Delays in Completion of Building Construction Projects in the Botswana Public sector by Medium to Large Category C, D and E Contractors

By

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DECLARATION

I, Joseph Musuya, hereby declare that this treatise is entirely my own work, except where otherwise stated and has not been produced in any manner or form before. All sources consulted are adequately acknowledged in the text and listed in the bibliography.

Signed:

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Student

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ABSTRACT

TITLE OF TREATISE: DELAYS IN COMPLETION OF BUILDING CONSTRUCTION PROJECTS IN THE BOTSWANA PUBLIC SECTOR BY MEDIUM AND LARGE CONTRACTORS

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A contract between a prospective building owner and a building contractor is rather like a contract of sell between a buyer of goods and the seller. What makes the building contractor different from the seller of goods, however, is that unlike the seller of goods who deals in identical ready-made goods, the building contractor deals in unique goods that must be assembled at a unique location. One of the essential features of a building contract is that the time or period for performance by the seller, in this case the building contractor is agreed in advance. The delivery of a building project by the contractor to the building buyer or client within the contractually agreed timeframe is, however, in reality rarely achieved. This is because the unique nature of each building project in terms of project characteristics such as design, size, complexity, quality, and location pose unique challenges to the building contractor. A review of literature on the

subject revealed that in developed countries where the building industry is expected to be quite efficient, at best, only about 20% of building projects are delivered within the agreed time period. The performance in the building industry in the Republic of Botswana, a developing economy, is not as good as in the developed countries. The performance of indigenous or 100% citizen contractors in Botswana is even more suspect, and has been the subject of much debate in this developing Southern African country.

This research study compared the performance of, medium to large, 100% citizen contractors and non-citizen contractors, in terms of the extent of delays in the completion of building projects. It was found that the extent of delays in the completion of building projects in the republic of Botswana is indeed higher for citizen contractors when compared with non-citizen contractors. A study of the effect of inexcusable or contractor caused delay factors on building projects carried out and completed by the two categories of contractors also revealed that citizen contractors are more adversely affected by the inexcusable delay factors when compared with the non-citizen contractors. The outcome of the study also appeared to suggest that the difference in the performance of the two categories of contractors was a result of the effect of inexcusable delay factors. Finally, an examination of the inexcusable delay factors that appeared to predominantly affect projects undertaken by citizen contractors showed that management related delay factors were the major contributors to the total inexcusable delays. This led to the conclusion that that the poor performance of the medium and large 100% citizen contractors, when compared with the non-citizen contractors, in the Republic of Botswana, was the result of deficiencies in the management of building projects.

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LIST OF ABBREVIATIONS

BIDP - Botswana institute of development professionals

PPADB – Public procurement and asset disposal board

DBES - Department of buildings and engineering services, ministry of public works, Botswana

BEPU - Boipelego education project unit, ministry of education, Botswana

MOW - Ministry of works, Botswana

CL - Common law applicable in Botswana

PS – Permanent secretary, who is the administrative head of each government ministry in Botswana.

CHAPTER 1
INTRODUCTION

1.1 Introduction

The construction industry in Botswana is an important segment of the economy and contributes significantly to the national capital formation, the national income, and employment creation. The government funds about 70% of the building construction activities in Botswana. The majority of these construction projects comprise primary and secondary school facilities, health facilities, ranging from clinics to medium size hospitals, police stations, sports facilities, staff housing projects and staff offices, among others. Due to the nature of the building industry as a supplier of infrastructure to society, it is not surprising that there is always concern in regard to its performance. The following are some of the main areas of concern in Botswana in this regard:

- Contractors abandon construction projects before completion for reasons that are not clear to the public.
- Delay in completion of projects is a common occurrence in the industry.
- The problem of delays in completion of building construction projects appears to be mainly prevalent among citizen construction firms.

This research study was meant to shed light on some of the issues in regard to the above concerns.

1.2 The Research Problem

The study proposes to identify the extent of delay and the inexcusable causes of delay in completion of building construction projects by citizen construction firms on the one hand and non-citizen construction firms on the other hand in Botswana. The study also compares the extent of delay and the inexcusable causes of delay among the two groups of building construction firms in order to

explain the high incidence of delay in completion of building projects by citizen building construction firms.

1.2.1 Sub-Problems

The sub-problems to be investigated in this study are:

1.2.1.1 What is the extent of delay in general and what are the inexcusable causes of delay on building projects undertaken by citizen construction firms?

1.2.1.2 What is the extent of delay in general and what are the inexcusable causes of delay on building projects undertaken by non-citizen construction firms?

1.2.1.3 How does the extent of delay and the inexcusable causes of delay relating to citizen firms compare with that of non-citizen firms? Can this comparison be used to explain the high incidence of delays in building projects undertaken by citizen contractors?

1.3 Hypotheses

The hypotheses for this study are:

- The extent of delay in completion of building projects in the Botswana public sector is generally high among building projects undertaken and completed by citizen contractors.
- The extent of delay in completion of building projects in the Botswana public sector is generally low among projects undertaken and completed by non-citizen contractors.
- The reason for the higher extent of delays among projects undertaken and completed by citizen contractors is poor management.

1.4 Delimitations of the Research

The delimitations of the research for this study are:

- The study was conducted on public sector projects only. The public sector accounts for about seventy percent of the building construction industry turnover in Botswana.
- The study involved construction firms registered with the public procurement and asset disposal board, category C, D, and E and above as defined in table 1. The reason for this limitation is that categories OC, A, and B as per table 1 are relatively small and predominantly 100% citizen owned. Category C and above, on the other hand, are medium to large firms comprising a mix of citizen owned and non-citizen owned firms that are required for this study.
- The study involved projects undertaken using either the ministry of works' standard form of building contract or the Botswana Institute of Development Professions (BIDP) form of building contract. Projects undertaken using any other form of contract were not included in the study.
- The study was conducted on projects that commenced not earlier than January 2000 and were completed before July 2004.

1.5 Definition of Terms

Terms used are defined as follows:

- Delay, in the context of the proposed study, refers to failure to complete a building project within the planned and/or contractually agreed building period.
- A citizen firm, in the context of the proposed study, refers to a firm that is 100% owned by Botswana citizens.

- A non-citizen firm, in the context of the study, refers to a firm that is not 100% owned by Botswana citizens.
- Public sector projects, in the context of this study, means projects undertaken under the supervision of the ministry of works and transport – Department of Buildings and Engineering Services (DBES), projects undertaken by the various local authorities, such as district councils and city/town councils, and projects supervised by the Boipelego education project unit (BEPU).

