ESTABLISHING A SUSTAINABLE CONSTRUCTION INDUSTRY IN LESOTHO: A REVIEW OF BARRIERS INHIBITING ITS ABILITY TO CONTRIBUTE TO ECONOMIC GROWTH

BY

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DEDICATION

This work is dedicated to all groups of people and individuals who are passionate about sustainable development. Through Lean thinking we can save our world for future generations.

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To Almighty God be all the glory and honour.

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DECLARATION

“I declare that the field study hereby submitted for the Magister in Business Administration at the UFS Business School, University of the Free State, is my own independent work and that I have not previously submitted this work, either as a whole or in part, for a qualification at another university or at another faculty at this university.

I also hereby cede copyright of this work to the University of the Free State.”

_____

Signed: Tsepiso Mofolo

Date: 25 November 2016

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CHAPTER 1: Research Proposal

1.1. Introduction

Without substantive research, the complementary relationship between economic growth and construction industry development remain a myth in Lesotho. The construction industry is globally regarded as one of the four leading sectors to economic growth (Babatunde & Low, 2013). The economic impact study report by the Lesotho Highlands Water Project (LHWP) revealed that the virtue of the magnitude of capital expenditure that was involved in the construction of the Katse and Mohale dams proved to have a significant impact on both the macroeconomic and microeconomic growth of the country (Lesotho Government, 2016). Governments should, therefore, recognise the development of construction enterprises as a key role player in achieving sustainable economic growth (Rahman, et al., 2010).

1.2. Overview of Lesotho's economy

The magnitude of the Lesotho Highlands Water Project (LHWP) phase II is expected to result in a boom in infrastructure development (Tente, 2014). The logic then suggests and predicts a complementary boom in the country's economy. However, this apparent fact may be farfetched due to chronic challenges facing construction industries in developing countries. These challenges often emanate from a total lack of regulation and absence of good practice in public and private sectors (Aynur, Serdar, & Nihan, 2012). The absence of these essential tools might have a detrimental impact on the economy of any country.

The economic setbacks of the 2008 global crisis are still prevalent in some developing countries (Ametepeya, Aigbavboab, & Ansah, 2015). Lesotho's current economic growth rate, for instance, is not sufficient to resuscitate the economy from the 2008 economic depression (Lesotho Government, 2016). This is despite the isolated economic affluence seen in 2010, 2011 and 2012, when the country managed to achieve a real Gross Domestic Product (GDP) growth rate of 6% (Wade Publications CC, 2015). In 2013 and 2014, the country maintained a robust economic growth at approximately 4.3% per annum, but began to decline significantly in 2015 owing to weakening construction and manufacturing sectors (IMF, 2016).

Lesotho's GDP is largely dependent on the revenue that the country receives from the Southern African Customs Union (SACU) (Lesotho Government, 2016). The country is now facing a threatening fiscal outlook due to an ongoing decline in SACU revenue that is expected to fall to as low as 16.4% of GDP in 2016. Previously, SACU revenue accounted for 29.2% and 23% of GDP in 2014 and 2015 respectively and in the 48-50% range prior to 2013 (Khaketla, 2016). Consequently, the country's economic growth took a concurrent decline from 5.7% in 2013 to 4.3% in 2014 (Wade Publications CC, 2015). The growth rate remained subdued at 2.6% in 2015 and is expected to decline substantially in 2016. This is, furthermore, exacerbated by the drought crisis and the current major political instability which threaten business and prospective foreign investment (Lesotho Government, 2016).The government wage bill ballooned to one of the highest in the world at 22% of GDP, which then increased public spending from 45% of GDP in financial year 2004/2005 to about 59% in 2015/16 (IMF, 2016). The current account deficit of the balance of payments is expected to widen in 2016/17 owing to lower SACU revenues (CBL, 2016) and fiscal consolidation is key in order to achieve macroeconomic stability and higher growth in the medium-to-long term, notwithstanding the small negative impacts on GDP in the short term (IMF, 2016).

Previous studies revealed an unemployment rate of 24% in 2008, a poverty rate of 57.1% in 2010/11 and high inequality with a Gini coefficient of 0.54 (IMF, 2016). These conditions are expected to remain pervasive due to non-inclusive growth. It is therefore paramount for the country to innovatively establish new growth engines, a more streamlined role for the state, and a dynamic private sector to seize opportunities in the Southern African market (World Bank, 2016). Small, Micro- and Medium-sized Enterprises (SMMEs) present potential opportunities that could result in a facelift to the economy (Khaketla, 2016). In unpacking the business opportunities surrounding the LHWP project, Tente (2014) revealed available gaps in different sectors of the economy such as banking, insurance, consultancy, construction and trade services. The World Bank financed the National Strategic Development Plan (NSDP) for 2012 to 2017. This study intends to provide directions in terms of policies and programmes that promote sustainable development and economic growth by establishing a robust and competitive private sector as well as enhancing local skills (Wade Publications CC, 2015).

1.3. Overview of Lesotho's construction industry

The construction industry is the leading industry in Lesotho's economy with a total of 9 946 companies, accounting for 40% of the total 24 865 companies registered with the Ministry of Trade and Industry (One-Stop Business Facilitation Centre, 2015). According to Alkalbani, et al. (2013) the construction industry has very low barriers to entry. The Lesotho construction industry is characterised by an utter lack of regulation, standards and procedures. A recently completed study by the World Bank, named "The Integrated Transport Project" (ITP), placed great emphasis on the need for the establishment of a Local Construction Industry Development (LCID) (Wade Publications CC, 2015). The LCID shall assist in establishing a conducive environment in terms of policy and strategy formulation for the development of a sustainable local construction industry.

The Lesotho construction industry is characterised by a huge influx of foreign companies (contractors and suppliers) freely entering and dominating the local markets, leveraging from uncompetitive conduct practices that are perceived as harmful to local construction enterprises. The construction industry being as broad in terms of variable services required, these dominant foreign companies have narrowed the market by vertically integrating complementary services in abuse of their power and dominance.

Moreover, foreign companies are often perceived to provide high-quality and low-cost services. However, the morals of these international firms have since been eroded. This is attested to by recent publications in local newspapers where they are alleged to have participated in corporate scandals; compromising or giving rise to poor quality, sub-standard products.

While it is important to create a conducive environment for foreign companies and investors in Lesotho, it is equally crucial to level the playing field by securing meaningful participation by local companies. The objective should be to import expertise while encouraging and implementing technological skills transfer, and not to eradicate the already existing knowledge and businesses.

1.4. Problem statement

Lesotho is a small, developing country entirely landlocked by the Republic of South Africa. It has a population of approximately two million people, of which 80% reside in the remote areas; that is, mostly inaccessible mountainous parts of the country (Wade Publications CC, 2015).

The key drivers of the country's economy are mainly domestic taxes and the declining SACU revenue (Khaketla, 2016). Dependency on tax and SACU revenue is detrimental to the country's economy as these are highly volatile and non-dependable sources for budget financing. It is evident that Lesotho is in dire need of alternative revenue streams. The development of Lesotho's private sector is seen as the cornerstone for sustainable revenue generation (Khaketla, 2016). The large number of companies in construction (40% of total registered companies with the Ministry of Trade) indicates the industry as being the most active sector of the economy. Government initiatives targeted at stimulating economic activity seem to be more inclined towards infrastructural development. The purported positive relationship between construction development and economic growth then becomes critically important.

Chr.Mavridis and Vatalis (2015, p.387) quoted a renowned economist by the name Keynes who wrote, *"The business cycle is determined by the interaction between income and the size of investment"* and a construction economist named Ofori who said "*construction industry in developing countries failed to play its expected role of providing the basis for socio-economic development, and securing improvements in the living conditions of the citizen".*

The problem is that the government of Lesotho still remains dependent on the highly volatile SACU revenue as a major source of budget financing despite its efforts to stimulate the economy through capital expenditure on construction projects. The problem shall persist unless barriers inhibiting efficiency of the construction industry are addressed.

1.5. Research questions

This study hopes to address the following key questions:

- What are the barriers to the establishment of a sustainable construction industry in Lesotho?
- Which barriers are more significant in inhibiting the establishment of a sustainable construction industry in Lesotho?
- How does Lesotho's construction industry perform relative to eight other comparable construction industries?

1.6. Objectives

In an attempt to address the above-stated research questions, the objectives of the research are:

- To identify barriers that inhibit the establishment of a sustainable construction industry in Lesotho;
- To assess the relative/proportionate significance of the identified barriers in inhibiting the establishment of a sustainable construction industry in Lesotho; and
- To compare how Lesotho's construction industry performs relative to construction industries in eight other comparable countries.

1.7. Research design

Research design is the flowchart that maps the manner in which data is collected, measured, and analysed in answering the research questions of the study (Sekaran & Bougie, 2014).

The study reviewed literature on the development of the construction industry and how it can support and translate into economic growth. Furthermore, common challenges and success factors facing the construction industries were identified and discussed.

1.8. Data collection method

A quantitative research design was used to evaluate which of the identified factors are applicable to Lesotho's construction industry. This unrestricted probability sampling

strategy consisted of multiple questions critical in evaluating the significance and relevance of the identified factors to the Lesotho construction industry and assist in further confirming the existence of issues unique to Lesotho's construction industry.

Lesotho has a small economy, which results in only a few active construction industry role players. A questionnaire survey was convenient as most companies have centralised their offices or operations in Maseru, which is the capital city. The representative sample consisted of contractors registered with the Lesotho Roads Directorate.

1.9. Ethical Considerations

Ethical conduct was embodied in the entire research process (Sekaran & Bougie, 2013). Consequently, permission was sought from the respondents prior to issuing out questionnaires. Informed consent was thus obtained and participation was voluntary with no harm to the respondents. Moreover, the study adhered to confidentiality by protecting the identity of the respondents and through anonymity in completing questionnaires and requiring no mention of names. Lastly, a cover letter from the University accompanied the questionnaires clearly specifying that responses would be used solely for the purposes of the study.

1.10. Sampling design

Lesotho's construction industry has a total population of approximately 9 450 registered companies (Lesotho Ministry of Trade and Industry, 2016). However, not all of these construction companies are active. The study focused only on construction companies that are actively registered and categorised with the Ministry of Public Works and Transport through the Roads Directorate of Lesotho. There were approximately 95 registered companies in March 2016 (Roads Directorate Lesotho, 2014). According to Krejcie and Morgan's table, a sample size of 76 will be adequate (Sekaran & Bougie, 2014).

1.11. Data analysis

The self-administered questionnaires were physically distributed and collected. The simple regression analysis method was used.

1.12. Layout of the study

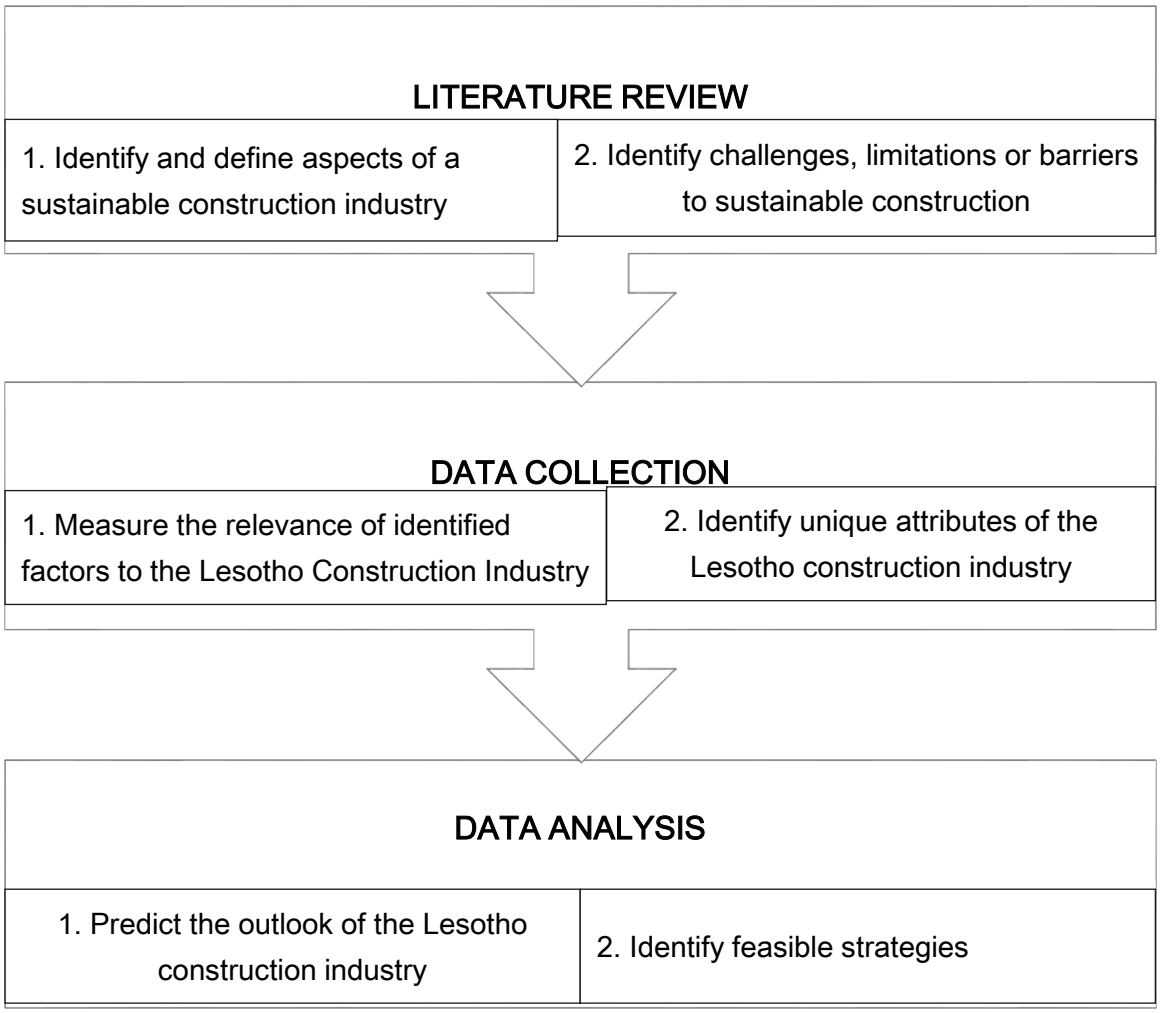

Figure 1: Research Layout

1.13. Summary of chapters

Chapter 1

Chapter 1 indicates that Lesotho has a weak economy that is largely dependent on the volatile SACU revenue. It also reflects that the construction industry is one of the largest sector contributors to the country's economy. The chapter also identifies that despite government initiatives to stimulate growth through infrastructural development, the government is still dependent on SACU revenue. Furthermore, the chapter introduces the study objectives and the research layout as well as summaries of all other chapters.

