and challenges encountered on construction sites in Swaziland.

Keywords: Management practices; Client; Contractors; Construction sites; Sub-contractors; Swaziland

Introduction

Construction can be seen as the conversion of raw resource inputs into defined functioning output; utilizing a managed process (Obiegbu, 2012). An increasing number of constructions organizations are applying project improvement initiatives to improve their performance (Mohammed and Anumba (2006). Site management involves a mixture of activities, which turn basic resources into a finished product (Mohammed & Anumba, 2006). It is a fundamental need for any construction industry to have an appropriate management system on site. Mohamed & Anumba (2006) posited that the site management team should have required timings and calculations for wages, plant, materials received every week; valuations, sub-contract details monthly, and correspondence and general information as necessary. The study investigated site management practices in Swaziland fro effective project implementation.

Health and Safety, and Materials Management

Materials management is an important function to improve productivity in construction projects. Kasim (2011) defines materials management as a function responsible for planning and controlling materials flow. Effective health and safety management is founded on the provision of a safe and healthy working environment with safe systems of work at its core. The key to success is to ensure that health and safety aspects are carefully considered and the risk of danger and hazard to persons, as a result of site activities, is systematically safeguarded.

Mohamed & Anumba (2006) argued that health and safety management on the construction site should include safety policy; COSHH and CDM regulations, insurance, building regulations, British Standards, and Codes of Practice. Griffith & Watson (2004) indicated that typical approaches to the achievement of the health and safety management implementation should include forms that are completed by supervisors and operatives as elements of the health and safety plan implementation. Mohamed & Anumba (2006) and Griffith & Watson (2004) indicated that several management approaches such as material management, total quality management, Just-in-time, business process re-engineering, and concurrent engineering have been implemented to improve construction site management practices. Griffith and Watson (2004) posited that successful organizations are those that have drastically changed or reengineered their business processes.

Swaziland Construction Industry

Swaziland's construction industry is very small as compared to that of South Africa (Mvubu &Thwala, 2009). The Swaziland Council is responsible for the regulation of the construction industry by giving priority to Swazi firms and Swazi companies through policy implementation, the establishment of ethical standards, practices, and procedures, and setting and promoting safety standards. The Council has the mandate for disciplinary control over the conduct of any person engaged in the construction sector (Swaziland Construction Industry Council, 2013). Swaziland's Ministry of Roads, Building, and Transportation is the major contributor to the local construction industry and implements all projects on behalf of all the ministries when it comes to capital projects (Mvubu and Thwala 2012). The construction companies' development, especially the small-medium-sized firms' programme, falls under the Ministry of Public Works and Roads (MPWT) (Mvubu & Thwala, 2012). Swaziland's Government maintains the regulatory role to ensure safety and quality of service throughout the industry and to monitor progress in achieving the vision and mission of the construction industry. This will mean a more focused and skilled national Government that can control, monitor, and regulate the relationships between service providers and implementing agencies (Thwala & Mvubu, 2009).

Methodology

This research adopted a quantitative approach which comprised of a questionnaire (Neuman & Robson (2009); Neuman, 2006). The target population for the study was consultants and construction companies registered with the Ministry of Public Works situated in Swaziland. An initial survey was conducted at random to select the construction companies. One hundred and twenty (120) questionnaires were distributed randomly to construction companies. The number of questionnaires administered falls within the accepted number required for analysis under Statistical Package for the Social Sciences (SPSS) (Pallant, 2010). The questionnaire was comprised of five sections. The first section was based on demographic data of the company. Section two consists of questions relating to factors affecting site management practices. Section three comprised of questions relating to the relationship among the construction teams. Section four consisted of existing site management programmes used at the construction sites in Swaziland. Section five was comprised of questions relating to the improvement of site management practices in Swaziland. A total of 87 were returned and only one questionnaire was incomplete, thus making a total of 86 which were analyzed, therefore the sample size used was 86. The study also used the mean item score (MIS) to present the findings for the Likert scale questions. Statistical Package for the Social Sciences (SPSS) Version 22 using Varimax rotation. The use of Exploratory factor analysis (EFA) was to confirm the reliability and validity of the factors affecting site management practices in Swaziland. The maximum likelihood with an eigenvalue over one, together with Varimax rotation was used as the analysis method (Pallant 2010). The adopted cut-off-alpha for this study was 0.70 and measures below 0.70 were eliminated (Pallant, 2010).