1.6 Assumptions

The assumption is that the projects personnel within government departments and consultant teams, such as architectural firms who supervise government building projects, are aware of the reasons for contractor caused delays. This is because these are the people who furnished the researcher with the information by way of questionnaires. It is assumed that if construction firms were approached to furnish the same information, it would match with that provided by the supervising teams of consultants. In case this assumption is not true, then a similar study targeting construction firms as the source of information needs to be carried out and the result compared with this study.

1.7 Importance of the Study

Delays in the completion of building construction projects impacts negatively on both the clients and construction firms. From the perspective of the construction firm, completion of projects within the time allowed for has the following advantages: -

- Project profits are earned within a shorter time
- Resources are released earlier for use on other projects

- There is no payment of liquidated and ascertained damages in Botswana, or penalties in the case republic of South Africa, by the firm for failure to complete the work within the time allowed for in the contract.

From the perspective of the client/employer/government, delay in the completion of projects has the following disadvantages: -

- Loss of interest
- Additional expenses in regard to the rental of alternative premises because of the delay in the planned occupation of their own premises.
- Loss of the benefit of using one's own facilities during the period of delay in completion for public sector projects.

It is clear from the above that delay in completion of projects is costly to both the client/government and the construction firm. It is envisioned that the result of the study will assist construction firms and the client/government to reduce the high incidence of delays in the completion of projects and thereby increase efficiency in the use of resources.

1.8 The Data and the Treatment of Data

1.8.1 The Data Needed and the Means for Obtaining the Data

The data was collected by means of questionnaires. The following information was obtained through questionnaires in regard to each building project included in the study: -

- Whether the construction firm carrying out the project is 100% citizen or non-citizen.
- The size of the construction firm. The size of firms ranges from category OC that is the smallest size, to category E and above, which is the biggest size. See the table below for more details:

Table 1: Categorisation of Building Contractors in Botswana by the Public Procurement and Asset Disposal Board (PPADB)

CATEGORY OF FIRM	MAXIMUM ALLOWABLE VALUE OF PROJECTS UNDERTAKEN BY FIRM (PULA)
GRADE OC	300000
GRADE A	900000
GRADE B	1 800000
GRADE C	4 000000
GRADE D	8 000000
GRADE E	UNLIMITED

- The original contractual duration of the project.
- The actual duration of the project for completed projects.
- The total delay
- The total delay attributable to the employer.
- The total delay attributable to the construction firm.
- The total delay outside the control of the employer and the construction firm.
- The various inexcusable causes of delay or the delay factors attributable to the contractor
- The extent of delay that resulted from each of the inexcusable delay factors.
- The type or form of contract used

The following are the sources of the data: -

- Department of Buildings and Engineering services, Ministry of Public Works.
- Buildings departments for district councils and city councils
- Consultant architectural, project management, or quantity surveying firms in charge of government projects. All projects that were targeted for the study were identified in advance based on preliminary information obtained from the client government departments. The projects were then randomly distributed among the various respondents in such a way that each project was allocated to only one respondent. The respondents were eventually requested to complete questionnaires in connection with the projects that had been randomly allocated to them. This ensured that there was no duplication of data that was received from the various sources.
- Boipelego education projects unit (BEPU)

1.8.2 The Research Methodology

The research was quantitative in nature. Data was collected from the field and analysed. Conclusions, based on the trends shown by the data were then made. A detailed description of the research methodology can be found in chapter 3.

1.8.3 The Treatment of the Data for Each Sub-Problem

The data in regard to the study was numerical in nature. Therefore tables, and bar charts were used as a basis for the organisation and illustration of the data for all the sub-problems. A detailed description of the treatment of data for each sub-problem can be found in chapter 3.

1.9 An Outline of the Proposed Study

The preparation of the questionnaires for the study was done in October 2003. Collection of data for the proposed study took place between April 2004 and July

2004. The analysis and interpretation of the data were done between August 2004 and September 2004.

CHAPTER 2

LITERATURE REVIEW

2.1 Introduction

Time for completion of a building construction project is one of the key factors that determine either the success or failure of a project. Kerzner (2001:5) asserts in this regard that project success includes completion:

- Within the allocated time period
- Within the budgeted cost
- At the proper performance
- With acceptance by the user/customer
- With minimum or mutually agreed upon scope changes

Brummer (2003:6) continues on the same subject as follows:
"The completion date of a building project forms a part of the essentialia of the contract and as a result is an extremely important milestone that the building contractor must achieve in the execution of the work."

It appears, however, that the completion of building projects within the planned building period is a rare occurrence. This statement is justified by the following extracts from the Botswana printed media:

Parents, teachers and students took to the streets on Monday to protest the stalled construction and refurbishment of Francistown senior secondary school buildings. (Mmegi Newspaper; 12th September 2003:P12)

We have too many contractors, mainly locals that have not been able to complete their projects within the time frame stipulated in their contract, and

worse still are these with a tendency to completely abandon their projects causing so much misery and inconvenience to the public (Mmegi newspapers; 12th March 2004:P12)

It is noted that construction is a complicated process involving many uncertainties due to the fact that each building project is unique in terms of scope, quality, design, location, management and form of contract; no two projects can be identical. Consequently, it is rather difficult to complete projects within predetermined time limits, as is the case with the manufacturing industry that produces identical products under factory-controlled conditions. Building projects are normally carried out in an environment that keeps changing and may not conform to the original forecast. It is therefore quite difficult to manage projects within the constraint of time.

Despite the difficulties mentioned above, it is possible to reduce the incidence of delays in completion of projects through a better understanding of the factors that influence the building project environment. Two of these factors have been identified for purposes of this study. The two factors are:

- The legal framework within which the project is undertaken
- Management

2.2 The Legal Framework within the Building Construction Environment in Botswana

According to Nigel et al (2000:37), failure of one party to the contract to perform and/ or to accept the performance of the other party timeously constitutes breach of contract. The law, therefore, provides protection to both parties to a building contract in the event of delay. The remedies availed by operation of the law of contract to protect the building client from possible delay of projects include the following:

- Cancellation of the building contract
- Claim for damages

Cancellation is, generally, an extreme measure that may not be available to the building client unless the nature of the breach is of a very serious nature. Building clients, in most cases, rely on the damages remedy to cushion themselves against the effects of delay. Damages, as a remedy is normally available either on its own or in conjunction with a claim for cancellation. Smith J C (2002:217) states the following in regard to damages:

"The object of damages, so far as money can do it, is to put the party injured by a breach in the same position as he would have been in had the contract been performed. How well off would he have been if the contract had been performed? How well off is he now? The difference is the measure of damages. If, for instance, a seller refuses to deliver the goods, and if there is a market for similar goods, the buyer can buy them and recover from the seller the difference between the contract price and (assuming it is greater) the market or current price of the goods at the time when they ought to have been delivered."

