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BENCHMARKING PERFORMANCE MEASUREMENT SYSTEMS IN BOTSWANA'S CONSTRUCTION SECTOR

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ABSTRACT

The performance of Botswana's construction industry has been steadily declining in recent years. Furthermore, the industry has been docked with many projects that are not delivered on time, go over budget, sub-standard quality or are just abandoned. The frequency of occurrence of such projects has been alarming and has raised the question of whether there is a comprehensive system in place to monitor and control these projects. Some of the adverse effects of these delays and misappropriations are; costs escalating above budgeted values and quality of the deliverables shifting from the standard and agreed specification. Performance Measurement Systems (PMS) can be used to determine progress towards achieving certain goals and milestones in the life cycle of a project. These PMS are not new to the construction industry as they have been adopted in the industry for some time now. Therefore, the advantages of employing or implementing such systems are well documented but a lot of troubles apparently solvable by PMS are still encountered within Botswana's construction industry.

A research survey was conducted on construction companies in Botswana with the purpose of finding out the extent of adoption of performance/progress measurement systems in Botswana's construction industry and the barriers to their implementation in the industry. From the research it was found that most companies have not adopted PMS due to lack of understanding on the methods.

Keywords: Botswana construction industry, construction projects, performance measurement systems, key performance indicators.

1. INTRODUCTION

The construction industry is vital for the development of any nation. According to Takim and Akintoye (2002) in many ways, the pace of the economic growth of any

nation can be measured by the development of physical infrastructures, such as buildings, roads, bridges, etc. Due to the economic significance of the construction industry, the performance of construction companies and projects are extremely important in Botswana. Botswana's construction industry comprises of small, medium and large contractors including international companies. The majority of construction companies, owned by Botswanan citizens' fall into the small and medium-size categories. The government of Botswana is the major client; therefore, government projects take precedence over all types of major construction activities (Swarnadhipathi and Boyd 2007). The growth of the construction industry is always linked to the government's investment in infrastructure and buildings mainly related to the mining industry. Thus, proving once again how influential the government is in the development of construction. (Kaboyakgosi and Sengwaketse 2003).

According to Palalani (2000), the construction industry is besieged with a number of challenges including sub-standard quality, information scarcity, inappropriate contracts, poor planning and lack of vision by the entire industry. The Botswana Confederation of Commerce, Industry and Manpower (BOCCIM) Study Report of 2008 revealed that the problem reported by Palalani (2000) was more severe than thought. Among the projects sampled by the study for investigation, 13% had been abandoned and were retendered for completion. When considering those which were completed without retendering, only 35% and 15% had been completed within cost and time, respectively *(implying 65% and 85% of the projects had cost and time overruns, respectively)*. When the two attributes were combined, only 8% of the total non-retendered projects were delivered within both time and cost. Thus implying that, 92% of the projects had experienced at least a cost overrun, time overrun or both (Ssegawa, et al. 2010). The study indicated one of the major reasons hampering project delivery in the construction industry was "inefficient and inappropriate decisions and actions taken relating to the planning and implementation of the project"

Adeyemi and Masalila (2016) investigated delay factors of construction projects and found that the five most important causes of construction delays by ranking as perceived by clients were: (1) Contractor's improper planning; (2) contractor's site management: (3) inadequate contractor experience: (4) labor supply problems and (5) subcontractor problems. The five most important causes of construction delays by ranking as perceived by consultants were: (1) contractor's improper planning: (2) contractor's site management; (3) shortage in material: (4) inadequate contractor experience, and (5) inadequate client's finance and payments of completed work. The five most important causes of construction delays by ranking as perceived by contractor were: (1) contractor's poor site management: (2) inadequate client's finance and payments of completed work: (3) subcontractors; (4) inadequate contractor experience, and (5) equipment availability and failures.

According to Deng et al (2012) the major problem indicated above can be tackled by use of PMS in construction industry. This view is shared by Wegelius-Lehtonen (2001) who postulated that the need for PMS is imminent in the construction firms since construction firms have many simultaneous construction projects, from which the relevant performance information is needed. There are also tens of material groups and subcontractors, whose performance should be monitored

together with construction firms' practices. In addition to monitoring, performance measures can also be used as a basis for progressive improvement of company productivity.