Findings

Descriptive analysis

This section discusses the profile of the respondents. Out of the 86 respondents, majority (79%) were males and 21% were females with first degrees and few of the respondents were Ordinary-Level certificate holders. Most (58%) of the respondents worked in the private sector with civil and building construction background. Majority (67%) of the respondents worked as site agents and few of

the respondents worked in other capacities. Only one (1) respondent did not indicate the working title. Majority (70%) of the respondents said site management practices was very effective.

Figure 1 shows that 35% of the respondents worked for a company with employee capacity ranging from 51-200. This is followed by 30% with employee capacity ranging from 6 – 20. The least was 1% with employee capacity greater than 200.

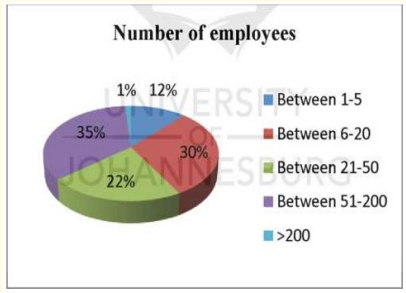

Figure 1: Number of employees.

Table 1 shows that most (36%) of the respondents were employed by building contractors. This is followed by Civil contractors and consultants respectively. Few of the respondents were Electrical contractors.

	Frequency	***Percent (%)***
Architect	4	5%
Quantity surveyor	7	8%
Building contractor	31	36%
Civil contractor	20	23%
Consultants	17	20%
Mechanical	0	0%
Electrical	2	2%
A Jf* * Missing	5	6%

Table 1: Company registration.

Figure 2 showed that 51.3% of the respondents used Microsoft Excel and 17.4% of the respondents used the critical path. Only 13.9% of the respondents used Materials Control. These results showed that there was a great need to educate Swazis construction companies about other management programs used for managing the construction sites.

Table 2 shows the ranking of the factors according to the mean item score (MIS) from the highest to the lowest. It was noted most of the respondents agreed that the client factors affected site management practices negatively. The factors on which they agreed most were "Lack of leadership skills" which was ranked 1st with MIS of 3.547. This is followed by "Dispute between owner and project parties" with MIS of 3.488. "Less information coordination between client and project team" was ranked 3rd with MIS of 3.442. The "Number of non-compliance to regulation" was ranked as the least factor among the eleven (11) factors with MIS of 3.036.

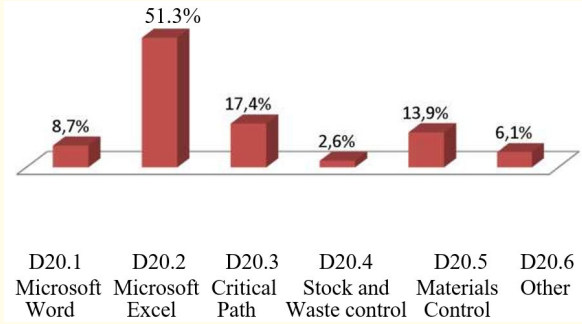

Figure 2: Type of programmes used.

Client Factors	*MIS*	*Ranking*
Less information co-ordination between client and project team	3.442	3
Less speed and unreliability of service from client	3.424	4
Making use of inexperienced consultants by the client	3.407	5
Making use of unqualified consultants by the client	3.400	6
Dispute management between client and professionals	3.384	7
Too many projects	3.329	8
High cost of compliance to regulators requirements	3.143	9
Low quality and unavailability of regulator documentation	3.105	10
Number of non- compliances to regulation	3.036	11
Lack of leadership skills	3.547	1
Disputes between owner and project parties	3.488	2

Table 2: Client factors.

Table 3 shows the factors are ranked according to the mean item score (MIS) from the highest to the lowest. The factors which they agreed on most were "Conflicting details on drawings", "Lack of details on sections of drawings" and "Delay of instructions or information" with 3.600, 3.565 and 3.558 MIS respectively. The factors of least agreement were "Inaccurate measurement by the quantity surveyor", "Notification of construction work" and "Testing of soil not carried out especially in high rise buildings" with 3.279, 3.221, and 3.186 MIS respectively.