Adams N S et al (1994:170) has the following to say in regard to damages:
"The object of damages, in so far as money can do it, is to place the injured party in the same situation, with respect to damages, as if the contract had been performed."

2.2.1 The Common Law [CL]

The common law on the other hand appears to provide protection to the building contractor from the consequences of delay in completion of building projects as a result of circumstances beyond his control. Indeed, according to Finsen (1999:140:
"The common law rule is that if the contractor, through no fault of his own, is prevented by supervening circumstances from completing the works by the due date, he will not be liable for damages."

Such supervening circumstances include the following:

- Natural disasters such as an earthquake or floods
- Exceptionally severe weather
- Civil disturbance
- Strikes
- Other unforeseeable events
- Acts of the employer, whether acting within his contractual rights, such as ordering additional work, or in breach of the agreement, such as handing over the site late.

Finsen (1999:140) goes on to say that in the above circumstances;

"The contractor would be relieved of his obligation to complete the works by the agreed date and would be obliged to complete only within a reasonable time. Time would then be said to be 'at large'. The employer would not be able, in such circumstances, to revive his right to liquidated damages by allowing the contractor additional time to complete the works – he has no right unilaterally to alter a term of the contract. Because of this difficulty, nearly all building contracts contain an express provision that entitles the contractor to additional time on the happening of such events."

Clause 20 of the Ministry of Public Works form of building contract and clause 23 of the BIDP form of building contract provides for extension to the building period by the client/employer.

Clearly, the common law ensures that the contractor does not shoulder the burden arising from delays to a building project occasioned by factors beyond his control. It would appear that in the absence of an extension of time provision in a building contract, the risks associated with delays in completion of a building project would be apportioned in accordance with the common law provisions.

2.2.2 The Standard Forms of Building Contracts in use in the Botswana public sector

The following are the forms of building contract in use in the Botswana public sector: -

2.2.2.1 Schedule and Conditions of Building Contract-Incorporating Bills of Quantities [Ministry of Works - MOW]

The ministry of public works makes use of this form of contract for most of the central government building projects.

2.2.2.1.1 Clause no 18 requires the contractor to: -

a. Take possession of the site on or before an agreed date of possession.
b. Forthwith begin the works after possession of site and regularly proceed with the same.
c. Complete the works [except such painting, papering or other decorative work as the Permanent Secretary (PS) may instruct him to delay] on or before the agreed completion date, subject to the provisions of the extension of time clause.

The first obligation in this case is for the contractor to take possession of the site as per the agreed date and commence with the works. The second obligation is for the contractor to proceed with the works regularly after commencement of the same. The expression “to proceed regularly” means to “proceed continuously, at reasonable tempo”. Other contracts such as the Republic of South Africa building contracts use the phrase “to proceed diligently”. The third obligation which forms the subject of this study is for the contractor to complete the works within the agreed timeframe.

2.2.2.1.2 Clause 20 summarises the events whose occurrence will result in the extension of the construction period, and hence give rise to a revised date for completion. These events are as follows: -

a) *If the works are delayed by force majeure*: This expression has its origins in French law. According to French law, as explained by Marsh PDV (1994:199), force majeure is defined as "*an event, which is unforeseeable, irresistible, and external to the debtor. Also, it must not have been due to his fault. A natural event such as rain must be of a wholly exceptional nature; a true calamity never experienced since records have been kept. The event must be insurmountable regardless of the extra expense to which the contractor may be put in overcoming the obstacle to the performance of the contract*." It is clear from the above definition that, events that would qualify to be referred to as "force majeure", may be very rare indeed. Such events may include exceptionally severe floods, earthquakes, unforeseen and exceptionally severe prolonged drought or lack of rain leading to acute shortage of water for the works, and other similar natural disasters that the contractor has no control over. It would be advisable, however, for the parties to have consensus at the time of entering into the contract as to what exactly constitutes "force majeure" so as to avoid disputes.

b) *If the works are delayed by exceptionally inclement weather*: According to Finsen (1999:141): "This is one of the supervening circumstances over which he (the contractor) has no control that would, in common law, excuse late completion". The contractor is supposed to have allowed for interruptions to the progress of the works arising from normal weather conditions and as such he takes the risks associated with such delays. What is "normal weather" in northern Botswana may turn out to be "exceptionally inclement weather" or severe weather conditions in southern Botswana, depending on what is considered "normal weather" in the two locations. Richter (page 76) states the following in this regard: "*Temperatures in the middle east and equatorial Africa during the summer months are commonly over 100 degrees Fahrenheit; sandstorms in Saudi Arabia during the summer are prevalent, while conditions are severe during the rainy season in the Ivory coast. These kinds of weather*

conditions may be unusually severe weather conditions in your home country but not at these locations". Clearly, if the weather experienced at any time during the construction process is more severe than that which could have been expected based on previous experience or records, then the contractor is entitled to extension of time. An example of severe weather is the "El nino phenomenon" which resulted in excessive rains in Botswana in the year 2001. Discussing the effect of excessive/severe rains, Finsen (1999:141-142) argues that delay caused by severe rains must include not only the period when the rain falls, but also the period when the site is so waterlogged after the rains that it is impossible to carry out certain work sections such as earthworks. Other forms of severe weather would include abnormally hot weather or abnormally cold weather, and severe winds. Severe winds may for instance render work by some trades such as laying of roofing sheets impossible. The starting point in the administration of this clause is to define what is "normal" or "ordinary" weather in a particular locality. Based on this definition, one is able to identify "severe" weather conditions that adversely affect the progress of a construction project. One must then quantify the delay caused by the inclement weather in days/weeks, and revise the date for completion.

c) *If the works are delayed by reason of the Permanent Secretary's (PS's) instructions given in pursuance of clause 1 or in consequence of the contractor not having received in due time necessary instructions from the PS for which he shall have specifically applied in writing*: The definition of PS's instructions is given under clause 1. The position is that the contractor is entitled to extension of time only if such an instruction is not occasioned by his own default and it delayed practical completion of the works.