Chapter 2

The literature review commences with the definition of *construction industry* and how it relates economic growth. This chapter identifies challenges that hamper the efficiency of a construction industry and establishes construction delays as a key parameter in measuring construction efficiency. The study discusses sustainable construction as a remedy to mitigate delays in ensuring a profitable industry.

Finally, the literature discusses sustainable construction industry development as a means of securing social, economic and environmental needs of future generations. Sustainable construction embraces innovation and new technology in construction management. Sustainable construction development supports the establishment of construction policies and regulations.

Chapter 3

This chapter outlines the data required and strategies intended for use in obtaining information as well as highlighting ethical considerations of the study.

Chapter 4

This chapter deals with the analysis of data obtained. It specifies the methods of analysis employed and the representation and interpretation of results.

Chapter 5

This chapter gives answers to the research questions. To a larger extent, Chapter 5 uses the results in Chapter 4 to define the Lesotho construction industry, establish the common factors with other construction industries, and make strategic recommendations for improvement and ensuring effective contribution to economic growth.

CHAPTER 2: Literature Review

2.1. Chapter Overview

The literature defines construction industry and identifies barriers to establishment of a sustainable construction industry. The chapter further suggests that attainment of a sustainable construction industry will secure the social, economic and environmental needs of future generations through adoption of innovative and emerging construction management methodologies.

2.2. Construction industry and economic growth

Construction industry in the context of this research refers to the construction of dams, roads, energy infrastructure, railways, sanitation plants, stadiums, hotels, industrial buildings and buildings in general. For the construction industry to thrive, it requires participation by several stakeholders, such as local authorities, government departments, private organisations, consultants, suppliers, contractors and the end-users of public infrastructure (Rahman, et al., 2010). The relationship between these stakeholders is managed through a process called project management.

The stakeholders relate to one another through a complex contractual structure that normally leads to the success or failure of construction projects. The diversity and fragmentation of the same stakeholders may, however, give rise to contradictory ethical principles and practices, which in turn might eventually adversely impact on quality and performance (Mousa, 2015). Each stakeholder often has their specific interests - which, in most cases, are incongruent and conflicting in nature; for instance, some members may only be keen on maximising their profits. The conventional way of managing these problems is by the implementation of project management (PM) techniques. These techniques are used to manage all stakeholders and construction operations in order to achieve a successful project.

According to Crain's Cleveland Business (2016), the PM approach allows the client to appoint a project manager who then uses PM techniques to plan the project from start to finish. The techniques enable the project manager to assign tasks and times as well as human resources, materials and plant for the scheduled activities. The technique therefore requires all drawing plans to be agreed on in advance and the materials and equipment to also be procured in advance.

However, countries with insufficient legislative enforcement and no formal professional codes of conduct are prone to high development failure and subsequent failure to protect local companies (Babatunde & Low, 2013). In South Africa, Windapo and Cattell (2013) identify negligence, bribery, conflict of interest, bid cutting, under-bidding, collusive tendering, cover pricing, frontloading, bid shopping, withdrawal of tender and payment game as practices contributing to failure in the sustainability of local businesses in the construction industry. To combat these problems, developed and newly industrialising countries have radically reinvented their construction processes, practices and procedures (Ofori, 2012). Ofori (2012) further points out that these problems have resulted in a high solvency rate in the construction industry of South Africa owing to failure in settling financial obligations. However, the ability of the construction industry to contribute efficiently to economic growth is impinged upon by these constraints.

The relationship between construction and the economy is best explained in the study of Aziz and Abdel-Hakam (2016) which suggests capital formation as the growth engine for the economy and reckons construction output grows faster during rapid economic expansion and suffers the most during economic stagnations. According to Chia, et al.(2014) all industries depend on construction as part of business investment. Previous studies have established a positive relationship between the development of a construction industry and economic growth (Ofori, 2012) in that a boom in the economy is accompanied by a booming construction sector and vice versa (Ramachandra, Rotimi, & Raufdeen, 2013). The data covering the period 1987–2010 in Turkey compiled by Yalçinkaya, et al. (2013) has confirmed a systematic relationship between construction industry investments and economic growth. Roads infrastructure creates an enabling environment for investment (Roads Directorate Lesotho, 2014). Construction productivity stimulates economic growth, leads to accumulation of capital formation, contributes to employment creation and provides critical backward and forward linkages to the rest of the economy (Chia, Skitmore, Runeson, & Bridge, 2014). In Turkey, Yalçinkaya, et al. (2013) established the unidirectional causality between construction investments and GDP.

However, the economic growth of developing countries is hindered by chronic corrupt practices that emanate from a tremendous lack of transparency and good governance (World Economic Forum, 2016). The construction industry does not only play a critical

role in the development of human settlements, but also serves as a growth engine for a country's economic development (Babatunde & Low, 2013). For instance, the construction sector of Spain contributes 10% to GDP, while in Portugal the construction industry contributes 7% to GDP (Kapelko, Horta, Camanho, & Lansink, 2015).

According to Tamin, et al., (2015), the Indonesian construction industry contributes 10.5% of Gross National Product, and creates 5.3% of the total jobs. However, the relationship between construction and economic growth is considered rather more complicated due to the problematic nature of the construction sector (Ametepeya, et al., 2015). For instance, *"Greece is experiencing one of the strongest economic attacks in its history. What was the role of construction activity in this crisis and what should it be in the future, so that the country must not experience a similar crisis?"* (Chr.Mavridis & Vatalis, 2015, p. 388).

In developing counties, these complications are aggravated by factors such as socio-economic strain, chronic scarcity of resources, weak institution and lack of effective solutions in resolving pertinent issues (Ofori, 2012). Furthermore, Alkalbani, et al.(2013) point out that it is difficult to obtain evidence from detailed studies relating to situations in the construction industries of developing countries.

Notwithstanding the fact that efficient markets with honest practices attract direct foreign investment, which in turn benefits the society (World Economic Forum, 2016), the development of the construction industry – particularly small, micro- and medium-sized enterprises (SMMEs) remains key for economic growth (Kamal & Flanagan, 2014). Kamal and Flanaga (2014) further allege that SMMEs in developing countries account for 45% of formal employment and are recognized globally as key stimulants of innovation, economic growth and job creation. It is, therefore, imperative for governments to address constraints that undermine performance of the construction industry in growing the economy.

Constraint is defined as anything that limits a system under continuous improvements from achieving its optimum efficiency (Goldratt & Cox, 2013). A study by Omran and Abdulrahim (2015) identified shortage of skills and knowledge, culture, inadequate performance management, lack of management leadership, poor communication and lack of continuous improvement as predominant barriers in the construction industry

of developing countries while the study by Ametepeya, et al.(2015) added insufficient standards and regulations/control measures, weak constitution or law enforcement institutions, chronic unethical practices, poor business acumen ethics, and a total lack of corporate governance as predominant constraints. Moreover, the manifested culture of “fear of change” is also a hurdle as people remain reluctant to accept change (Alkalbani, et al., 2013).

On the basis of the available literature, prevalent barriers in this study are limited to structural problems such as unavailability of financing, corruption, operational inefficiency or wastage, lack of skills and training and inefficient construction legislation or political interferences. The consequential effects of these problems trigger down to quality, cost and time of the project. The operational cost of construction and the cost of rework or material wastage are relatively high. Consequently, time is therefore of significant importance in addressing inefficiencies in the construction industry; hence, this study shall place a specific focus on construction delays. The interaction between the cost, quality and time translates to the profitability of the construction industry.

2.3. Conventional Project Management Practices

2.3.1. Critical Path method

In project management, the *Critical path* concept is based on the philosophy that an aligned set of activities or tasks govern the completion of a project. The start to finish of these activities determines the total duration of the project. The critical path therefore represents a series of all tasks that are critical in completing a project. Goldratt and Cox (2013) regard these activities as constraints and suggest that once they are identified, they should then be exploited in such a manner that does not waste or lose any time.

Providing a buffer of time at each of the feeding paths into the critical path protects the Critical path as a whole. But sometimes the Critical path is delayed because appropriate resources are not available and hence the next task or set of tasks have to wait until it is finished. This creates a dependency of resource(s) – especially in a situation where several projects are done by the common resource(s) and there is a limited capacity of the resource(s). The resource buffer in this case does not help

because the contentions for this common resource(s) is so high that the resource(s) is not coping and hence it is falling behind – making the Critical path change from one set of tasks or activities to the next. The dependency in this case can only be performed sequentially and not at the same time, taking into account the limited capacity of the resource(s) in question. So a new path is created along the dependent activities of the limited capacity common resource(s) and the path is the longest chain of steps. These steps, according to Goldratt and Cox (2013), will consist of sections that are path dependent and sections that are resource dependent, creating the longest path in the PERT diagram.

In the Critical chain concept, Goldratt and Cox (2013) point out that the chain of steps that make up the constraints on the critical path is the longest chain of dependent steps which can occur as a result of resource(s). They also point out that the scheduling and sequencing of the resource(s) within the chain cannot follow a definite pattern as this may give a faulty impression of accuracy. Hence, they propose that the scheduling of the limited capacity common resource(s) should be such that no two steps performed by the common resource(s) should be in parallel and whatever feeding buffers that will be inserted into this chain should support this concept; that is, the feeding buffers should be changed to support the constraints. Goldratt and Cox's (2013) argument also reveals that sometimes this common resource or these resources are placed parallel in the chain to create a sense of time saving, whereas these resources can be placed sequentially within the chain to better solve the constraints resource contention problems. In resource contention situations, following the Critical path is disastrous and can lead to loss of control, so the removal of all resource contentions will identify the Critical chain - and although it may be longer than the Critical path, introducing the feeding buffers after the removal of all resource contentions in the proper scheduling positions will prevent the introduction of unforeseen circumstances.

According to Goldratt and Cox (2013), one of the main benefits of the Critical Chain method, especially in project management, is the identification and elimination of resource contention in a project constraint situation. This can be done by rearranging the time of the input of the limited capacity common resource(s) in such a manner that,

although it extends the chain, it also allows the resource(s) input to take place according to its criticality on the chain.

Goldratt and Cox (2013) also assert that the Critical Chain Method is applicable in the manufacturing sectors where production inventory can be reduced with a corresponding improvement in production volumes, and in accounting - where huge savings can be made from a new approach to investment justification.

Other benefits include its applicability to real problems in many other industries such as systems, finance, people management and marketing. The fact that it deals with the ability to apply the knowledge to develop problem-solving skills in many endeavours demonstrates its practical research ability benefits in the learning environment.

Goldratt and Cox (2013) illustrate that the Critical Chain Method exhibits some limitations, some of which include the fact that resource contention between projects led by different project leaders makes the decision of choosing the step(s) or task(s) to postpone relative to the other by the limited common resource very difficult. As they point out, and true to their words, no project leader wants their activity or task postponed irrespective of how less significant or unimportant it is on the constraint path.

Similarly, removal of contention with one resource may lead to contention being created for other resource(s) and it becomes cumbersome if one has to do the same for multiple projects. Even after all contentions had been removed, a slight deviation in the delivery of any estimated milestone by any of the limited common resource results in resumption of resource contention again.

Another limitation of the Critical Chain Method is the tendency to treat estimates, especially time estimates, as constant real-time scenarios instead of variable time scenarios, and being more precise only leads to the schedule goalpost being constantly moved to accommodate the many resultant resource contentions the exercise continuously generates.

In construction supervision where Engineering Consultants are usually involved, the Critical Chain Method applies to both the phenomena of single projects and multiple

projects. One opines that the application of the Critical Chain Method is of utmost necessity as we encounter resource contention in many of our single project and multiple project scenarios.

In some of our multiple project scenarios, and as the leader of one of the projects, the contention for the input of the Geotechnical Engineering team, who are responsible for the design and implementation of the Geotechnical aspects of our projects, is of utmost importance to many, if not all, our projects. Apart from the fact that their involvement in all our projects is mandatory, they constantly have inputs at various stages of the project life cycle - in reporting, providing feedback, checking and basically also in quality control.

Being the common limited resource of many of the on-going projects, contention for their attention is unavoidable and all project leaders have to examine their various Critical paths to identify where this very limited resource in the organisation can commence its contribution to each of our projects.