As a process, performance measurement is not simply concerned with collecting data associated with a predefined performance goal or standard. Performance measurement is better thought of as an overall management system involving prevention and detection aimed at achieving conformance of the work product or service to your customer's requirements. Additionally, it is concerned with process optimization through increased efficiency and effectiveness of the process or product. These actions occur in a continuous cycle, allowing options for expansion and improvement of the work process or product as better techniques are discovered and implemented. In the manufacturing and construction industries, performance measurement is used as a systematic way of judging project performance by evaluating the inputs, outputs and the final project outcomes. (TRADE 1995)

The aim of this study is therefore to benchmark the adoption and implementation of PMS in Botswana‘s construction industry. This work is necessary since it will allow the identification of PMS adoption and implementation barriers. Hence understanding the challenges in the adoption and implementation of PMS will assist in the formulation of appropriate strategies to effectively implement performance measures. Thus this should help the country move a step closer to reviving the construction industry.

2. LITERATURE REVIEW

2.1 Botswana Construction Industry

In Botswana, the industry has been at the forefront of national infrastructure building from scratch after independence (Magang, 2000). Its contribution to the economy has been immense in terms of housing, employment, support for manufacturing industries and GDP. In the last decade, for example, the average contribution to GDP by the sector has been on average about 6.6% while its absorption of labour has averaged 9% on an annual basis. The employment and GDP contribution trend is depicted in Figure 1.

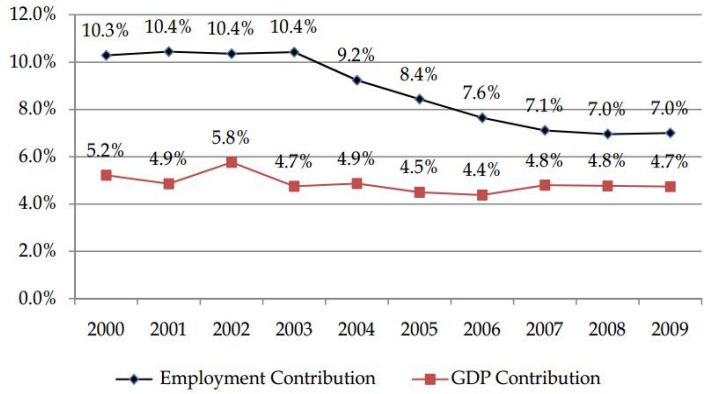

Figure 1: Contribution of Botswana’s construction industry to employment and GDP. Source (CSO 2009)

Over the past decades some researchers studying the construction industry in Botswana, have been progressively indicating that the industry is challenged by a number of aspects which need fixing. A BOCCIM study report of 2008 identified one the causes of poor performance of the industry was how the industry is organised. The study found that the industry is hardly organised and well-coordinated. It lacks leadership and a vision to take it forward and contribute more meaningfully to socio-economic development. It is punctuated by many voluntary organisations which, lack legal backing to register and regulate members or would-be members. Figure 2 attempts to illustrate the current picture of the industry, dividing it into three components namely, suppliers, clients and the business environment.