d) If the works are delayed due to a civil commotion: A civil commotion is a situation characterised by lawlessness such as in a riot. It is one of the

common law supervening circumstances that would excuse the contractor from the obligation to complete by the date for completion.

e) If the works are delayed due to a local combination of workmen: This refers to a situation whereby employees of construction firms in a particular locality resort to actions that cause delay to the various works for reasons that are not attributable to any one contractor in isolation.

f) If the works are delayed due to a strike or lockout affecting any of the trades employed upon the works. Upon the happening of a strike or lockout, the contractor shall immediately give notice thereof in writing to the PS but he shall nevertheless use constantly his best endeavours to prevent delay and shall do all that may reasonably be required to the satisfaction of the PS, to proceed with the works: Finsen (1999:143) states the following in regard to civil commotion, strikes and lockouts: “This is a wide category of supervening circumstances causing delay, all of which must be unforeseeable and beyond the control of the contractor”. Nel et al (2001:110) defines a strike as “the partial or complete considered refusal to work or the retardation or obstruction of work by persons who are or have been employed by the same employer or by different employers for the purpose of remedying a grievance or resolving a dispute in respect of any matter of mutual interest between employer and employee. A lockout on the other hand is defined as the exclusion by an employer of employees from the employer’s work place for the purpose of compelling the employees to accept a demand in respect of any matter of mutual interest between employer and employee, whether or not the employer breaches those employee’s contracts of employment in the course of or for the purpose of that exclusion”. The legal position is that the contractor is also entitled to extension of time in the event of a strike that may not necessarily affect his employees or the employees of his subcontractors, but which nevertheless interferes with the progress of the works, and thus lead to delays.

g) If the works are delayed due to a delay on the part of nominated sub-contractors or nominated suppliers which the contractor has, in the opinion of the PS taken all practical steps to avoid or reduce: This clause recognises that since nominated sub-contractors and nominated suppliers are appointees of the employer, it is not fair to hold the contractor responsible for their conduct. The contractor is therefore excused from completing by the date for completion and is entitled to extension of time if the progress of the works is negatively affected by the aforementioned appointees of the employer.

h) If the works of other contractors or tradesmen engaged by the employer that are not referred to in the Bills of Quantities delay the works: Clause 24(c) requires the contractor to "permit the execution of work, not provided for in the bills of quantities, by artists, tradesmen, or other like persons engaged by the employer". As discussed under (g) above, the provision protects the contractor from the risks of delay arising from the employer's direct appointees. These direct appointees' of the employer may be nominated sub-contractors as per "g" above or artists and tradesmen referred to in this particular case.

i) If any of the above events occur, the Permanent Secretary or PS (employer) is obligated to make a fair and reasonable extension of time for completion of the works. Sawyer (1981:53) states the following in this regard: "*As a matter of general principle, provided the contractor has followed the procedure of submitting full and detailed particulars of his request for an extension of time, it should be granted to him notwithstanding the fact that it might appear that he has no need for such an extension particularly if it is obvious that he would complete the work well within the agreed time for completion. Whether he needs it or not is not the criterion – it is an entitlement to which he has a right if circumstances so dictate".* The above observation should be applicable

when administering clause 20. It is noted that this form of contract is silent on the procedure to be followed by the parties should any of the supervening circumstances mentioned under 2.2.2.2.2 (a)-(h) occur. The clause just provides that "*in the event of any of the above happening, the employer shall make a fair and reasonable extension of time for the completion of the works*". It is suggested that a procedure should be set out to avoid confusion.

2.2.2.1.3 Clause 19 requires the contractor to pay liquidated and ascertained damages for non-completion if he fails to complete the works by the agreed date of completion:

In the Republic of South Africa and Namibia, the standard building contracts normally provide for penalty clauses as opposed to the liquidated and ascertained damages' clauses.

The common law position in regard to damages provisions in contracts is very well articulated by Smith, JC (2002:230):

"If the sum is a genuine estimate of the actual damages likely to be suffered in the event of breach, the term, known as a liquidated damages clause, is enforceable. If however the sum fixed is not a genuine estimate but is greater than any loss likely to be caused and is intended to operate as a threat to keep a potential defaulter to his bargain, it is described as a penalty clause – and is not enforceable. The injured party can recover no more than the loss actually sustained by him as a result of the breach".
Sawyer, (1981:32), on the other hand puts it thus:

"The amount of liquidated damages is intended to be a pre-assessment by the employer of the damage he will suffer on either daily or weekly basis should the works not be completed and he is not able to take possession of them at the appropriate time. The amount of damages can vary considerably in value

according to circumstances; Liquidated damages are intended to be a commercially calculable figure which bears a relationship to the realities of the costs expected to be incurred by the employer if unable to occupy the works on time and in no way should be regarded as a penalty upon the contractor".

It is noted, however, that whereas the pre-assessment of liquidated damages may be somewhat easier for building projects, it may prove quite challenging to commercially calculate the same in the case projects such as roads.

2.2.2.1.4 Clause 22(a) allows the employer/client to cancel the contract if "the contractor without reasonable cause wholly suspends the works before completion" or "fails to proceed with the works with reasonable diligence". The obligation not to wholly suspend the works without a valid reason implies that the contractor must proceed "continuously". The obligation to proceed regularly and diligently means that the contractor is expected to proceed continuously, industriously and efficiently with appropriate physical resources so as to progress the works steadily towards completion substantially in accordance with the contractual requirements as to time (Atkinson,D:2001).

2.2.2.2 The Botswana Institute of Development Professions Standard Form of Building Contract [BIDP]

2.2.2.2.1 Clause 21

This clause is similar to clause 18 of the ministry of works (MOW) contract and relates to the date of possession of the site and the date of completion.

2.2.2.2.2 Clause 22

This clause is similar to clause 19 of the ministry of works (MOW) standard contract.