The researcher is of the view that the Critical Chain Method not only eliminates resource contention, but also prevents unnecessary outsourcing of presumably scarce resources. The method makes the resource better manage itself by providing services at the required time and spreading this provision in such a manner that all projects benefit. It allows its time to be spent in the proper place on the constraint and attending to those who need it at the time they need it, not when they do not.

Finally, as pointed out in the Theory of Constraint, the Critical Chain Method is a method of removing friction between people and inducing people to improve the way they manage their projects, subsequently resulting in the project being delivered on time and within budget.

In Project Management, there is a need to be able to measure the performance of a project during the project life cycle. The Baseline is the initial standard against which the performance of a project can be measured at a later stage during the project life cycle.

The measurement of the monitoring and controlling processes of the project performance against the baseline in terms of its scope, time and cost is achieved by

applying the concept of Earned Value Management (EVM) Technique. This is a method that allows the comparison and measurement of the project performance in terms of its scope, time and cost and is usually expressed as an amount relative to the project budget. The baseline of the project scope is the WBS (Work Breakdown Structure), while that of time is the project schedule, and that of cost is the actual project budget. This technique is able to determine the direction of the project to see whether it is performing well or not. It is important to know in time if a project is ahead or behind schedule or if a project is under budget or experiencing cost over-run.

The Earned Value Management (EVM) method can be demonstrated using a concept that expresses the scope and time of a project in monetary values, which can then be compared to cost, given the impression of similar comparison platform for all the project performance indices.

The techniques used to demonstrate Earned Value Management (EVM) method can be illustrated in the following dimensions:

Planned Value (PV) – is the total value of work which is supposed to be completed within a given time frame. In monetary terms, it represents the authorized budget assigned to the work to be completed for an activity or WBS component.
Earned Value (EV) – is the value of the work which has been performed in terms of the budget that was allocated to it. In monetary terms, it is the actual value of money that had been earned in performing the work in reality at the point of the project evaluation. The Earned Value being measured cannot be greater than the Planned Value for a component being considered.
Actual Cost (AC) – is the total cost actually incurred and recorded in accomplishing the work being performed for an activity or a WBS component. The Actual Cost usually corresponds to whatever was budgeted for in the Planned Value and what was measured in the Earned Value, hence the Actual Cost is the total cost incurred in reality and it represents whatever money that had been spent from the project budget.

The comparison of all the above dimensions are used to determine the performance of the project and this is illustrated in the **Schedule Variance (SV)** and **Cost Variance (CV)** calculations and the **Schedule Performance Index (SPI)** and **Cost**

Performance Index (CPI) calculations. These calculations are then used to determine the performance of the project in terms of its schedule and costs respectively.

The SV is expressed as the difference between the Earned Value (EV) and the Planned Value (PV) and it helps to indicate if the project is ahead or falling behind its baseline schedule. If the project is ahead of schedule, this difference is positive (+); and if the project is behind schedule, the difference is negative (-). However, at the end of the project, the SV will always be zero (0).

Similarly, the Cost Variance (CV) is the difference between the Earned Value (EV) and Actual Cost. If the CV is positive (+), then the project is said to be performing under budget; but if the CV is negative (-), the project is experiencing cost over-run and hence it is over budget. Cost Variance indicates the relationship between the project physical performance and cost spent.

In terms of the Schedule and Cost Performance indices, the Schedule Performance Index (SPI) is the ratio of the Earned Value (EV) and the Planned Value (PV). If this ratio is greater than one (1), it means that the project is achieving more than was planned for at that particular monitoring period, meaning that the project is ahead of schedule. On the other hand, if the ratio is less than one (1), then in the same manner it means that the project is running behind schedule.

Similarly, the Cost Performance Index (CPI) illustrates the behaviour of the project in terms of the value of work completed and the actual cost or progress made on the project at the point in time. It is the ratio of the Earned Value (EV) of the project and the Actual Cost (AC), and if this ratio is greater than one (1), then the project is under budget and hence doing well; but if the ratio is less than one (1), then there is cost over-run on the project.

Other project performance indicators or techniques used to demonstrate Earned Value Management methods include:
Budget At Completion (BAC) – which is the estimated total cost of the project when completed, or what the whole project is supposed to cost;

Estimate At Completion (EAC) – which is what the project is expected to cost after some portion of it has been completed. It can be illustrated as the ratio of BAC and the CPI (i.e. EAC = BAC/CPI {OR} [AC/EV] * BAC).

2.4. Barriers in the Construction industry

2.4.1. Project delays

According to Aziz and Abdel-Hakam (2016), construction delay is the most complex, risky and costly problem and is defined as the time overrun either beyond completion date specified in a contract, or beyond the date that the parties agreed upon for delivery of a project. Project delays are considered chronic in construction and often result in cost overruns and loss of potential income that could be earned during the operation of the constructed facility (Aynur, et al., 2012). Aziz and Abdel-Hakam (2016) developed a graph represented in Figure 2.1 below to indicate the number of construction project delays in the pipeline, general construction and building construction from different countries. The graph shows Malaysian general construction having the largest number of delays.

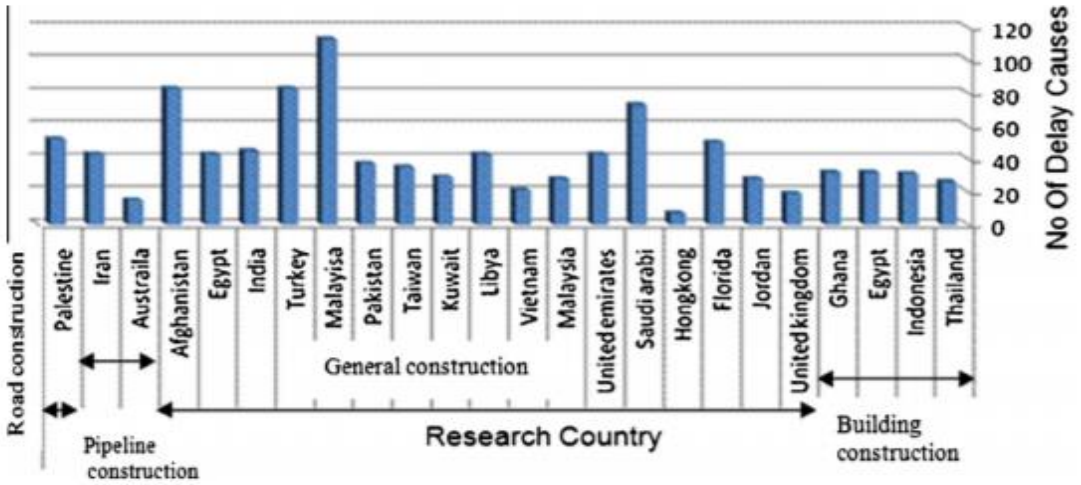

Figure 2: Causes of delays in construction

Source: (Aziz & Abdel-Hakam, 2016, p. 1516)

2.4.2. Lack of project financing

The governments of the eastern and southern African countries have acknowledged the need for initiatives to increase investments in infrastructure to support their regional economic growth (Ngoma, et al., 2014). Ngoma et al. (2014) further suggest that these governments lack financial capacity to deliver the essential developments and seek external financing from Public Private Partnerships (PPP) with the private sector.

The cost for both fixed capital and working capital are very high for construction projects. Project financing can be classified as fixed capital cost while cash-flow may represent working capital (Mohamad, et al., 2014). The World Bank over the years have enjoyed the monopoly of being the prime financier of Africa's development, but recently China through the China Development Bank and the Export-Import Bank of China have stiffened up the competition by increasing their financing to Africa's development (Dominik Kopi´nski and Qian Sun 2014*).* Africa is a lucrative market for investment as it has the majority of least developed countries that rely on foreign aid as a major source of fixed capital (Wamboye, 2014).

2.4.3. Corruption

The construction industry in many countries is characterised by inefficiencies, high degree of concentration, corruption as well as a change resistant culture (Song & Liang, 2011, p. 350). The construction industry is one of the most risky industries in terms of fraudulent practices as a result of its complex and costly nature coupled with dense third-party contracting relationships. This very nature of the construction business creates a conducive environment for things to go wrong. For instance, in South Africa, the magnitude of money involved in the construction of the 2010 FIFA World Cup stadiums may have enticed formation of cartels and bid rigging uncovered by the South African Competition Commission. These cartels resulted in reported wastage of approximately R42 billion.

Corruption is regarded as the core barrier to economic development and growth (World Economic Forum, 2016). It is perceived to be centred on tender irregularities as well as irregularities pertaining to contract administration and project close-out

(Bowen, et al., 2012, p. 885). According to Chr.Mavridis and Vatalis (2015), corruption emanates from bribes (kickbacks) and personal interest (prejudices), fraudulent practices, poor government judicial systems and nepotism. Corruption is a measure of political maturity as for instance; in South Africa, large infrastructure projects are commissioned by the government and typically put out to tender, and works are often executed by local construction firms (Windapo & Cattell, 2013).

The Economic Forum (2016) views corruption as a waste or carrying cost to taxpayers and society at large. With the construction industry in many countries being characterised by inefficiencies, high degree of concentration and corruption, Lesotho is no exception. Wilson (2015) opines that corruption can be eradicated by providing a balance between detection and prevention policies.

Several weaknesses surrounding construction industries in under-developed and developing countries include insufficient standards and regulations, weak constitution and law enforcement, poor business acumen and ethics, segregation among stakeholders and an utter lack of corporate governance (Ametepeya, et al., 2015). These deficiencies give rise to numerous problems, such as wasted expenses, tendering uncertainty, increased project costs, economic damage, blackmail, criminal prosecutions, fines, blacklisting, and reputational risk (Babatunde & Low, 2013). Moreover, Kamal and Flanagan, (2014) even reckon that it has become impossible to be involved in the construction industry or business in certain parts of the world without participating in unethical conduct.

Subsequent to the recent slowing of China’s economy, India is now the leader of the fastest-growing economies (World Economic Forum, 2016). Still, according to the World Bank Enterprise Survey (2014), the private sector in India regards corruption as the prime obstacle in the business environment.

According to Le Billion (2014), several recent studies reiterate the close correlation between inequality, mistrust and corruption. These studies suggest inequalities that result from unequal power relations, which then foster and reinforce trust within privileged circles, while reducing out-group trust – which, in turn, exacerbate corruption. Townsend and Landman (2016) opine that more trust equals less

corruption. Moreover, the South African Reconciliation Barometer Survey (2014) reflects significantly high levels of mistrust between different racial groups. This therefore suggests corruption in South Africa to be a result of the existing multiple social cleavages such as different races, tribes, geographical locations, previous economic exclusion/apartheid, immigrants' influx and different political philosophies. This multi-faceted social fraternity prohibits social cohesion, which then promotes corruption.

2.4.4. Operational inefficiencies

According to Song and Liang (2011), waste in project execution accounts for approximately 30%–35% of total construction costs. Studies conducted in the UK indicate that up to 30% of construction waste results from the cost of redoing the work; 40–60% from labour inefficiency; 10% from wasted materials and 3–6% from accidents. Similarly, rework accounts for 35% of the Australian construction waste, while 50% result from project cost overrun (Aziz & Hafez, 2013). In developing countries including Sudan, these problems have manifested in multi-faceted ways such as high construction costs; costs overrun; delays; lack of skilled labour; reliance on imports; and low quality of construction work (Elkhalifa, 2016). Rework is a significant factor that contributes to time and cost overruns in construction projects and its attributes include: scope deviation, changes, errors, omissions, defects, failure, damage, repair, and non-conformance (Love & Edwards, 2005). Lack of conformity to plans often results from inappropriate plans rather than inadequate performance. Other causes of delay are attributed to improper management of materials, lack of an explicit and detailed model of the project materials management process and lack of skilful management where less attention is paid to resources allocation, i.e., human, financial, and material resources (Aziz & Abdel-Hakam, 2016).

Research in developing countries has established construction delays as a consequence of poor designs, lack of skills, poor procurement procedures for materials and equipment, poor maintenance or breakdowns of equipment, poor inspection, poor planning, poor scheduling and site organisation, poor documentation and utter lack of detailed, written procedures (Ofori, 2012).

In summary, sources of lack of operational efficiency in the construction industry emanate from lack of qualified staff and lack of experience (Chr.Mavridis & Vatalis, 2015).

In conclusion, a high performance or sustainable construction industry will ensure optimum contribution to economic growth. A long-run analysis of construction productivity can depict the evolvement of the industry and the extent of competitiveness (Kapelko, et al., 2015). An establishment of a sustainable construction industry is therefore a key factor in building long-term competitiveness.

2.5. Sustainable construction industry

Construction is seen as one of the largest environmental burdens, but construction leaders acquainted with environmental impact studies and assessment may be influenced to improve their construction method (Asadollahfardi, et al., 2015). Globally, construction industry consumes a large proportion of natural resources and energy; hence, it potentially has an important role in sustainability (Wang, 2014). It is therefore imperative for construction industries to urgently embrace the idea of incorporating sustainability to ensure an effective environmental management that will minimise air, water, noise and light and land pollution.

Sustainable construction is a cutting-edge phenomenon, forming a component of a subjectively defined concept called sustainable development. Sustainable development can be defined in terms of attitudes and judgments to assist in ensuring long-term environmental, social and economic growth in society (Ding, 2008). Sustainable construction, therefore, means establishing a healthy built environment that takes cognizance of resource efficiency and ecological design (Kibwami & Tutesigensi, 2016). Furthermore, Ametepeya, et al.(2015) assert that sustainable construction is a construction process which ensures cultivation of benefits from all intrinsic themes of sustainable development; namely, environment, social development and economic growth.