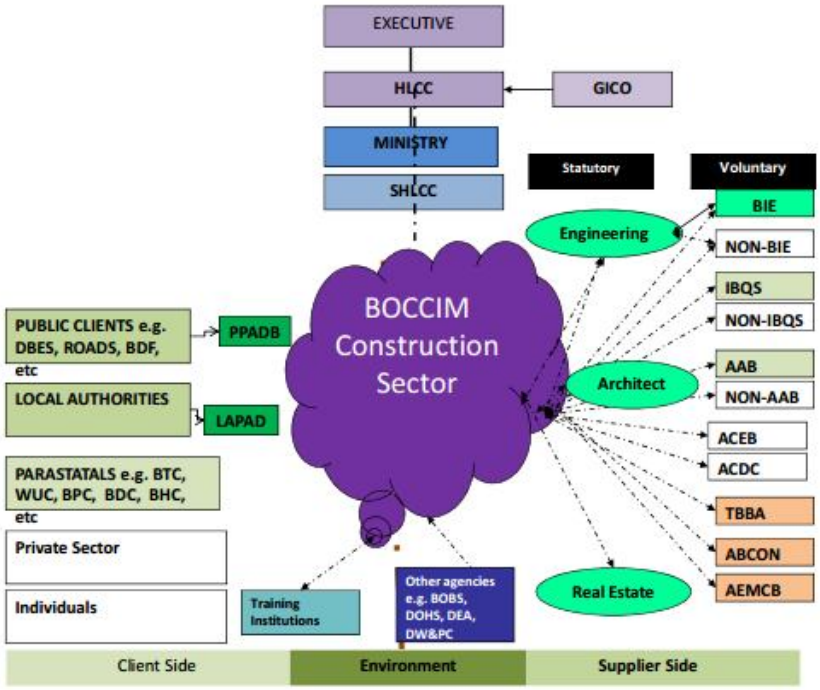

Figure 2: Diagrammatic representation of the Construction Industry in Botswana. Source (Ssegawa, et al. 2010)

The diagram in Figure 2 shows a grouping of clients on the left ranging from the central and local government, parastatals, private sector to individuals. The public and local authorities' asset procurement and disposal entities are also prominently indicated. Most notably is the PPADB which has the mandate of procurement and disposal of assets and registering contractors.

On the right hand side of the Figure 2 are supplier groupings made of associations, which are mainly voluntary in nature in regard to membership. They range from professional to trade associations of contractors, material and plant supplier. New legal entities are beginning to appear on the horizon in form of regulatory councils or boards especially for the professions in the construction industry, for example, engineers, quantity surveyors and architects (and affiliated professions like the Botswana Institute of real Estate).

In the middle of Figure 2 is BOCCIM Construction Sector (a division of BOCCIM which is an amalgamation of private sector service providers). It is important to note that BOCCIM Construction Sector membership is private and voluntary. It is also led by a group of volunteers from various facets of the construction industry. Theoretically, BOCCIM Construction Sector attracts other interested parties or stakeholders of the industry, for example, training institutions.

2.2 Performance Measurement Systems (PMS)

Performance measurement systems entail the regular collecting and reporting of information about the inputs, efficiency and effectiveness of process or projects. PMS can be used to judge project performance, both in terms of the financial and non-financial aspects and to compare and contrast the performance with others, in order to improve programme efficiency and effectiveness. Moreover, according to Steven et al (1992), measurements are needed to track, forecast, and ultimately control those variables that are important to the success of a project, and this has been agreed by many researchers and practitioners such as Love and Holt (2000) and Chan, (2001).

The ability to measure the performance of operations can be seen as an important prerequisite for improvement, and companies have increased the capabilities of their PMS over the last years (Fawcett and Cooper 1998). Some of the most common performance measurement tools are described by Simmons (2000) are as follows:

- Key performance indicators (KPI) are the navigation instruments that companies use to understand whether they are on track or veering off the prosperous path. They serve to reduce the complex nature of organizational performance to a small number of key indicators in order to make performance more understandable and digestible.
- Enterprise risk management (ERM) represents a set of tools and approaches to identify, assess and manage corporate risks. While risk management started its life very much as an internal control back-room function, today it has moved up onto the boardroom agendas of most businesses
- Performance appraisals is a tool to assess job performance of individuals in a company. If performance appraisals are done right they can very well facilitate meaningful communication, ensure individual goals are aligned with the objectives of the business, motivate and engage employees.
- Balanced scorecard (BSC) is another popular measurement tool that has been designed to articulate the strategic objectives of a business and then align performance measures and action plans to these strategic objectives to ensure the strategy gets executed.
- Benchmarking is traditionally seen as comparing your own performance with external best-practice performance or competitors (where best practice performance can come from outside the sector or industry a company operates in).