Table 4, the factors are ranked according to the mean item score (MIS) from the highest to the lowest. The factors which they agreed on most were "Making use of inexperienced supervisors", "Non-compliance with the specification" and "Wrong selection of materials" with 3.894 and 3.744 both MIS respectively. The factors with the least agreement were "Lack of site supervision", "Wrong curing procedures" and "Stripping formwork too early" with 3.477, 3.453, and 3.312 MIS respectively.

In Table 5, the factors are ranked according to the mean item score (MIS) from the highest to the lowest. The factors which they agreed on most were "Lack of communication between the main contractor and sub-contractor" and "Lack of communication within the contractors' organization" with 3.565 and 3.541 MIS respectively. The factors of least agreement were "Strikes due to late payments by the client to contractor" and "Lack of communication between clients' representatives and the contractor" with 3.353 and 3.349 MIS respectively.

Consultant Factors	*MIS*	*Ranking*
Conflicting details on drawings	3.600	1
Lack of details on sections of drawings	3.565	2
Delay of instructions or information	3.558	3
Inadequate or wrong drawings provided by the architects	3.477	4
Lack of site inspection	3.453	5
Non-implementation of corrective actions during the construction process	3.417	6
No approvals of inspection authority	3.314	7
Offences and penalties	3.291	8
Inaccurate measurement by the quantity surveyor	3.279	9
Notification of construction work	3.221	10
Testing of soil not carried out especially in high rise buildings	3.186	11

Table 3: Consultant factors.

Contractor Factor	*MIS*	*Ranking*
Making use of inexperienced supervisors	3.894	1
Non-compliance with specification	3.744	2
Wrong selection of materials	3.744	3
Late delivery of materials	3.706	4
Insufficient material	3.686	5
Lack of proper equipment	3.671	6
Unqualified labour force	3.651	7
Inability to read and understand/interpret drawings	3.640	8
Inadequate motivation of the labour _ force	3.581	9
Poor working conditions	3.581	10
Few storage _ facilities	3.518	11
Employing of unqualified supervisors	3.506	12
Making use of defective or damaged ^ formwork	3.500	13
Lack of site supervision	3.477	14
Wrong curing procedures	3.453	15
Stripping_ formwork too early	3.312	16

Table 4: Contractor factors.

Management/Administration on problems	*MIS*	*Ranking*
Management/Administration on problems	MIS	Ranking
Lack of communication between the main contractor and subcontractor	3.565	1
Lack of communication within the contractors' organisation	3.541	2
The contractual conflict between the consultants and the contractor	3.453	3
Failure of payment from the client	3.435	4
Strikes due to late payments by the client to the contractor	3.353	5
Lack of communication between client's representatives and the contractor	3.349	6

Table 5: Management or administration problems.

Improvement of site management practices

In Table 8.6, the factors are ranked according to the mean item score (MIS) from the highest to the lowest. The factors which they agreed on most were "Have complete and suitable design at the right time", "Use suitable construction methods to suit specific projects" and "Proper project implementation and management" with 4.291,4.235 and 4.212 MIS respectively. The factors with the least agreement were "Efficient management- worker relations", "Use new construction equipment" and "Allocation of adequate duration" with 4.012, 3.847 and 3.430 MIS respectively.

Factors	***MIS***	***Ranking***
Have a complete and suitable design at the right time	4.291	1
Use suitable construction methods to suit a specific project.	4.235	2
Proper project implementation and management	4.212	3
Use suitable scheduling	4.209	4
Speedy decision-making process	4.186	5
Frequent coordination between the construction team	4.174	6
Adherence to construction drawings and specifications	4.128	7
Minimize dispute between all parties	4.128	8
Ensure good material procurement	4.128	9
Ensure up-to-date technology utilization	4.116	10
Effective project planning	4.081	11
Timely supply of material	4.081	12
Clear communication among parties involved	4.058	13
Clear information	4.047	14
Use of appropriate construction methods	4.028	15
Efficient management - worker relations	4.012	16
Use new construction equipment	3.847	17
Allocation of adequate project duration	3.430	18

Table 6: Improvement of site management practices.