The concept of sustainable construction is farfetched to developing countries due to barriers in politics, finance, leadership, socio-cultural developments and expertise (Ametepeya, et al., 2015). But even for developed countries, barriers such as climate change pose a huge challenge to sustainability or the use of natural resources for

construction. According to Kibwami and Tutesigensi (2016), carbon emission is used to measure environmental sustainability in construction projects, while Ding (2008) suggests that these environmental issues should be considered at a stage prior to even the development of conceptual designs in order to improve chances of achieving sustainability in construction projects. According to Wang (2014), the pre-construction stage is crucial for the selection of appropriate design and materials in order to minimize pollution.

Notwithstanding the remarkable economic growth achievement by China, the country remains a developing country due to social development impediments which are among the perquisites for a country to be upgraded into a developed country (Wang, 2014). The gross national income (GNI) per capita for China is ranked 89 which is below the world average (World Bank, 2016); while in the UK after the recession, the government adopted sustainable development policies as a strategy to achieve long-term improvement in well-being and economic prosperity (Dadhich, et al., 2014). On the other hand, a knowledge gap in sustainable practices is apparent in developing countries such as Uganda, making the issue of addressing carbon emissions very complex (Kibwami & Tutesigensi, 2016).

Wang (2014) reckons stringent environmental regulations result in robust and significant impact in promoting competition and innovation (Wang, 2014). Rapid urbanization in most African countries (Kibwami & Tutesigensi, 2016) therefore warrants adoption of international environmental guidelines such as ISO 14001, which have been shown to have a positive impact on the construction sector (Wang, 2014).

On the other hand, adoption of corporate governance in construction is critical in achieving a sustainable construction industry. Corporate governance guides both strategic and operational decisions of the firm (Andreou, et al., 2014). Corporate governance concentrates on the wealth of business and supports economic stability by upgrading the performance of organizations and expanding their right to gain entrance to outside capital (Shahzad, et al., 2015). Adoption of corporate governance can assist companies in improving or even maximising their profits as it reduces agency risk (Andreou, et al., 2014).

The call for sustainable buildings is a result of an accelerated depletion of natural resources, rising energy costs and the greenhouse gas emissions as well as improved

awareness of indoor environmental quality. Traditional construction processes place emphasis on cost, time, and quality performance of projects, while sustainable construction requires those performance goals to display attributes such as low energy efficiency, minimal gaseous emissions, and waste generation (Korkmaz, et al., 2013). Adoption of corporate governance in construction also promotes the development of a sustainable procurement system.

A procurement system is an organizational system that assigns specific responsibilities and authorities to people and organizations, and defines the relationships of the various elements in the construction of a project. Sustainable procurement is a process that ensures that the organisation's needs for goods, services, works and utilities are met in a way that achieves value for money on a whole life basis in order to generate real long-term social and economic benefits while minimizing damage to the environment (Naouma & Egbua, 2015).

Barriers to sustainable procurement includes fragmentation in the industry, lack of long-term perspective, clients' unwillingness to share burden, lack of clear concept definition of sustainable construction and its benefits, regulatory constraints and inconsistent government policy and lack of fiscal incentives (Naouma & Egbua, 2015).

2.6. Sustainable Construction industry development

Construction industry development is the process that enhances the efficiency and capacity of the construction industry to enable governments to meet both infrastructural and economic development objectives (Ofori & Toor, 2012). Construction industry development is further defined as a deliberate, systematic process that targets the improvement of the competence and attractiveness of local companies as well as promoting Lean Construction methods (Song & Liang, 2011). Chr.Mavridis and Vatalis(2015) define sustainable construction industry development as a designed process which aims to enhance the efficiency of the construction industry in order to achieve desired infrastructural products, and to support environmental and socio-economic development. Ofori (2012), in turn, describes sustainable construction industry development as an intentional and monitored procedure to enhance the competence of the construction industry in order to support and sustain state economic, social development and environmental objectives.

Construction industries in Australia, Singapore, Hong Kong and the UK regard development of the construction industry as a continuous improvement process that enables them to constantly review and improve their systems and provide a basis for a reasonable forecast about the future (Wong, et al., 2010). According to South Africa's construction industry development board (CIDB, 2004), public-sector capacity is a key constraint on infrastructure delivery and sustainable growth in the South African construction industry. Shen, et al. (2010) proclaim that sustainability in construction can be best achieved by proactively considering the three dimensions of sustainable development, namely social, economic and environmental issues during project feasibility studies. These issues include market availability, project financing and economic returns, social impact and environmental friendliness.

Sustainable construction industry development requires a holistic approach that takes into consideration the interaction between Lean Construction principles, socio-economic and environmental policies, technological advancement and the principles of construction or project management. According to Munthe-Kaas etal. (2015), recent advances in construction technology, such as CAD, cannot reduce errors in the design and construction but can improve the efficiency of drawings. Siti, et al. (2014) suggest that fostering collaboration between project participants would enable the sharing of knowledge and information, which is essential for effective execution of the construction project.

2.6.1. Lean Construction

The concept of Lean Construction is said to contribute tremendously to the elimination of waste through the rethinking of existing construction processes and practices (Omran & Abdulrahim, 2015). Lean Construction emanates from the principles of the Toyota Production System (TPS), namely the application and adaptation of the fundamental concepts and principles that focus on waste reduction, increase in value to the customer, and continuous improvement (Dave, et al., 2016). Lean Construction has been adopted in the construction industries of China, Brazil, the United Kingdom, Vietnam, Malaysia, Mexico, Nigeria, Ghana, the Middle East, Uganda, Germany, the USA, Singapore, Chile, Finland, Lebanon and Norway (Marhani, 2012).

According to Damaj, et al. (2016), several studies confirm that Lean Construction processes enhance businesses; reduce costs; and achieve higher productivity, improved safety and greater quality. This is attested to by several successes such as the achievement of 9% waste reduction in the design of the Norway construction industry (Munthe-Kaas, et al. 2015). By reducing paper wastage, Lean Construction leads to other benefits such as protestation of environmental degradation by reducing carbon dioxide emission footprint (Fuenzalida, et al. 2016). Lean Construction also proved to be economically and socially sustainable by increasing the productivity of Ireland's construction industry by 20% while creating an additional 6000 jobs (Ebbs, et al. 2015).

Lean Construction consists of several other practices, including sustainable procurement, just-in-time (JIT), and use of pull-driven scheduling, reduction of variability in labour productivity, improvement of flow reliability, elimination of waste, simplification of operations and implementation of benchmarking. Moreover, Lean Construction is founded on the effective adoption of key management and construction concepts such as Total Quality Management (TQM), Business Process Re-engineering (BPR), teamwork and value-based management. (Alinaitwe, 2009, p. 17). The crux of Lean Construction is that it is a business strategy that focuses on business process re-engineering and value-based management *(*Lidelöw & Simu, 2015*).* Business Process Reengineering (BPR) is an innovative business administration concept which radically rethinks the traditional business approach to entirely renovate all operation processes in order to obtain a progressive business performance (Cheng, et al., 2012), while re-engineering is the fundamental re-thinking and radical redesign of business processes to achieve dramatic improvements in critical, contemporary measures of performance such as cost, quality, and time (Kader & Dwolatzky, 2016).

Lean principles, therefore, require a fundamental change in the behaviour and attitudes of the parties involved in order to overcome barriers to cooperation, which often arise from industrial, organizational and cultural barriers (Naouma & Egbua, 2015). It is, therefore, imperative to ensure that project and people's interests are aligned. For instance, Lean Construction to procurement require a strong emphasis on the importance of forging co-operative relationships from the onset and enabling continuous improvement. Contrary to traditional approaches, Lean Construction minimizes delays by planning the project from the end to the beginning and such by

involving the line mangers and front-line employees during the planning stage (Crain's Cleveland Business, 2016). Fabrication and assembling happens off site and materials and equipment are delivered.

The effective implementation of this concept in the Lesotho context should include a thorough risks and rewards assessment. Proponents of Lean Construction cite that the success and/or failure of this model in some countries have been as a result of the existence of inevitable barriers that inhibit its successful implementation (Omran & Abdulrahim, 2015, p. 53). Naouma and Egbua (2015) identify waste reduction, process focus in production planning and control, end-customer focus, continuous improvements, co-operative relationships and systems perspective as core elements of Lean Construction.

2.6.2. Sustainable construction policies and regulation

Failure to achieve excellence in construction is often rooted in general policies and standards problems (Abdirada & Nazarib, 2015). Conventional sustainability policies in the construction industry are critical for radical improvement and economic growth (Dadhich, et al., 2015). For instance, corporate governance obliges a public policy objective and diminishes the powerlessness of the financial crises (Andreou, et al., 2014). Furthermore, during the 2010 conference entitled "*The crisis in the building and construction*", the Technical Chamber of Greece in 2010 made an acknowledgement to the effect that adequacy of standards in construction products are fundamental for the economic development and that the building crisis resulted from the political deadlock and the market saturation (Chr.Mavridis & Vatalis, 2015). It is therefore paramount for all governments to develop policies based on long-term strategies (Kapelko, et al., 2015). However, information technology policies, education and training remain key constraints for the construction industry of the developing economies (Alkalbani, et al., 2013), whereas first world countries like the United Kingdom (UK) and United States of America (USA) have instituted robust policies to prohibit bribery and corruption from their construction industries – which in turn – support their construction companies in avoiding or mitigating the risk of losing competitiveness in emerging markets (World Economic Forum, 2016).

The study by Wong, et al.(2010) further suggests that it is mandatory for governments to establish policies that focus on the establishment of long-term goals in the construction industry, for strategic planning is key to the sustainable development of construction industries. Wong, et al. (2010) further add that long-term vision and policy for the construction industry are two of the dominant factors in long-term industry and economic development.

Many countries have since established agencies dedicated to improving the performance of their respective construction industries (Ofori, 2012). Hong Kong, for instance, established the Construction Industry Review Committee to review the status of its construction industry comprehensively and the committee identified strategic planning as the most relevant factor for long-term growth. Consequently, the importance of the development of construction industries cannot be over-emphasized and should be approached in a comprehensive and forward-looking manner.

Furthermore, long-term industry strategies such as “Construction 2020” in Australia and “The Big Ideas” in the United Kingdom are regarded as effective proactive approaches in setting the focus and enabling the construction industries to cope with challenges (Ofori, 2012). These collective set of rules help in identifying key issues, drivers and trends in the construction sector for the next 20 years.

Hong Kong established a centralized planning body to ensure the timely launching of major public-funded projects and to strategically plan and coordinate the overall output of the construction sector. The body also formulated and implemented a framework with streamlined legal procedures through efficient public consultation processes (Wong, et al., 2010). Furthermore, the centralized planning body identified continuous improvement and adjustment needed in business models as a critical area in enabling companies to remain relevant to the market and to enhance the competitive edge required to sustain growth.

Recently, Southern African Countries established construction industry development agencies as a collaborative initiative to coordinate and group resources. However, this initiative does not guarantee any success of construction industry development due to several challenges facing developing counties (Mukuka, et al., 2015). Quality is one of the chronic impediments in the construction industry of these developing countries. Quality Management System is defined as an administrative procedure entrusted to

ensure adherence to the desired specifications in order to achieve the desired outcome. The process usually includes systematic planning, control, assurance, and improvement (Abdirada & Nazarib, 2015); a governance that provides written workflows, job descriptions, clear organizational structure, comprehensive policies and procedures to reduce the risk of internal fraud (Gunduz & O¨ nder, 2013, p. 527). On the other hand, immunity and leniency in policies give rise to endemic corrupt practises (Wilson, 2015). For instance, South African government policies have a major influence on tender and procurement procedures, employment and labour practices, BEE, planning permissions and controls, skills development and training and business practices.

2.6.3. Technology

Construction projects are becoming sophisticated and fragmented in nature, yet contractors are persistently facing shortened project durations and reduced budgets. The timely delivery of accurate and reliable information between project participants has become more critical and important because information is the foundation upon which decisions are made and projects are estimated, planned, monitored, and controlled.

Recent developments in technology promise to introduce efficiencies that were not previously available to the industry. Technologies such as wireless information technology became core competencies of construction companies. Technology and new material development have become critical in resolving the complexity brought about by the ever-growing aesthetical and time-constraint demands from clients (Turina, et al., 2013).

However, it is not easy for developing countries to penetrate the global construction market due to complex requirements in finance, management and technology (Lee, et al., 2011). For instance, implementation of Information and Communication Technology (ICT) is rare in the construction industry of these developing economies (Alkalbani, et al., 2013). Moreover, in order to ensure the completion of projects, clients in the global market opt for contractors with sound financial standing and unique technological attributes (Lee, et al., 2011). Consequently, these present constraints to construction industries of developing countries and subject them to continuous search for financing alternatives (Ngoma, et al., 2014). However, to gain the required

competitive edge, role players in the construction industry of these developing countries must keep abreast of the changes and improvements in the fields of knowledge connected to construction (Ametepeya, et al., 2015). The adoption of ICT will continuously have a significant impact on the development and transformation of design and construction processes and construction materials (Ofori, 2012).

ICT in the construction sector refers to all goods and services and the management required to enhance efficiency and productivity as well as growth in the industry (Alkalbani, et al., 2013). Research and development support the level of technology that can be adopted in the construction industry in order to improve the performance of both individuals and organizations. Recent studies reveal the successful use of manufacturing procedures and techniques to construction (Ofori, 2012). Other examples include adoption of *e*-procurement technology, which positively affects managers' perceptions of both procurement practices and procurement performance. E-procurement is an information system that facilitates the integration of the supply chain in the construction industry. A fully electronic procurement includes online submission of tenders.