The use of simple and well-designed PMS is essential for supporting the implementation of business strategies. PMS provides the information required for process control and makes it possible to tackle challenging goals (Formoso and and

Lantelme 2000). Without the use of appropriate PMS, it becomes difficult for organizations to understand why poor performance continues, or how improvement could be achieved. (Leong and and Tilley 2008)

2.3 PMS in the Construction Industry)

In There has been a lot of research on performance measurement in general. In the last couple years, a number of studies have reported implementing performance measurement. However, very few studies were reported on PMS in the construction industry. (Nudurupati et al. 2007)

According to Beatham et al.(2004) there are three specific types of measures, which can be used in the construction industry which are, KPIs, KPOs (key performance outcomes) and perception measures. KPIs are measures that indicate the performance of processes. They are used as leading indicators, which gives opportunity to change and to take appropriate corrective action before the situation gets out of control. KPOs are the results of a completed action or process. They do not offer an opportunity to change the outcome as they are lagging indicators. They are used to measure the results of processes and sub-processes, whose results cannot be altered. Perception measures can be either leading or lagging indicators, they are usually measured on the perception (feedback) of people on the performance.

According to Robinson et al (2005), construction organisations have shown interest in PMS. It is therefore argued that the evaluation of performance in the construction is more oriented towards the project level (Love and Holt, 2000), and mainly focuses on the “tangibles” or “hard” factors while neglecting the “intangibles” or “soft” factors (Love and Holt, 2000). Further, the utilisation of the three traditional performance indicators; time, cost, and quality have been identified as the common approach of measurement. Table 1 shows common performance indicators as identified by different authors utilised in the construction sector.

Table 1 Summary of available previous studies on performance indicators used at project level.

No.	Author and year	Performance indicators
1	Pillai et al. (2002)	Benefit, Cost effectiveness, Risk, Customer commitment, Project status, Stakeholders, Decision effectiveness, Project management, Production
2	Cheung et al. (2004)	People, Safety, Cost, Client satisfaction, Time, Communication, Quality, Environment
3	Wong (2004)	Staff experience, Contractor experience, Resources, Time, Site

		management, Cost, Safety, Quality
4	Constructing Excellence (2005, 2006, 2009) and Roberts and Latorre (2009)	Client Satisfaction, Profitability, Defects, Productivity, Predictability cost time, Safety, Construction cost time, Social indicators, Variance cost time, Environment, Contractor satisfaction
5	Rankin et al. (2008) and Canadian Construction Innovation Council (CCIC) (2007)	Cost, Scope, Time, Innovation, Quality, Sustainability, Safety, Client Satisfaction
6	Luu et al. (2008)	Construction cost, Team performance, Construction time, Change management, Customer satisfaction, Material management, Quality management, Safety
7	Skibniewski and Ghosh (2009)	Construction cost, Defects, Construction time, Client satisfaction product, Predictability cost and time
8	Toor and Ogunlana (2010)	On time, Safety, Under budget, Defects, Specifications, Stakeholders, Efficiently, Disputes, Effectiveness
9	Construction Industry Institute (CII) (2011)	Cost, Accident, Schedule, Rework, Changes, Productivity

Adopted from Al-Sulaihi et al (2012).

A study by Nudurupati et al (2007) has shown that by introducing small changes in the construction industry through a structured PMS with appropriate management information systems, there can be significant improvements that successfully address all stakeholder requirements, which focus on critical improvement areas as well as bringing cultural changes.

3. RESEARCH METHODOLOGY

The methodology adopted in this research study consisted of a survey of PMS

adaptation and utilization within Botswana construction industries.

The survey questionnaire developed, asked a series of questions regarding the awareness of PMS, extent of use of PMS, barriers to PMS adoption, problems/challenges encountered in PMS use, and benefits achieved as a result of PMS adoption. The questionnaire formulated was sent to construction companies registered with Public Procurement and Asset Disposal Board (PPADB) as contractors engaged in building works.