2.2.2.2.3 Clause 20

This clause spells out the circumstances under which the contractor is excused from completing the works by the date for completion and hence is entitled to extension of the planned contractual building period and a revised completion date. The clause is slightly different from the similar clause in the ministry of works standard building contract, clause 20. Listed below are the events that will entitle the contractor to extension of time. The events have been directly quoted from the contract:

a) Force majeure
b) Exceptionally inclement weather
c) Loss or damage occasioned by fire, lightning, explosion, storm, tempest, flood, bursting or overflowing of water tanks apparatus or pipes, earthquake, aircraft and other aerial devises or articles dropped therefrom, riot, and civil commotion.
d) Civil commotion, local combination of workmen, strike or lockout affecting any of the trades employed upon the works or any of the trades engaged in the preparation, manufacture or transportation of any goods or materials required for the works
e) Architects instructions issued in accordance with the provisions of this contract
f) The contractor not having received in due time necessary instructions, drawings, details, or levels from the Architect for which he specifically applied in writing on a date which, having regard to the date for completion stated in the appendix to these conditions or to any extension of time then fixed under this clause or clause 33 (1) (c) of these conditions, was neither unreasonably distant from nor unreasonably close to the date on which it was necessary for him to receive the same.
g) Delay on the part of nominated subcontractors and nominated suppliers which the contractor has not taken all practical steps to avoid or reduce
h) Delay on the part of Artists, tradesmen, or others engaged by the employer in executing work not forming part of this contract

i) Opening up for inspection of any work covered up or of the testing of any work, materials or goods in accordance with clause 6(3) of these conditions (including making good in consequence of such opening up or testing), unless the inspection or test showed that the work, materials or goods were not in accordance with the contract.

j) Contractor's inability, for reasons beyond his control and which he could not reasonably have foreseen at the date of this contract to secure such labour, goods, or materials as are essential to the proper carrying out of the works

2.2.2.2.4 Clause 25 is similar to clause 22 of the ministry of works standard building contract and provides for the employer to cancel the contract if the contractor defaults as follows:

- Without reasonable, cause wholly suspends the carrying out of the works before completion
- Fails to proceed regularly and diligently with the works

2.2.3 Excusable Versus Inexcusable Delays

It would appear that the effect of the common law and the forms of contract is to lay down rules that can be used to determine the party that takes responsibility in the event of a delay. From the perspective of the contractor, he needs to know when the prevailing circumstances excuse him from delivering the project by the planned or contractual date for completion. It is therefore helpful to categorise possible delays to projects as either excusable delays or inexcusable delays. Excusable delay occurs when the circumstances described in the common law and/or the forms of contract in use excuse the contractor from completing by the planned or contractual date for completion and hence entitle him to a revised date for completion. Inexcusable delay occurs when the contractor has no excuse by operation of the common law and/or the forms of building contract to complete the project later than the planned or contractual completion date.

2.2.3.1 **Excusable delays**

This is delay that arises without any contributing fault on the part of the contractor. The causes of delay, in this case, may be the result of either the action of the employer/consultant or due to circumstances beyond the control of the parties to the contract. Employer/consultant caused delay includes the following:

- Employer's instructions in terms of the building agreement [CL-common law] [MOW-ministry of works building contract] [BIDP-Botswana institute of development professions building contract]
- Late issue of instructions that the contractor has specifically requested in writing [MOW] [BIDP]
- Delay caused by other contractors and tradesmen employed directly by the employer executing work not forming part of the contract [MOW] [BIDP]
- Breach of contract by the employer [CL]
- Opening up for inspection of any work covered up or of testing of any work, materials or goods in accordance with the contractual provisions unless the inspection or test showed that such work, materials, or goods were not in accordance with the contract. [BIDP]. It would appear that this applies in cases where either there was no express provision for inspection prior to covering up, or there was such provision but probably due to the negligence of the consultant or client inspection did not take place before covering up the work.
- Contractor's inability, for reasons beyond his control and which he could not reasonably have foreseen to secure such labour, goods, or materials as are essential to the proper carrying out of the works. [BIDP]

The reasons for delay beyond the control of the contractor and the employer/client are:

- Exceptionally severe weather [CL] [MOW] [BIDP].

- Civil disturbance [CL].
- Strikes affecting trades employed upon the works [CL] [MOW].
- Civil commotion, local combination of workmen, strike or lockout, affecting any of the trades employed upon the works or any of the trades engaged in the preparation, manufacture, or transportation of any of the goods or materials required for the works [BIDP].
- Lockouts affecting trades employed upon the works [MOW].
- Natural disasters such as floods, earthquakes [CL].
- Any other unforeseeable event beyond the control of the contractor [CL].
- Force majeure [MOW] [BIDP].
- Civil commotion affecting trades employed upon the works [MOW].
- Local combination of workmen affecting trades employed upon the works [MOW].
- Delays caused by nominated sub-contractors and nominated suppliers for which the contractor has taken all practical steps to avoid or reduce [MOW] [BIDP].
- Loss or damage occasioned by fire, lightning, explosion, storm, tempest, flood, bursting or overflowing of water tanks, apparatus or pipes, earthquake, aircraft and other aerial devises or articles dropped therefrom, riot, and civil commotion. [BIDP].

2.2.3.2 Inexcusable delay

Whenever the circumstances leading to delay can be attributed to the fault of the contractor, then the delay may be described as inexcusable. Based on the common law rules and/or the forms of building contract previously discussed, inexcusable causes of delay may include the following:

- Normal weather conditions; the contractor ought to have allowed for delays arising from normal weather conditions in the original building period. Failure to do so may lead to delays for which the contractor is deemed to be responsible. [CL] [MOW] [BIDP]

- Failure by the contractor to specifically request for a particular instruction in writing, and the delay in issuing the instruction results in delay to the project. [MOW] [BIDP]
- Any other event that is foreseeable and that is within the control of the contractor. [CL]
- Delay caused by nominated sub-contractors and nominated suppliers that in the opinion of the employer, the contractor did not take all practical steps to avoid or reduce. [MOW] [BIDP]
- Delay caused by any other reason not specifically referred to by either the common law or the forms of building contract in use. Such causes may be the result of diverse factors such as poor management by the contractor.

2.2.4 Concluding Remarks on the Legal Framework Applicable to the Building Industry in the Botswana Public Sector

It is clear from the foregoing that the legal framework in the building industry allocates the various known risks to the contractor and the employer/client. If the contractor carries the risk associated with the occurrence of a particular event, and that event eventually causes delay in completion of a project, then it can be said that the contractor is responsible for the delay or that the contractor has caused delay. The same is also true in case the employer/client carries the risk associated with the occurrence of a particular event. The legal framework also identifies certain circumstances which may cause delays in completion of projects, but whose occurrence is outside the control of the contractor and the employer/client. It can therefore be said that in certain cases, the delay is neither caused by the contractor nor by the employer/client.

2.3 Delays and the Management Factor within the Building Construction Firm

2.3.1 Introduction

Building construction firms are business enterprises just like manufacturers or retailers. They are all geared towards achieving certain objectives. Cronje et al (2000:38) identifies the following as some of the organisational objectives of an enterprise:

- Profitability
- Growth
- Market share
- Social responsibility
- Wellbeing of employees
- Product quality
- Service to consumers.