However, a downside in this new initiative is that the application of e-procurement platforms requires significant investment in both specialist software and staff training. The concept of e-procurement can be used with most procurement methods in construction except, perhaps, for the partnering arrangement of contractors.

2.7. Key findings on literature review

Inefficiency in the construction industry is of great concern to most countries of the world. Construction poses danger to both socio-economic and environmental sustainability. Several countries in the world have engaged in initiatives in an attempt to mitigate these negative effects, and these developments require a continuous improvement. The problems identified from different studies are not unique. However, developing countries are lagging behind in adopting sustainable approaches in their construction industry.

CHAPTER 3: Research Methodology

3.1. Introduction

Research methodology is the philosophical structure that maps the basis for the research (Brown, 2006). Research methodology defines the research design adopted by the study and provides justification for the methods chosen by describing practical applicability and suitability of the chosen approach. The methodology prescribes the most appropriate procedure of attaining the objectives of the research. This chapter essentially defines data collection and analysis methods. Description of data collection includes description of the population considered in the study, the sampling strategy and the data gathering method, ethical considerations and demarcation of the study.

3.2. Data collection

In this study, the data collection section includes a description of the population considered in the study, the sampling strategy and the data gathering method, ethical considerations and demarcation of the study.

3.2.1. Research design

Research design is a flowchart that maps the manner in which data is collected, measured and analysed in answering the research questions of the study (Sekaran & Bougie, 2014, p. 95). The information needed for this research was gathered from two major sources:

- Literature review; and
- Structured questionnaire survey (table 1 below).

The literature review provided useful insight on the construction industry challenges and the available philosophies in achieving sustainability in construction. The literature further informed and guided the development of the questionnaire.

Collectively, the objective of the study was to identify the factors that inhibit the ability of Lesotho's construction industry to contribute to economic growth. The literature established key barriers that pertain to the construction industry, its development and the linkage with sustainable development. The survey enabled the researcher to understand these issues in the context of Lesotho's construction industry.

3.2.2. Study population and sampling

To gain insight from the industry, the survey questionnaires were used to establish the nature of Lesotho's construction industry. The questionnaires assisted the researcher in establishing the competitive nature of the industry as well as barriers to sustainable growth and development.

The Roads Construction sector has the highest capital expenditure budget which accounts for 17.6% of the total of government capital expenditure (Khaketla, 2016). It was therefore important to focus the study on road contractors registered with the Roads Directorate of Lesotho (RD). Registration or categorization with the RD is a prerequisite or eligibility requirement for any company to undertake road construction work in Lesotho. A total of 165 road construction companies were registered with the Roads Directorate in March 2016, of which 95 are active contractors and 70 are suspended (Roads Directorate, 2016). These companies hold different ratings or categories as determined by the Directorate. The categories range from the highest category (which is A) to the entry level categories E, E1, E2 and E3.

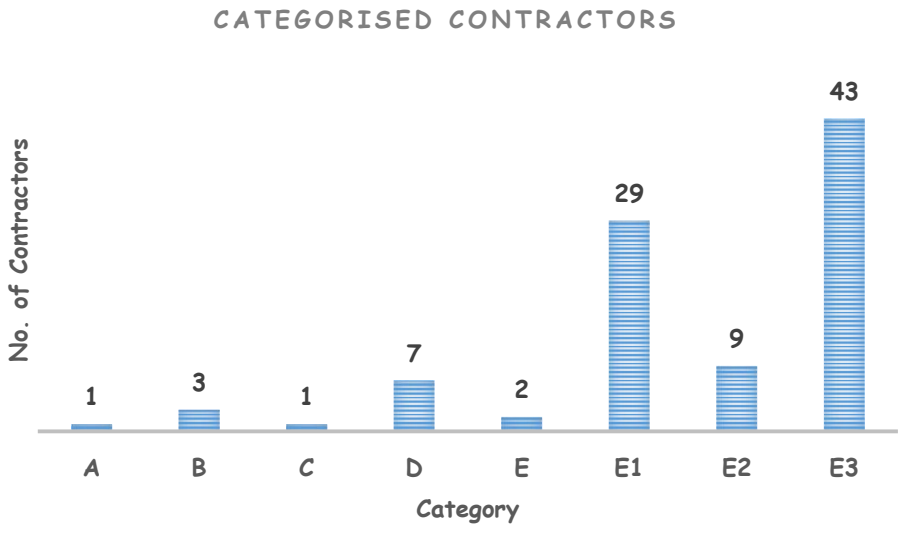

Figure 3: Lesotho's Categorised Roads Contractors

Figure 3 above shows the total of active roads contractors in Lesotho. The study considered an active population of contractors (95 companies). Krejcie and Morgan's table suggest the sample size of 76 (Sekaran & Bougie, 2014, p. 268). Stratified random sampling technique was employed in the lower categories and all companies

within higher categories were considered in order to ensure that the sample represents all specific subgroups or strata in a proportionate manner.

The sample calculator (The Survey System, 2009) was used to establish a representative sample size of the lower level categories (D, E, E1, and E2 & E3). This sample was used to arrive at a well-substantiated conclusion. The total population of entry-level contractors was 90 and, based on the desired confidence level of 95% and a confidence interval of 5, the sample resulted into a sample size of 73 on entry-level contractors.

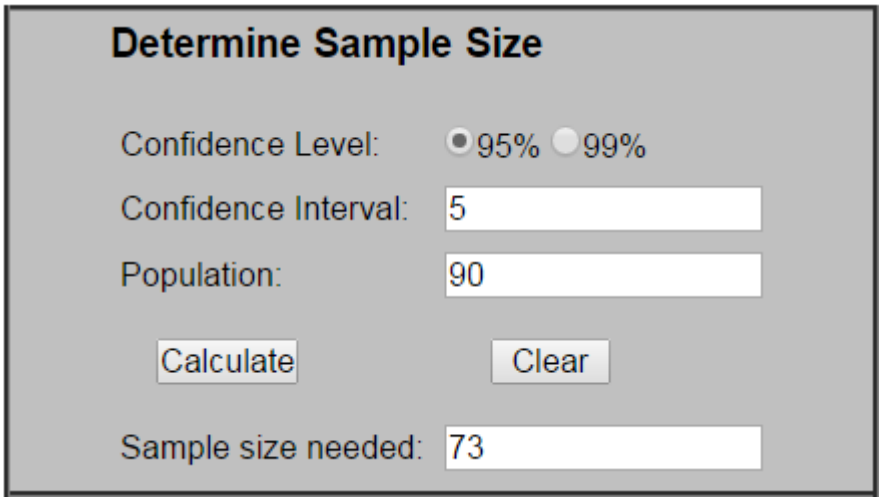

Figure 4- Sample Size Calculator (www.surveysystem.com, 2016)

The sample size therefore includes 73 smaller companies and all 5 larger companies, which resulted into a total sample of 78 construction companies.

3.2.3. Data collection method

The questionnaire survey used a quantitative approach to gather responses from the respondents in the selected sample. These questionnaires were mostly derived from literature. The questionnaires were used to evaluate and analyse the significance and relevance of the construction industry barriers identified from the literature. The positivist approach was implemented. The data used for the purpose of analysis was collected through a structured questionnaire that consisted of 41 questions. These questions were classified into four major areas considered to affect the construction industry from other countries, as concluded from the literature. These classifications were:

- Barriers due to financing;
- Barriers due to corporate practices;
- Leadership and Management barriers; and
- Barriers due to external factors.

A detailed structure of the questionnaire and the questions are as enclosed in Table 1 below.

Table1: Sample of Research Questionnaire

CAUSES		Always	Very Often	Sometimes	Rarely	Never
Delays due to Financing issues						
1	Project financing					
2	Delayed payments					
3	Access to Credit					
4	Cash-flow					
5	Price inflation					
Corporate Practice						
6	Bureaucracy					
7	Conflicts and Litigations					
8	Procurement procedures					
9	Conflict of interest					
10	Fraudulent practices					
11	Nepotism					
12	Inadequate judicial system for construction disputes					
Leadership and Management						
13	Land expropriation					
14	Variation orders during construction					
15	Poor subcontractor performance/delays					
16	Rejected work or Rework					
17	Poor site management and supervision					
18	Inadequate contractor experience					
19	Lead times for imported materials					
20	Lack of qualified technical staff					
21	Obsolete or traditional work methods					
22	Errors in designs					
23	Shortage in equipment/insufficient numbers					
24	Lack of skilled operators for specialized equipment					
25	Equipment failure (breakdown)					
26	Culture, low motivation and morale of labours					
27	Disputes, strikes and absenteeism					
28	Unrealistic contract price or duration					
29	Interference of other projects					
30	High turnover of skilled staff					
31	Low labour productivity levels					
External factors						
32	Insufficient onsite utilities (water, electricity)					
33	Overcrowded work areas/confined site					
34	Traffic accommodation or community disruptions					
35	Force majeure (war, hurricane, epidemic diseases)					
36	Rainfall and inclement weather					
37	Obtaining permits (government)					
38	Accidents					
39	Building codes used in the design of the projects					
40	Environmental laws or restrictions					
41	Approvals (or lack of) from authorities					

This questionnaire was administered to 78 respondents with the survey lasting for approximately two weeks. It was administered to the construction industry experts and leaders who gave their assessment based on extensive experience and expertise. The questionnaires were delivered to the respondents and collected back by the researcher after a designated time. The questionnaire used a five-point Likert scale and all questions were quantitative. The respondents gave their assessment to this ordinal questions with scores assigned from “Never”, ”Rarely”, “Sometimes” ,“Very Often” to “Always”.

The questionnaires were deemed critical in evaluating the significance and relevance of the identified barriers to the Lesotho construction industry and in further assisting to confirm the existence of issues unique to Lesotho’s construction industry. Moreover, due to the centralized planning nature of services in Lesotho, construction companies have their head offices based in Maseru. All sampled companies were thus easily accessible during the survey.

3.3. Data analysis

Data analysis was critical in transforming the raw data obtained into the meaningful data which led to a fair conclusion. The questionnaire responses were coded for ease of computation as follows:

never = 1, rarely = 2, sometimes = 3, more often = 4 and always =5

According to Sekaran and Bougie (2014) coding assigns a specific number to a response in order to simplify data capturing in a database. The data is captured and checked for completeness in order to identify outliers, incompleteness or omitted data from the respondents. Sekaran and Bougie (2014) define outliers as illogical and inconsistent responses.

The transformed data was first explored with Microsoft Excel (2013) to obtain frequencies. The Relative Importance Index (RII) was computed in order to test the significance of each variable. The RII can be best described as a weighted average described by the following function:

$$I = \quad \sum_{i=1}^{5}(a_i . x_i) \div \sum_{i=1}^{5}(x_i)$$

Where [I] shows relative importance index and [i] indicates index of answer category in a Likert scale such as 1 for never, 2 for rarely, 3 for sometimes, 4 for very often and 5 for always. α_i represents the numerical value of a corresponding *i*. α_i ranges between 0 and 4 (α_i = 0 for i = 1, α_i = 1 for i = 2, α_i = 2 for i=3, α_i = 3 for i = 4 and α_i = 4 for i = 5. x_i denotes the frequency of the relevant answer. Resulted index interval is therefore as follows:

Always	0 – 0.8
Very often	0.81 –1.60
Sometimes	1.61 – 2.40
Rarely	2.41 – 3.60
Never	3.61 – 4.0

The variables were then ranked and classified according to their RII score. A basic rule of thumb was used to regard a score above the mid-way value of 2.0 as significant and below 2.0 as insignificant.

Correlation analysis was then computed to establish dependency between barriers. A rule of thumb again dictated that 0.53 to 1 indicates a strong correlation between variables. The statistical software called R was used to compute the Chi Squared test to validate correlation between barriers with strong correlation. Lastly, the comparison study was undertaken to establish the conditions in Lesotho as opposed to other countries using the strongly correlated variables. Correlation measure was important in identifying barriers that may collectively be hindering the establishment of a sustainable construction industry.

3.4. Ethical considerations

Resnik (2011) defines ethics as norms of conduct that differentiate between acceptable and unacceptable behaviour. In research, ethics guide researchers towards achieving the study objectives and to avoid erroneous and misleading statements. In this study, it was important for the researcher to ensure that research participants were not subjected to harm in any ways whatsoever and respect to their dignity was made a priority. The researcher submitted the introductory letter from the management of University of The Free State Business School (UFBS) to the sampled

company manager(s) and obtained full consent from the company's management prior to the study. The letter from the University clearly stated that the information obtained is meant only for the purpose of academic research and shall therefore be protected and kept private and confidential.

Anonymity of organizations was ensured by making sure that the questionnaire did not require any names or specific information that could reveal the identity of the respondents. The researcher ensured that the aim and objectives were clear without any deception or exaggeration. Honesty and transparency were encouraged to avoid any form of misrepresentation and bias during the analysis of data obtained. The questionnaire emphasised voluntary participation of respondents and completely avoided use of offensive, discriminatory, or other unacceptable language. Furthermore, the Harvard system of referencing was used to acknowledge works of others and Turnitin software was used as a tool that measured the originality of the content and avoid plagiarism.

3.5. Demarcation of the Study

The study falls within the discipline of Construction Economics and Management. Construction remains one of the key economic indicators for developing countries and therefore it was paramount to quantify the economic output that could result from a highly efficient construction industry. Road construction in Lesotho has the highest infrastructural spending; therefore, the study targeted only road construction companies in the Lesotho construction industry. These contractors have their head offices in Maseru.