Construction companies in Botswana need to register with PPADB which is under the Ministry of Finance and Development Planning, to operate in Botswana except for large scale international companies. The PPADB has six categories of contractors, where categorization is based upon the maximum value of a single project that a particular company can handle. PPADB takes into consideration several factors such as available resources (plant, vehicles, funds, etc.), the number of trained professionals involved in the business, previous projects undertaken (locally and/or internationally) and references of good standing in the industry, when determining the category. Citizen-owned companies belong to the lower classes up to Class 'D' with a very few at Class 'E'. Questionnaires were distributed via e-forms by email to 146 construction companies (in different categories) selected randomly in different parts of Botswana.

In order to ascertain PMS adoption barriers, respondents were provided with a sample of possible areas of performance measures that can be undertaken in the construction industry and then asked to identify, from that list, the barriers hindering them from implementing measurement. The provided areas included: construction cost, construction time, cost predictability (design and construction), time predictability (design and construction), defects, client satisfaction with the product and client satisfaction with the service; and three company performance indicators namely; safety, profitability and productivity.

4. FINDINGS AND DISCUSSION

In The survey instrument was designed in way to anticipate a response time of two weeks. A total of 80 completed surveys were returned for a response rate of about 54 %. With respect to population class, the survey response percentages are within a few percentage points of target population.

Table 2 shows the number of employees at the companies that responded to the questionnaire

Table 2: percentage of respondents

Number of employees	Percentage
Less than 25	75
Between 25 and 100	21.25
Between 100 and 500	3.75
More than 500	0

Of the companies which responded, 75% are small sized companies, 21.25% are medium sized companies and 3.75% are considered to be large companies based on number of employees. Size of the respondent companies is further echoed in table 3 which shows the PPADB categorization of the companies.

Table 3: PPADB category and percentage of respondents

Category	Percentage
OC	62.5
A	12.5
B	8.75
C	6.25
D	6.25
E	3.75
TOTAL	100

Most small sized companies are found at the OC category. As already mentioned, categorization is based upon the maximum value of a single project that a particular company can handle as determined by PPADB. OC and A category are considered to be small sized companies, B and C categories are considered to be medium sized while those at D and E represent large scale companies.

From the research it was found out that 65% of the respondent companies know of PMS in one form or another. This is a surprising finding given the increasing number of failed projects in Botswana over recent years. Since most are familiar with PMS the question now becomes whether they are implemented or not. 35% of respondents do not know of PMS, however this does not imply that the companies have not implemented or used one of the PMS tools under different names and formats. Of the 65% that know about PMS only 38.5% have actually adopted PMS. The most commonly adopted tools include Key Performance Indicators, Benchmarking and Balanced Score Card.

The respondents further indicated some the benefits they have enjoyed since adopting PMS. These are depicted in table 4 below.

Table 4: Benefits of PMS as indicated by respondents

Benefit	Percentage
Reduced operational costs	84.6
On time delivery of project stages	76.9
Reduced rework	59.6
Better control of stages	75

The companies that know about PMS but have not adopted them attributed it to the various reasons depicted in table 5.

Table 5: Respondents barriers of adoption of PMS

Barrier	Percentage
We lack staff with sufficient knowledge of these practices	50
Top management does not support this type of change	31.25
Lack of emphasis on the tools and PMS specific budget	18.75

Table 5 shows the PMS adoption barriers identified by the research participants. The majority of participants identified lack of staff with sufficient knowledge on PMS as the main barrier to adoption. This indicates that while companies may be aware of the benefits of implementing PMS, they are unable to adopt them due to lack of people with practical knowledge on how to implement the tools. The next major barrier to PMS adoption was identified as lack of support from top management, 31.25% of the research participants identified this as a barrier. This further indicates a lack of knowledge on PMS as such methodologies that are well documented to bring about significant cost reductions and provide better control of projects cannot garner support from decision makers.

From the results of the questionnaires it can be concluded that use of PMS in Botswana's construction industry is very much at its infancy. Without its adoption projects will continue to experience delays with significant time and cost overruns. It's been suggested by Adeyemi and Masalila (2016) that the main project delaying factors in the eyes of the client, consultants and contractor relate to poor planning and management. These can be directly alleviated by PMS.