Kerzner (2001:5-6) lists the following as the main objectives in regard to any one project:

- Completion of the project within the allocated time
- Completion of the project within the budgeted cost
- Completion of the project at the proper performance or specification level
- Acceptance of the completed project by the customer or user
- When you can use the customer's name as a reference

The objectives of a building construction firm in regard to a building project would therefore include the following:

- To complete the project within the time allowed for in the contract
- To complete the project within the budgeted cost and earn the forecasted level of profits
- To complete the project at the proper performance or specification level

- The acceptance of the completed project by the customer or user

Nunnally (2004:12) distinguishes between the principal objectives of the construction manager and his other important responsibilities. The principal objectives are:

- To complete the project on time
- To complete the project within budget

The other important responsibilities of the construction manager are:

- Safety
- Worker morale
- Public and professional relations
- Productivity improvement
- Innovation
- Improvement of technology

It is clear from the foregoing that completion of building projects within the allocated time period is one of the key goals of a contractor. It is also one of the principal parameters that may be used as a yardstick for the determination of the success or failure of a project. What steps must the contractor take in order to meet or exceed his objectives? The answer to this question is that he needs to inject adequate management input in the construction process. What is management? Cronje et al (2000:100) defines management as “the process whereby human, financial, physical and information resources are employed for the attainment of the objectives of an organisation”. In the context of a construction firm, the resources that are normally employed include the following:

- Materials
- Labour
- Plant
- Equipment
- Sub-contractors

- Finances, including income, expenses, and cash flow
- Consumables

What exactly does the management process do in its interaction with the resources listed above? Cronje et al (2000:100) states that the management input plans, organises, leads and controls.

2.3.2 Planning

Management decides what has to be done or, put another way, executes the task of planning. The act of planning, in this case, means setting up the objectives, including making decisions in regard to the way in which these objectives should be accomplished and the resources that are required to accomplish all the objectives. A construction firm should plan at two different levels, i.e. at the corporate/strategic level and at project level. Corporate plans are roadmaps for the firm towards the achievement of its vision and long term objectives. Long-term objectives may include the following:

- Increased market share
- Growth in terms of projects portfolio
- Growth in terms of annual turnover
- Improved efficiency
- Improved performance and quality
- The creation and maintenance of a competitive advantage over the competition in terms of the efficient and timeous delivery of high quality projects within budget.

Project plans, on the other hand, are project specific and short term. They are roadmaps for the attainment of the objectives of a particular project. Both of the above plans are necessary for the project success in the short run and for the survival of the firm in the in the long run.

2.3.2.1 Strategic Planning

Kerzner (2001:1012) defines strategic planning as the process of formulating and implementing decisions about an organisation's future direction. The aim is to steer the organisation towards the realisation of its vision and long-term objectives. A construction firm may, for example, wish to increase its turnover by 30% per year over the next ten years. In order to realise this goal, certain decisions must be made and implemented. The formulation and implementation of such decisions, traditionally, follows the models illustrated in figures 1 and 2.

Figure1: Swot Analysis

Source – Pearce & Robinson (2002:204)