CHAPTER 4: Results and Analysis

4.1. Introduction

This chapter presents the results and analysis obtained in addressing the research questions. It presents the barriers to the establishment of a sustainable construction industry in Lesotho. Furthermore, this chapter presents results on the significance of the identified barriers to the Lesotho's construction industry as well as provide a comparison of results between the Lesotho construction industry and eight other comparable countries.

4.1. Results analysis

The researcher first computed a frequency table with weighted averages in table 4.1 below to get a general feel of the results. The variables were then rendered significant or insignificant on the basis of their scores. The variables that score 2.0 and above were then ranked in table 4.2 below.

Correlation testing was used to test dependency between variables and Chi-square was used to validate the correlation between the highly correlated variables. Finally, a comparison was made between the highly correlated variables in Lesotho's construction industry.

4.1.1. Frequencies

The study established that project financing, delayed payments, difficult access to credit and cash-flow problems are responsible for 39% of financial related problems. Approximately 24% of the barriers in corporate practice occur very often and happen 37% occasionally. The frequency shows equitable responses between the measures factors, which may imply a complementary or causality between variables.

Leadership and management barriers are experienced 29% very often and 39% occasionally. Land expropriation, variation orders, poor contractors' performance, lack of skilled operators, lack of qualified technical staff, lack of contractors' experience and lack of construction management and supervision happen more often than other variables.

Frequencies for external factors barriers occur rarely in the Lesotho construction industry. These factors are relatively uncommon in Lesotho's construction industry in exception of obtaining approvals from authorities.

4.1.2. Weighted average

The relative importance index was computed as a weighting factor and enables classification of each variable. Barriers relating to finance, and leadership and management have relatively high weighting scores followed by corporate practice factors and, lastly, external factors. This trend was observed as complementary to the trend noted from the frequency above. It can therefore be assumed at this early stage that financial barriers and leadership management barriers are prevalent to the construction industry of Lesotho.

4.1.3. Ranking and classification of variables

Classification and ranking were done on the basis of the weighted score. Approximately 49% of the total variables have a relative importance index of above 2. The ranked barriers consist of 80% of the studied financial barriers; 29% of the studied corporate practices; 68% of barriers considered under leadership and management and none of the external factors scored above 2.0.

Figure 4.2 below indicates that delayed payment, project financing and cash-flow are respectively ranked the top three and occur very often. Barriers pertaining to access to credit and material and labour price inflations are classified as occasional barriers, but access to credit is more significant than price inflation.

Bureaucracy and fraudulent practices rank 6 and 19 respectively and are both classified as occasional barriers. Poor performance and variation orders are ranked top 4 and 5 respectively, while culture of labourers rank 7. Land expropriation, unrealistic contract prices and duration rank 8 and 9 respectively, while poor site management and shortage of equipment rank 11 and 12. Other issues ranked leadership and management barriers including inadequate experience, lead times for material, lack of qualified staff, rework as well as unproductive labour force. The only ranked external barriers difficulty in obtaining approvals from authorities.

Table 2: Frequency, RII & Impact

Description of barrier	Impact of challenge (frequencies)					Total response	Relative Importance Index	Impact classification
	Always	Very often	Sometimes	Rarely	Never			
Financial barriers								
Project financing	13	33	22	7	3	78	2.59	Very often
Delayed payments	28	34	12	2	2	78	3.08	Very often
Access to credit	6	23	33	11	5	78	2.18	Sometimes
Cash-flow	9	32	28	5	4	78	2.47	Very often
Price inflation	4	12	30	29	3	78	1.81	Sometimes
Corporate practice barriers								
Bureaucracy	8	22	36	12	0	78	2.33	Sometimes
Conflicts & Litigations	2	14	29	29	4	78	1.76	Sometimes
Procurement procedures	5	17	32	19	5	78	1.97	Sometimes
Personal interest	5	19	32	14	8	78	1.99	Sometimes
Fraudulent practices	6	18	31	18	5	78	2.03	Sometimes
Nepotism	3	19	27	22	7	78	1.86	Sometimes
Inadequate judicial system	5	21	24	21	7	78	1.95	Sometimes
Leadership and management barriers								
Land expropriation	9	29	23	12	5	78	2.32	Sometimes
Variation orders	8	29	31	10	0	78	2.45	Very often
Poor performance	6	33	24	14	1	78	2.37	Sometimes
Rework	2	22	35	17	2	78	2.06	Sometimes
Poor site supervision	3	25	38	9	3	78	2.21	Sometimes
Inadequate contractor experience	4	26	29	17	2	78	2.17	Sometimes
Lead times for imported materials	9	17	33	15	4	78	2.15	Sometimes
Lack of qualified technical staff	6	25	28	13	6	78	2.15	Sometimes
Obsolete work methodologies	2	24	29	17	6	78	1.99	Sometimes
Errors in designs	1	20	34	21	2	78	1.96	Sometimes
Insufficient equipment	6	21	35	14	2	78	2.19	Sometimes
Lack of skilled operators	3	30	30	18	8	78	1.89	Sometimes
Equipment breakdown	3	20	33	17	5	78	1.99	Sometimes
Culture of labourers	11	23	27	15	2	78	2.33	Sometimes
Labour unrest	2	11	36	26	3	78	1.78	Sometimes
Unrealistic contract price or duration	10	21	26	19	2	78	2.23	Sometimes
Projects Interference	2	25	29	18	4	78	2.04	Sometimes
Skilled staff turnover	2	18	33	22	3	78	1.92	Sometimes
Labour productivity	6	19	29	19	5	78	2.03	Sometimes
External barriers								
Insufficient onsite utilities	3	16	22	31	6	78	1.73	Sometimes
Confined site	2	13	27	29	7	78	1.67	Sometimes
Community disruptions	3	18	29	23	5	78	1.89	Sometimes
Force majeure	3	4	17	28	26	78	1.10	Rarely
Inclement weather	4	13	29	24	8	78	1.76	Sometimes
Government permits	5	15	35	20	3	78	1.99	Sometimes
Accidents	2	4	33	35	4	78	1.55	Rarely
Building standards	2	6	35	25	9	77	1.57	Rarely
Environmental laws or restrictions	1	5	41	28	2	77	1.68	Sometimes

Approval from authorities	8	19	33	18	0	78	2.22	Sometimes

Table 3: Ranking of barriers

Factors	RII	Factor Group	Ranking
Delayed payments	3.08	Finance	1
Project finance	2.59	Finance	2
Cash-flow problems	2.47	Finance	3
Variation orders during construction	2.45	Leadership and Management	4
Poor performance	2.37	Leadership and Management	5
Bureaucracy or Complicated client administration processes	2.33	Corporate practise	6
Culture, low motivation and morale of labours	2.33	Leadership and Management	7
Land expropriation	2.32	Leadership and Management	8
Unrealistic contract price or duration	2.23	Leadership and Management	9
Approvals from authorities	2.22	External factors	10
Poor site management and supervision	2.21	Leadership and Management	11
Shortage in equipment/insufficient numbers	2.19	Leadership and Management	12
Ease of credit access	2.18	Finance	13
Inadequate contractor experience	2.17	Leadership and Management	14
Lead times for imported materials	2.15	Leadership and Management	15
Lack of qualified technical staff	2.15	Leadership and Management	16
Construction rework	2.06	Leadership and Management	17
Interfering of other projects	2.04	Leadership and Management	18
Issues related to fraudulent practices	2.03	Corporate practise	19
Low labour productivity levels	2.03	Leadership and Management	20

4.2. Group Factors

4.2.1. Financing factors

Figure 4.1 below shows that delayed payments and cash flow happen very often. Delayed payments almost happen always, while access to credit almost happens very often. Price inflation occurs occasionally but almost rarely.

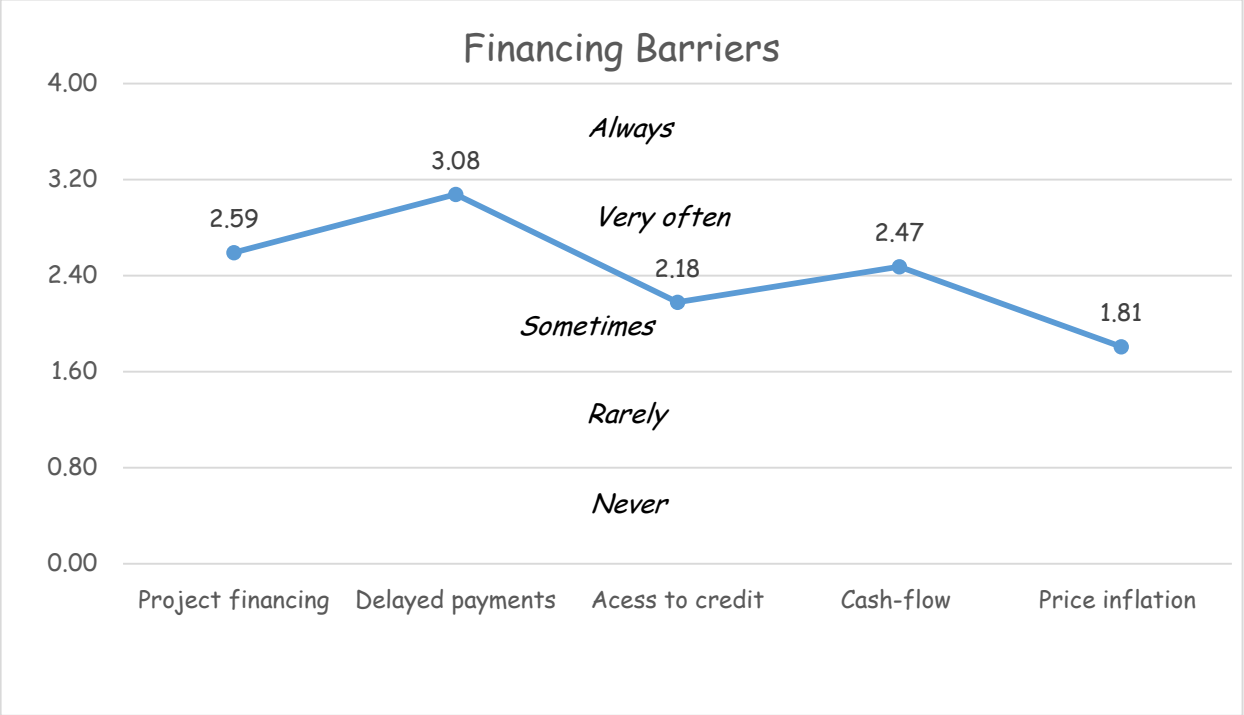

Figure 5: Financial factors

4.2.2. Corporate practice factors

Figure 5 below shows that all measured factors happen occasionally in the Lesotho construction industry. However, bureaucracy occurs more often as opposed to other factors.

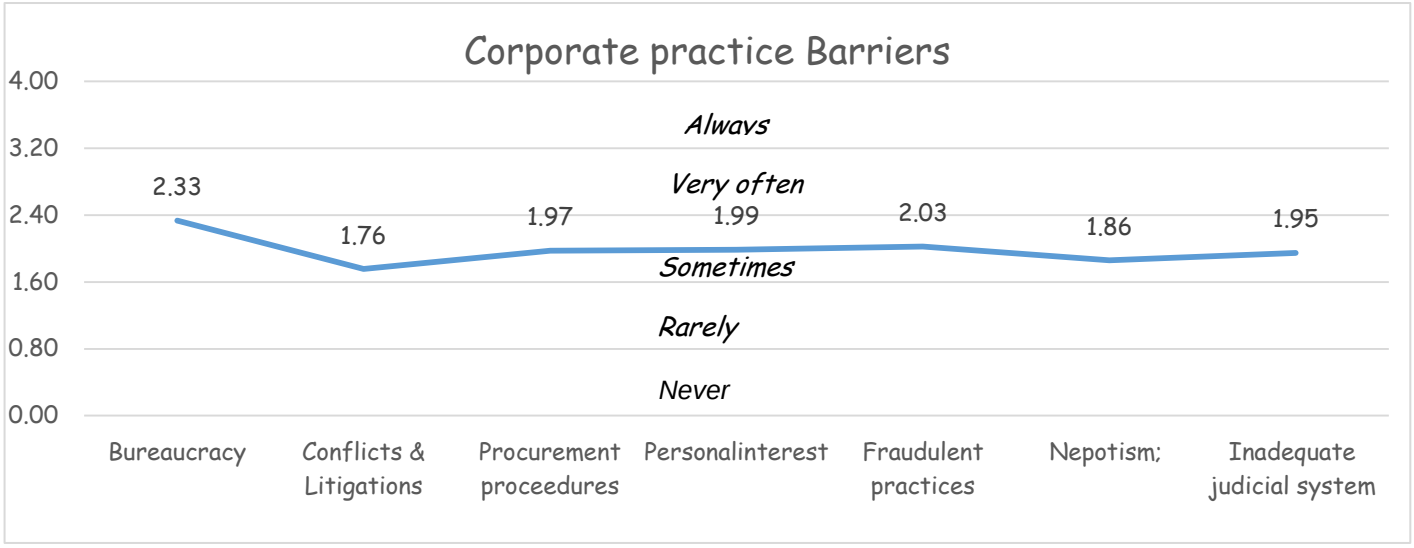

Figure 6: Corporate factors

4.2.3. Leadership and Management factors

Figures 6, 7 and 8 below indicate that the majority of leadership and management barriers happen occasionally, but are more inclined towards happening very often.