Performance measurement has played an important role in other sectors companies, providing essential information for planning and control of management processes. They also allow the monitoring and control of the objectives and strategic goals (Sink and Tuttle, 1993; Neely et al. 1995). The most prominent and readily applicable PMS to Botswana is KPI and Benchmarking.

Benchmarking can help increase the sector's performance because it allows the continued improvement of the organizations and their processes, by comparing and evaluating their performance relative to best practices in the sector. In fact, benchmarking has been a very useful practice, not only in the pursuit of superior performance but also in identifying the organizations problems. (Pinheiro 2011)

KPIs can show how much progress is being made toward important project goals. They can be used in the recognition of problems, which identification occurs when a particular indicator shows a deviation from an established pattern. (Sink and Tuttle, 1993). Processes can only be controlled from the moment the company is able to

define their performance standards. KPIs contain information that can also be used not only to evaluate, but also to learn. Indeed, learning is more than evaluation. The objective of evaluation is to determine what is working and what isn't. The objective of learning is to determine why (Behn, 2003)

Benchmarking and Key Performance Indicators (KPIs), can represent a substantial help for professionals in the construction sector, giving them the ability to provide products and services with the best relation quality/benefit, which will be recognized by its customers, and simultaneously allowing them a more efficient monitoring of construction projects, contract management and performance evaluation of the entities involved. Thus, companies need to look at benchmarking and KPIs as a mean of making them viable and profitable, something that in the future will bring, first, a sustainable competitive advantage compared with other companies in its market and, on the other hand, the possibility of attracting new customers and create more value for themselves and for their stakeholders. (Pinheiro 2011)

5. CONCLUSION AND RECOMMENDATION

In PMSs have been identified as one of the most effective productivity improvement tools of the 21st century. Many other construction companies have implemented PMS and achieved advantageous results. Botswana's construction industry is plagued with its non-performance, constant cost overruns and late delivery of projects to name just a few, and yet the industry is slow to adopt PMS. The aim of this research was to investigate adoption barriers preventing Botswana constructor companies from adopting PMS as well as to investigate implementation challenges hindering the successful implementation.

Results of the research show that most construction companies in Botswana know about PMS but have not adopted them citing the lack of knowledgeable staff on the tools and lack of management support to implement PMS. Most of the respondent companies are categorized as SMEs category, this indicates that due to the size of the organizations, the companies may not have enough resources to develop personnel adept in PMS and can be tasked with developing expertise in this area.

Based on the analysis and conclusions of this research paper, a number of recommendations are summarized below:

- Botswana construction industry needs to put a considerable effort in understanding PMS. Construction Industry Trust Fund can help or offer training on such systems and tools to decision makers at construction companies.
- Companies should learn how to benchmark. Benchmarking is the simplest performance measurement tool to use. Taking note of companies that have successfully implemented PMSs and adapting lessons learnt to their own can make significant improvement. Companies can also invest in staff to learn on such methodologies.
- Construction companies should include PMS plan in their strategic planning. This will ensure that resources are set aside for PMS adoption, implementation and continuous improvement.

- Government assistance in training scarce in such a sector should be a priority. As previously mentioned most companies are SMEs, thus resources for staff development could be lacking. This is where a government which wants its construction sector to prosper should step in to assist. However this should not be limited to the construction sector only. There should be a statutory agencies supporting mainly SMEs to grow. Growth including development of staff and support in implementation of cost reducing initiatives.
- PPADP, the department tasked with registering construction companies could play a bigger role in the sector by not only registering companies but by applying more stringent checks on company owners and staff that they are well qualified to carry out construction projects.
- A more stringent evaluation process is required after projects are delivered late to find the consequences which often manifest as cost overruns, loss of profit, increased overheads, stress, acrimony among stakeholders, corporate contractor failure, litigation, loss of job opportunities and resources tied up in delayed projects.

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