The Kaiser-Meyer-Oklin

The Kaiser-Meyer-Oklin value was 0.856, exceeding the recommended value of 0.7 and Bartlett's test of sphericity reach a statistical significance of 0.00, (less than 0.05) thus supporting the factorability of the correlation matrix. Principal components analysis revealed the presence of two components with eigenvalues exceeding 1, explaining 56.5% and 13.1% of the variance respectively. To help in the interpretation of these components, varimax rotation was performed.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.856
Bartlett's Test of Sphericity	Approx. Chi-Square	646.755
	df	55
	Sig.	0.000

Table 7: KMO and Bartlett's test for client factors.

The Kaiser-Meyer-Oklin value was 0.912, exceeding the recommended value of 0.7 and Bartlett's test of sphericity reached a statistical significance of 0.00, (less than 0.05) thus supporting the factorability of the correlation matrix. Principal components analysis revealed the presence of two components with eigenvalues exceeding 1, explaining 68.5% and 7.1% of the variance respectively. To help in the interpretation of these components, varimax rotation was performed.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.912
Bartlett's Test of Sphericity	Approx. Chi-Square	1494.034
	df	120
	Sig.	0.000

Table 8.14: KMO and Bartlett's test.

Management/Administration problems

The Kaiser-Meyer-Oklin value was 0.740, exceeding the recommended value of 0.7 and Bartlett's test of sphericity reached a statistical significance of 0.00, (less than 0.05) thus supporting the factorability of the correlation matrix. Principal components analysis revealed the presence of one component with an eigenvalue exceeding 1, explaining 60.3% of the variance.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.912
Bartlett's Test of Sphericity	Approx. Chi-Square	272.139
	df	15
	Sig.	0.000

Table 8.16: KMO and Bartlett's test.

Improvement of site management practices

The Kaiser-Meyer-Oklin value was 0.801, exceeding the recommended value of 0.7 and Bartlett's test of sphericity reached a statistical significance of 0.00, (less than 0.05) thus supporting the factorability of the correlation matrix. Principal components analysis revealed the presence of five components with eigenvalues exceeding 1, explaining 43.3%, 11.4%, 10.9%, 6.3% and 5.7% of the variance respectively. To help in the interpretation of these components, varimax rotation was run using the rotated factor matrix.

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.801
Bartlett's Test of Sphericity	Approx. Chi-Square	1102.858
	df	153
	Sig.	0.000

Table 8.19: KMO and Bartlett's test.

Summary of findings

Most of the respondents were males, with bachelors degree certificate and had worked in private sectors with civil and building construction background. Few of the respondents had worked in a firm with an employee capacity ranging from 51-200. The use of management software program (Microsoft Excel) in managing the construction sites was common among the firms. Most of the respondents had indicated that lack of leadership skills, dispute between owner and project parties, and less coordination of information between client and project team were the factors that affect site management practices. Consultant factors that affect site management practices were found to be conflicting details on drawings, lack of details on sections of drawings and delay of instructions or information. Contractor factors that affect site management practices were found to be making use of inexperienced supervisors,

non-compliance with the specification and wrong selection of materials. Management or administration problems that affect management practices were found to be lack of communication between the main contractor and sub-contractor and lack of communication within the contractors' organization. Most of the respondents agreed that improvement of site management practices require the use of suitable construction methods to suit specific projects and proper project implementation and management.

Conclusion and recommendations

The study investigated site management practices in Swaziland for effective project implementation. Microsoft Excel software was common among the construction sites. There was lack of leadership skills and coordination among the construction firms which had resulted into disputes between owners and project parties. Consultants had problems with details on drawings with some sections and delay in issuing of instructions. Lack of experienced supervisors, non-compliance with the specification and wrong selection of materials had been the major problems to the contractors.

Improper communication between the main contractor and sub-contractors within the contractors' organization had fuelled the management/administration problems on construction sites. Microsoft Excel software should be encouraged for use in all construction sites. Leadership skills must be part of requirement for employment and contractors should be encouraged to strengthen the coordination among themselves to prevent dispute between owners and project parties. Competent personnel or an architect should be employed by the contractor to supervise projects and advised to comply with the specifications. There should be proper communication between the main contractor and sub-contractors to prevent management/administration problems on sites.

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