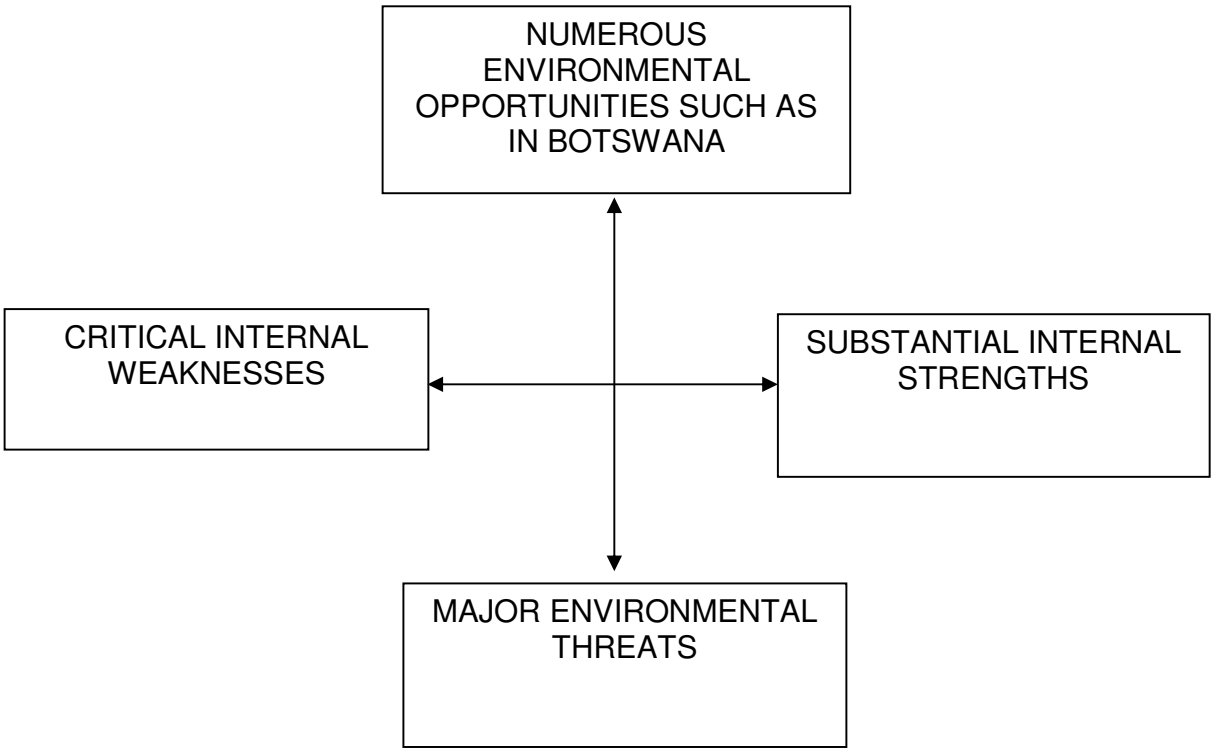
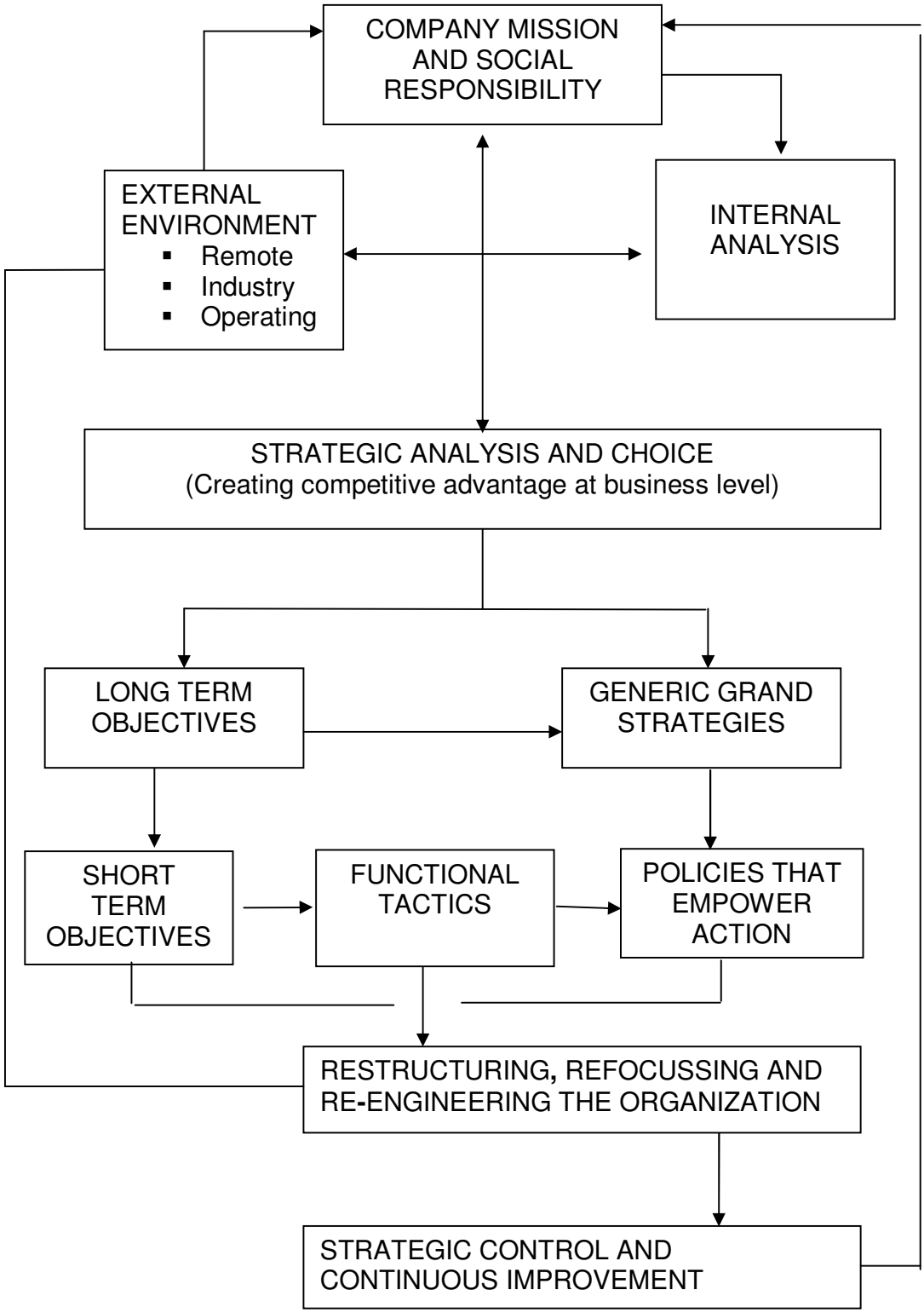


Figure 2: Strategic Management Model



Source – Pearce & Robinson (2002:2)

Strategic planning should, naturally, translate into strategic choices. This involves making decisions in regard to the objectives of the firm and the strategic path the firm should take in order to achieve such objectives. The firm must then restructure, reorganise, and refocus in line with its strategic choices. A building firm that carries out and implements its strategic plans should be able to succeed in its endeavours, not only in Botswana, but anywhere else in the world. Such success should be reflected in the achievement of its objectives including completion of its projects on schedule, within budget, and to specification.

2.3.2.1.1 Standard Policies and Procedures

Strategic planning, for a construction firm, also involves the formulation and standardisation of its policies and procedures for use on each of its projects. Procedures for repetitive tasks such as tendering, estimating, purchasing, budgeting, scheduling, quality control and reporting should be standardised. This encourages consistency in the manner in which decisions are made and is a proven recipe for success. In the absence of standard procedures and policies, managers often are inconsistent and haphazard in their decisions and the likely result is failure in the endeavours of the firm.

2.3.2.1.2 Strategic Selection of Projects

The last aspect of strategic planning for a building firm involves the strategic selection of projects. Every firm should evolve a standard method for selecting projects. Firms should only seriously tender for these projects that have been strategically selected based on the availability and quality of resources. It would be a grave mistake for a firm whose resources can only support one project of a given size to take on two or more projects simultaneously. The firm's available resources should be matched against the prospective project characteristics such as size, quality or specification, complexity and location. The likelihood of project success, which includes completion of projects within schedule, is seriously undermined if there is a mismatch between the available resources and

any of the above mentioned project characteristics. Indeed, according to Kerzner (2001:1028), the critical constraint in this case is the availability and quality of critical resources.

2.3.2.2 Project planning

The tasks that a contractor should carry out during the planning of every building project should include:

- The compilation of the project objectives in line with the firm's corporate objectives. Project policies and procedures based on the firm's global policies and procedures should also be set up.
- The preparation of the building programme and the drawing up of schedule monitoring procedures for use during the implementation of the project.
- The preparation of the project budget, the expenditure curve and the setting in place of cost monitoring procedures for use during project implementation. The contractor's budget, at this stage, should include a priced list of all the required materials and labour. Estimates of overhead costs, contingency amounts to take care of the unforeseen situations and the anticipated profits should also be included. All aspects of the project costs should then be monitored during the construction stage so as to detect any undesirable deviations and take remedial measures.
- The project quality is always as specified in the contract documents. The contractor should set up quality control procedures to be used during project implementation to ensure that the quality of the finished works conforms to the requirements of the contract.
- The preparation of a procurement schedule for the materials, plant, equipment and the consumables required for the project.
- The preparation of a list of all the required plant and equipment including the date when required. This information should then be used as a basis for their procurement, as explained above.

- The preparation of policies and procedures in regard to authorisations, approvals and project variations and Health and Safety.