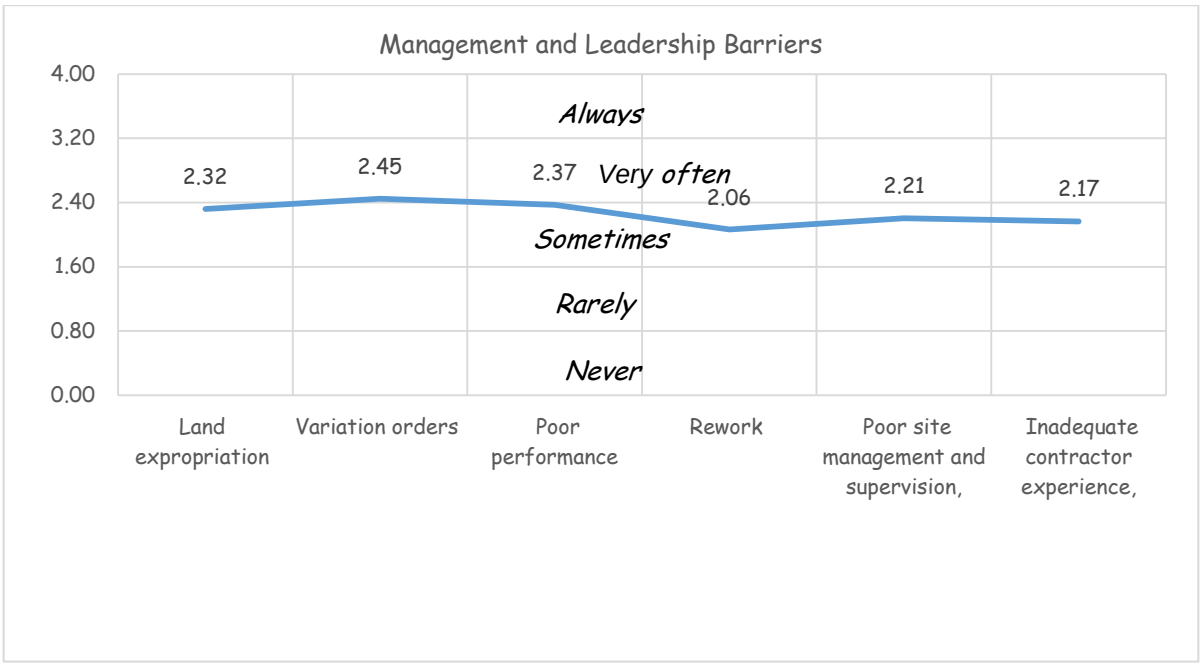

Figure 7: Leadership and Management factors

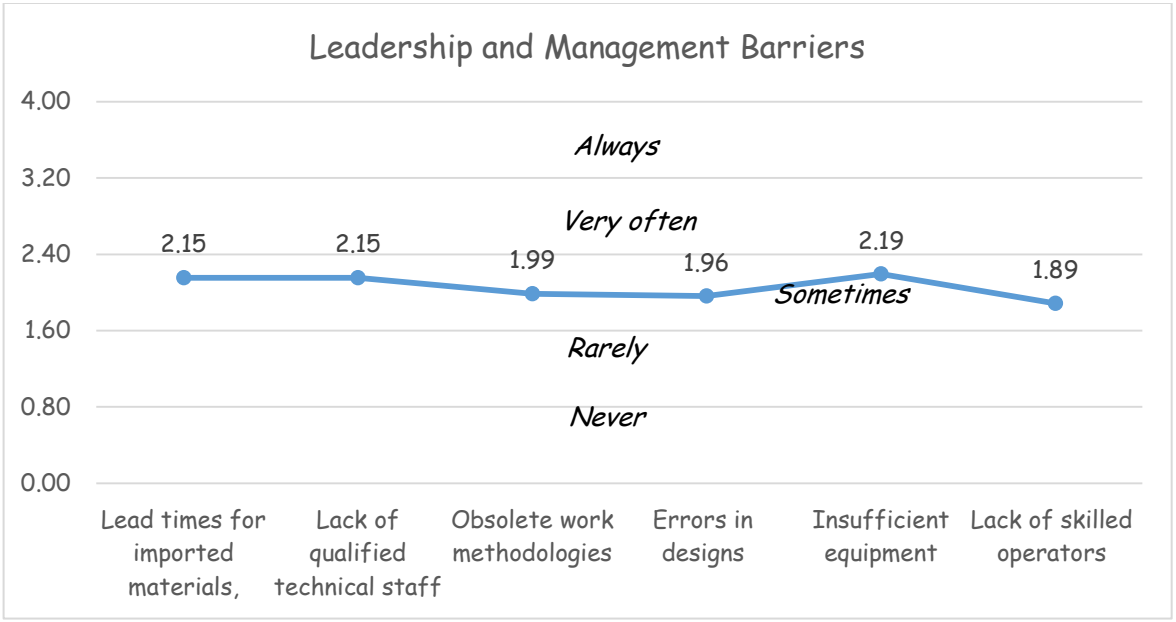

Figure 8: Leadership and Management factors

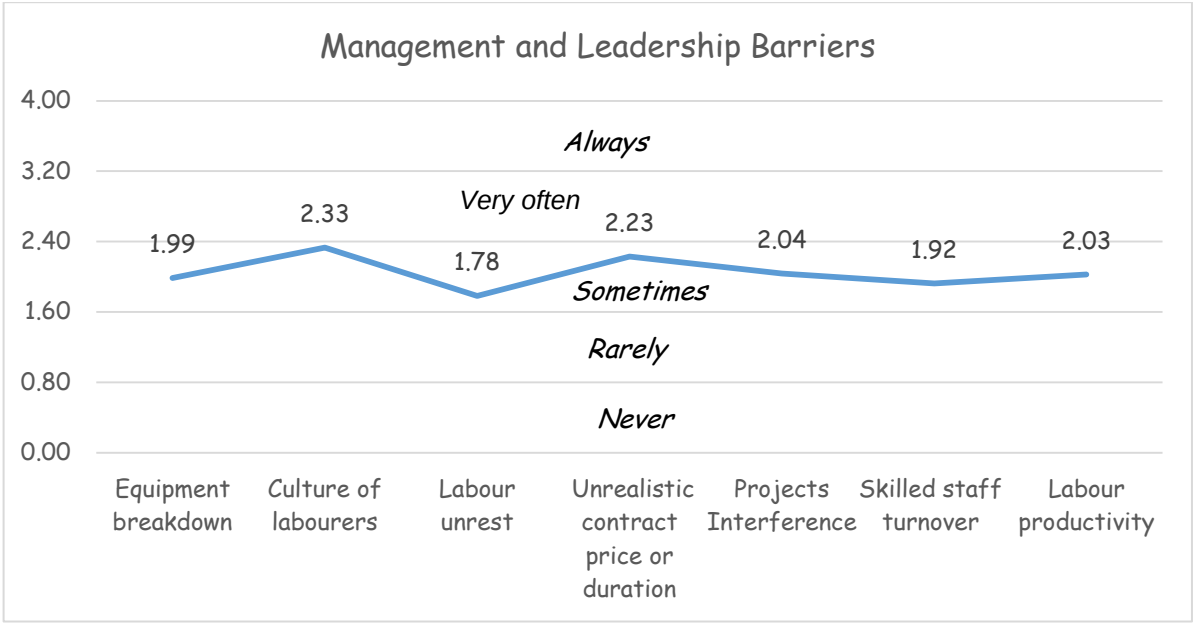

Figure 9: Leadership and Management factors

4.2.4. External factors

Figure 9 below depicts that external factors are not necessarily a barrier in the Lesotho construction industry. Force majeure factors happen rarely.

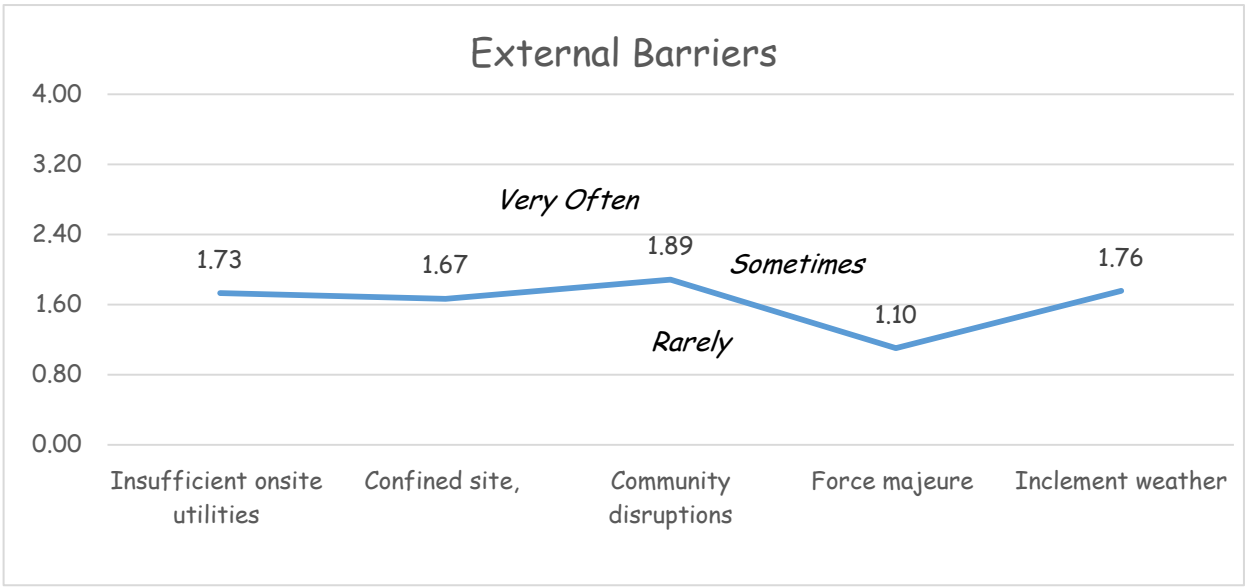

Figure 10: External factors

4.3. Correlation analysis

Table 5.3 below reports all correlating variables with a correlation coefficient above 0.52. The basic rule of thumb suggests a correlation coefficient between 0.5 and 1 to be strong. Conflict of

interest and fraudulent practices have a strong dependency and conflict of interest and nepotism in turn have the highest correlation coefficient of 0.72. The strong correlation does, however, not imply causality between variables. For instance, that as much as 37% of delayed payments can be explained by lack of project financing and about 41% of poor performance can be explained by lack of utilities does not imply that either of the two can cause another.

4.4. Chi-squared test

The Chi-Squared test gave a p-value of 2.2e-16 between the highly correlated variables. The p-value is below 0.05 which confirms and validates a strong dependency or correlation between the tested variables.

4.5. Comparison study

The researcher refers to results in the study by Kazaz et al. (2012, p.431). Kazaz et al. (2012) have drawn results from the following authors and countries:

- African countries:

Egypt (El-Razek *et al*. 1985), Ghana (Frimpong et al. 2003), Nigeria (Aibinu, Odeyinka 2006), and Zambia (Kaliba et al. 2009).

- Asian countries:
- Hong Kong (Lo et al. 2006), Indonesia (Kaming et al. 1997), Jordan (Sweis et al. 2008), Kuwait (Koushki et al. 2005), Lebanon (Mezher, Tawil 1998), Malysia (Zamba-sivan, Soo 2007), Thailand (Toor, Ogunlana 2008), UAE (Faridi, El-Sayegh 2006) and Saudi Arabia (Al-Kharashi, Skitmore 2009).
- European countries
  Turkey (2012), UK (Sullivan, Harris 1986) and Vietnam (Long et al. 2004)
  United States of America (Baldwin et al. 1971)

In this study, the researcher considered all African countries as they compare to Lesotho geographically and considered the recent studies from the rest of the counties, namely Jordan, Malaysia and Saudi-Arabia and Turkey. The results show that all the problems mentioned are generally present in all the countries.

Table 3: Correlation Analysis

Variable 1	Variable 2	Correlation co-efficient	Interpretation of results	Variable Group
Project financing	Delayed payments	0.61	Government projects are implemented on the basis of budget not necessarily the availability of funds. Slow acquisition of funds therefore results in delayed payments to contractors	Financial barrier
Conflict of Interest	Fraudulent practices	0.58	Conflict of interest often leads to fraudulent practices	Corporate practice barrier
Conflict of Interest	Nepotism	0.72	Bureaucracy; nepotism occurs in order to protect interest of individuals	Corporate practice barrier
Conflict of interest	Fraudulent Practices	0.62	Conflict of interest on its own leads to fraudulent practices	Corporate practice barrier
Nepotism	Fraudulent Practices	0.55	Illegal engagement of staff leads to those individuals carrying out fraudulent practices	Corporate Practice barrier
Inadequate judicial system for construction disputes	Nepotism	0.53	Companies are owned by individuals and there is little legislation to prohibit nepotism	Corporate practice barrier
Poor contractors' performance	Insufficient onsite utilities	0.64	Without adequate water, electricity and other resources and services, it becomes difficult for contractors to preform 'work adequately and to the desired quality/standard	Leadership and management and External barriers
Poor contractors' performance	Interference of other projects	0.54	Shuttling resources between projects results or dividing focus often leads to poor performance.	Leadership and Management barrier
Poor contractors' performance	Rework or rejected works	0.54	Poor quality work or unacceptable work gets rejected and requires to be repeated and this is also regarded as poor performance	Leadership and Management barrier
Lead times for imported materials	Lack of qualified technical staff	0.58	Inability to order material on time happens due to lack of planning and absence of other technical skills	Leadership and management barrier
Low labour productivity	Lack of qualified technical staff	0.55	Lack of technical skills results in under-utilisation of resources including labour resource	Leadership and management barrier
Poor site management and supervision	Lack of qualified technical staff	0.59	Lack of technical staff results in disruptive and chaotic site management and supervision	Leadership and management barrier
Poor site management and supervision	Use of obsolete work methods/technology	0.56	Traditional approaches to construction work are no longer relevant or applicable to the complex construction environment of today. Obsolete work methods lead to poor site management.	Leadership and Management barrier
Culture, low motivation and morale of labours	Lack of skilled operators	0.54	Poor operators create confusion for labourers which then demotivates them. Alternatively labourers with low motivation may not be eager to acquire training or skills	Leadership and management barrier

Factors that delay construction projects	AFRICAN COUNTRIES					OTHER COUNTRIES			
	Lesotho (*current study*)	Zambia (Kaliba et al. 2009)	Egypt (El-Razek et al. 2008)	Nigeria (Aibinu, Odeyinka 2006)	Ghana (Frimpong et al. 2003)	Turkey (*Kazaz et.al. 2012*)	Jordan (Sweis et al. 2008)	Malaysia (Samba-sivan, Soon 2007)	Soudi Arabia (Al-Kharashi,Skitmore 2009)
Financial factors									
Project financing	√	√	√	√	√	√	√		
Delayed payments	√	√	√		√	√			
Corporate practise factors									
Personal or conflict of interest			√						√
Fraudulent practices			√						√
Nepotism			√						√
Inadequate judicial system to resolve construction disputes									√
Leadership & Management factors									
Poor Contractor's performance,	√	√		√	√	√	√	√	√
Poor site management and supervision	√	√	√	√	√	√	√	√	√
Lead times for imported materials,	√	√	√	√					√
Lack of qualified technical staff	√	√				√	√	√	√
Rework or rejected work	√	√	√	√	√	√	√		
Lack of skilled operators		√				√	√	√	√
Culture, low motivation and morale of labours	√					√			
Interfering of other projects	√								
Low labour productivity levels	√					√			
External factors									
Insufficient onsite utilities									

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CHAPTER 5: Conclusion and recommendations

5.1. Introduction

Sustainability in this study refers to practices that ensure protection of environmental degradation, ethical social practices and efficient economical ways of doing things. Development of a sustainable construction industry in Lesotho therefore requires the establishment of policies that will enforce protection and/or conservation of natural resources and environment, job creation to improve quality of life of people and construction of infrastructure that is fit for use. Furthermore, a sustainable construction industry will enforce efficient construction methodologies that will eliminate construction waste. Efficiency is therefore key in achieving a sustainable construction industry.

Construction efficiency in this study was measured from barriers that inhibit the success of the three pillars of project management, namely cost, time and quality. Several sustainable construction barriers were identified from the literature and were investigated in the context of Lesotho. These barriers were then classified under financial, corporate practice, leadership and management as well as external categories.

5.2. Limitations of the study

This is a ground-breaking study in Lesotho. There is little or no research publications on the Lesotho construction industry. The study was limited to road construction contractors and the majority of these construction companies are led and managed by individuals without relevant technical skills. Poor record keeping results in lack of records to support or provide reference to some of the questions. The majority of the companies lack adequate experience to comment objectively on the subject as the economy of Lesotho is relatively small to ensure their active participation.

5.3. Barriers to the establishment of a sustainable construction industry in Lesotho

5.3.1. Financial barrier

The study identified project financing and delayed payments as key constraints to the establishment of a sustainable industry in Lesotho. The two factors were found to have a strong correlation of 0.61 which imply that 37.2% of the results is common between the variances of the two variables. Notwithstanding the significance of cash-flow problems, a relatively weak dependency was observed between cash-flow with either project financing or delayed payments.

Project financing and delayed payments were found not to be unique to the Lesotho context as studies in Zambia, Egypt, Ghana, Turkey and Jordan reflect similar problems. Lessons can be learned from Malaysia and Saudi Arabia where studies reflect that these countries are not faced with challenges of project financing and delayed payments.

5.3.2. Corporate practice barriers

The consequential effects of unethical behaviour are detrimental to the country's welfare, environment and construction safety. It is therefore critical for any construction industry to develop a robust governance through bureaucracy reforms and stringent law enforcement. Factors related to corporate practice were not found significant in the Lesotho construction industry. However, the study established a strong dependency between nepotism, conflict of interest, fraudulent practices and inadequate judicial laws that govern the construction industry. The study shows that nepotism and personal interest have the strongest correlation of 0.72 among all other factors investigated. However, factors related to corporate practice were not found significant in the Lesotho construction industry.

Among the countries under consideration, Egypt and Saudi Arabia are the only countries battling with these corporate practice factors. It is, however, paramount for the Lesotho construction industry to take preventive measures against these factors.

5.3.3. Leadership and Management barriers

Lack of leadership and management seems prevalent in the Lesotho construction industry. Barriers relating to leadership and management accounts for 65% of the top 20 barriers in the Lesotho's construction industry. These variables have a strong correlation with one another as well as with other variables. Poor contractors' performance and lack of qualified technical staff were found to be the most dominating factors.

In terms of comparisons among countries, research shows that the problem of utter lack of leadership and management in construction industry is endemic. Countries such as Malaysia and Saudi Arabia, which enjoy strong financial support, also struggle as a result of similar factors.

5.3.4. External barriers

Certain factors are often beyond the control of construction companies or industries as a whole. These factors entail what is normally referred to as "Acts of God" or local conditions. Approval of authorities was found to be a significant external factor in Lesotho's construction industry. Notwithstanding its significance, a weak correlation exists between approval from authorities and other investigated variables. However, a strong correlation of 0.64 exists between contractors' performance and availability of water supply, electricity and other state resources. On the other hand, research shows that construction projects these countries do not struggle with availability of onsite utilities.

5.4. Summary and Recommendations

The construction industry in Lesotho is highly labour-intensive, making it an opportune country to give potential jobs and income to future generations and communities, and hence, alleviate poverty. The inefficiency in Lesotho's construction industry therefore undermines the capability of this sector in yielding optimum contributions to economic growth and socio-economic development. Furthermore, it is paramount to note from the study that the country's construction industry fails to embrace environmental practices, which then leads to excessive consumption of resources, land degradation, air and water pollution, loss of habitats, and high energy usage. According to Ofori (2012), construction industry inefficiencies and lack of sustainability have inspired countries such as

Singapore, India, Malaysia, Ghana, Hong Kong and Uganda to establish construction development agencies in order to enhance their industry's performances.

On the basis of this study, it is recommended that the Lesotho construction industry adopt a controlled and deliberate process that will improve its capacity and efficiency in order to maximise its contribution to economic growth. However, it is imperative to acknowledge impediments such as economic weaknesses and insufficient skills to support the desired construction industry development. The manifestation of these problems has resulted in a shortfall in terms of achieving targets in respect of time schedules, budgets and specified quality, which then renders the industry inefficient.

In combatting the barriers identified from this study, Lesotho's construction industry should integrate the construction industry value chain to enhance productivity and efficiency as well as enforce regulation that will assist in strengthening the image of the construction industry. Furthermore, it is recommended that the industry invest in education and training of engineers, research and development (R&D) in construction as well as leveraging on already available research information and construction technology in order to mitigate the existing knowledge gap.

The establishment of a Local Construction Industry Development (LCID) in Lesotho is essentially critical in order to comprehensively review the current state of the industry and identify crucial issues as well as formulate tangible goals that will enhance the industry's performance and ensure achievement of continuous development. Amongst others, the quality of the design is identified as one of the key challenges in Lesotho's construction industry and this has a significant impact on the physical output infrastructure, which is the nation's economic backbone that is meant to form the arteries for the facilitation of productive activity by enabling distribution of goods and services. The LCID will then play a pivotal role in influencing competition within the construction sector.

The strategic role will require LCID to ensure development of long and short-term plans, policies, initiatives, procedures and communication channels that will give guidance to prioritisation of infrastructure projects required to attract foreign investment. Furthermore, it is imperative for the LCID to fully appreciate the intricate relationships between

Lesotho's construction industry and other sectors of the economy in order to militate its efficiency.

Sustainable construction industry development is deemed to integrate human skill and technology development, corporate and entrepreneurial development, materials and operating environment development, and the development of documentation and procedures (Ofori, 2012). It further presents opportunities that can provide impetus and support for instilling a culture of integrity and accountability that will promote socio-economic and environmental sustainability in the Lesotho construction industry.

The onus lies with the Lesotho Government to ensure facilitation of a growth enabling environment for both established and emerging construction enterprises. This as suggested by the study requires local enterprise protection policies in order to secure interest of local companies while ensuring a concurrent development of technical staff, wealth and professional ethics. Contractor's categories is basically being used as measure of contractors' development and it measures company turnover and the size of previous contracts; Martin and Root, (2012) ague that these alone do not reflect all development aspects. It should be understood that the success of establishing a sustainable construction industry is underscored by the competitiveness of the construction industry.

5.4.1. Implications for further study

Further research will be necessary to unpack and validate the results obtained in this research through an inclusive survey that encompass all construction sectors companies such as buildings, water and electricity. Furthermore, it will also be critical for future research to distinguish between public and private projects for comparison.

ABSTRACT

The study identified barriers to the establishment of a sustainable construction industry in Lesotho. The researcher grouped these barriers into four categories, namely: financial, corporate practice, leadership and management, as well as external factors.

A quantitative research design was used to evaluate which of the identified factors are applicable to Lesotho's construction industry. This unrestricted probability sampling strategy consisted of multiple questions critical in evaluating the significance and relevance of the identified factors to the Lesotho construction industry and assist in further confirming the existence of issues unique to Lesotho's construction industry. Lesotho has a small economy, which results in only a few active construction industry role players. A questionnaire survey was convenient as most companies have centralised their offices or operations in Maseru, which is the capital city. The representative sample consisted of contractors registered with the Lesotho Roads Directorate.

Project financing, delayed payments, cash-flow problems and access to credit were found to be the predominant financial barriers in the Lesotho construction industry. Conversely, the study revealed barriers relating to corporate practice and external factors as the least problems; bureaucracy, procurement procedures and delays resulting from obtaining approval from authorities were found to be significant. Leadership and management barriers were found to be widespread in Lesotho's construction industry. The study established a strong correlation between the shortage of qualified technical staff and several operational issues such as poor performance, lack of experience as well as poor site management and supervision. The strong correlation might imply causality between these variables.

The barriers identified as significant in Lesotho were similarly found to be prevalent in other countries. The study proposed establishment of a local construction industry development board to lead policies towards good sustainable practices, regulations and promotion of cutting-edge technology in the construction industry. The core mandate of the board should be the establishment of a socially, environmentally and economically sound practice in the Lesotho construction industry.

Key words: Lesotho, construction industry, economic growth, sustainability, development, Lean Construction

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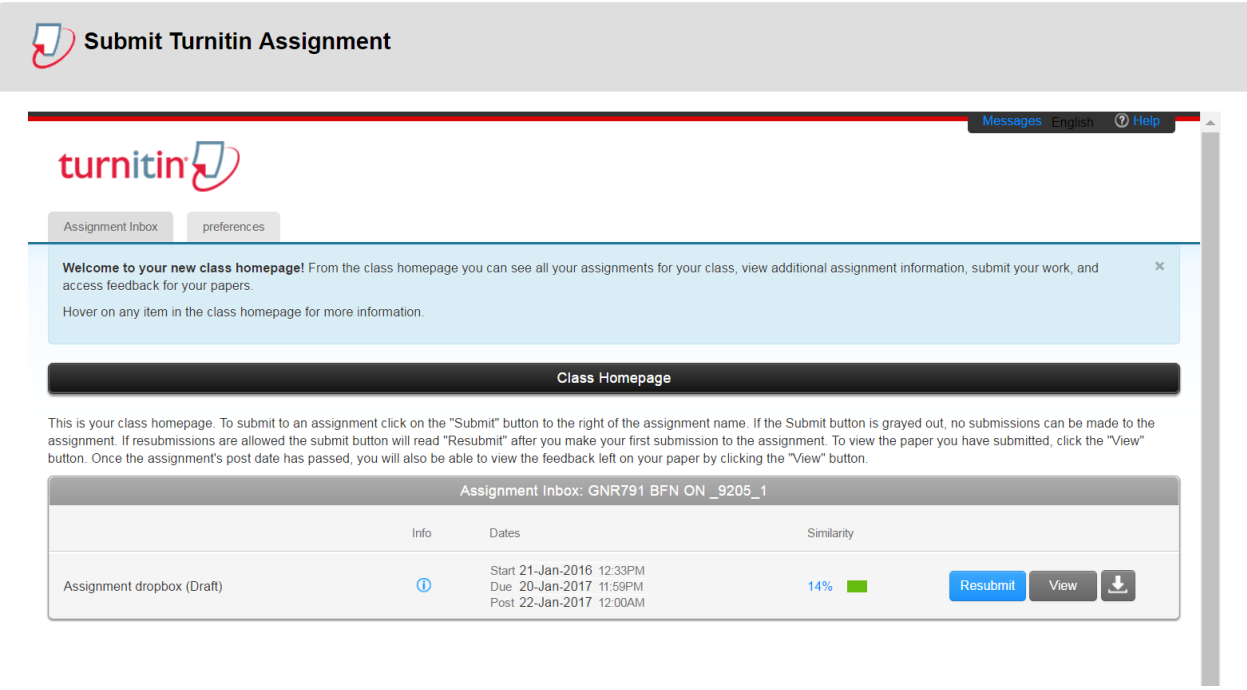
APPENDICES

Appendix A: Turnitin Score



Appendix B: Coded data set

Appendix C: Correlation Analysis