2.3.3 Organising

Management decides how things should be done or organises. According to Hauptfleisch, (2002:4), organising entails the analysis and application of resources and the determination of interrelationships between participants and resources. This includes the allocation of labour, plant, equipment, materials and sub-contractors to the project tasks. It also includes the definition of the various duties that are necessary for the smooth functioning of the construction process. There are two levels at which a firm should carry out the task of organising. The first level is corporate where the emphasis is on the provision of structures that integrate all projects being carried out by the firm. The second level is for each individual project where the emphasis is the provision of structures for each individual project. The following structures should be prepared for the two levels as explained above:

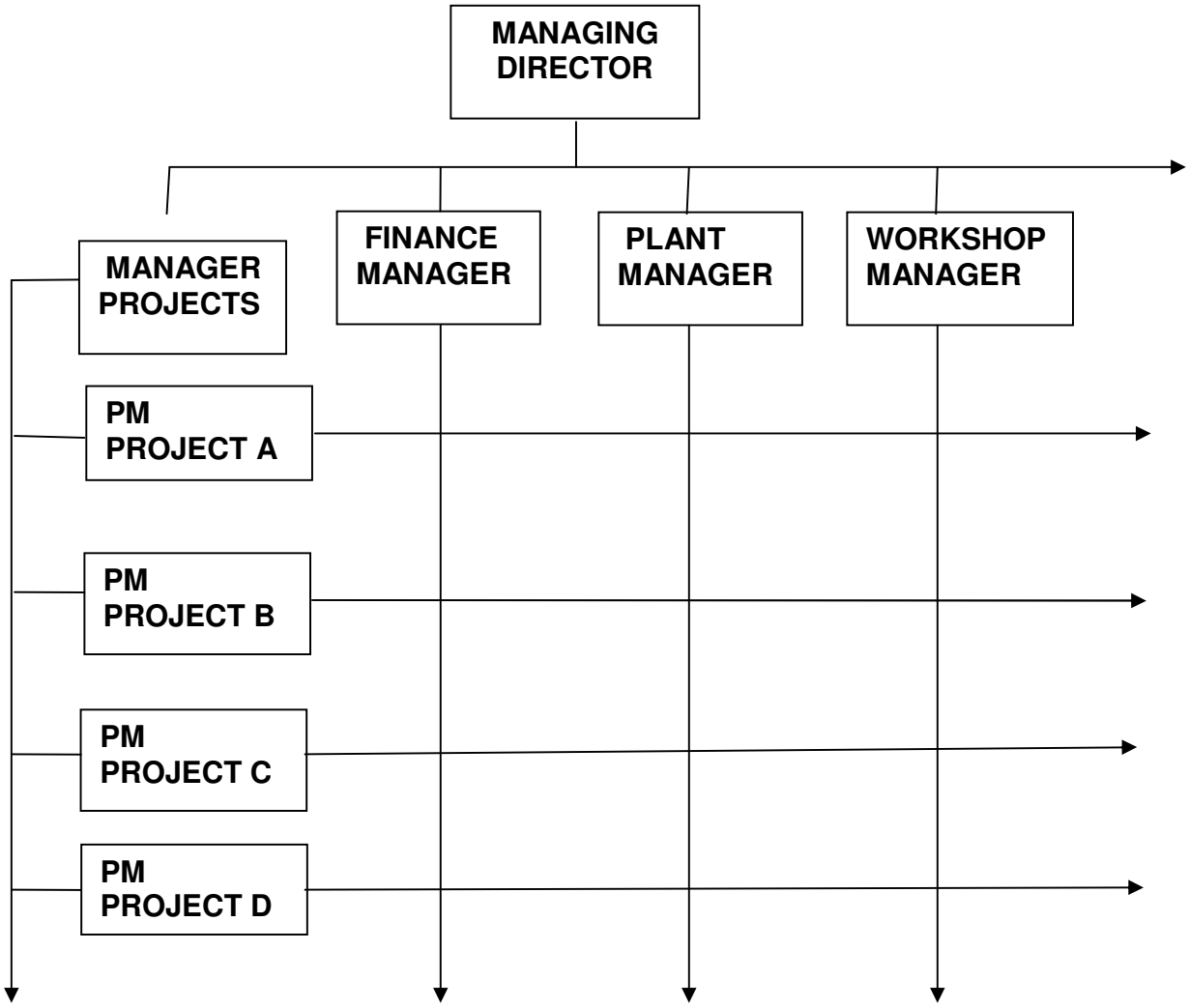
- Organisational structures.
- Responsibility assignment matrices.

Gareis, R (1989:243) states the following in this regard:
"The management of single projects, the management of the network of projects, and the management of the relationships between the company and the single projects should be considered."

The above could be paraphrased as follows:
"The organisation of each individual project, the organisation of the network of projects, and the management of the relationships between the company and each individual project should be considered."

Figure 5 illustrates an organisational structure suitable for use by a building firm with multiple projects:

Figure 3: An example of a contractor's organisational structure



2.3.4 Leading

Leading is the act of directing the energies of the human capital towards the achievement of the objectives as planned. It has often been said that the success of a business venture may depend not only on the managerial capabilities of the people in charge, but also on their leadership skills. The act of leadership is accomplished through the application of the following:

- Motivation
- Knowledge of group behaviour
- Communication
- Power, authority and influence

- Leadership style

Using the above, the leader is able to influence the behaviour and direct the activities of the subordinates towards the accomplishment of the objectives of the firm.

2.3.5 Controlling

The task of controlling comprises the following:

- Establishment of appropriate standards or benchmarks.
- Measurement of the actual performance
- Comparison of actual performance with the predetermined standards or benchmarks.
- Remedial action in view of any deviations between the actual performance and the predetermined or planned performance.

All aspects of the firm or project should be subjected to this task of controlling. This includes taking note of any negative deviations from the planned targets and making changes in, for example, the rate of progress or tempo of working in order that the initial time objectives may be accomplished.

2.3.6 Inexcusable Management Related Causes of Delay

Based on the above, it is concluded that the following will result in delays in completion of building construction projects:

- Lack of strategic planning by the contractor
- Contractor's poor strategic choices
- Contractor's lack of competent and skilled human resources
- Contractor's lack of suitable non-human resources such as plant and equipment
- Absence of or poor organisational structure

- Absence of a reporting structure and/or responsibility assignment matrices
- Absence of policies and procedures
- Failure by the contractor to standardise policies and procedures
- Contractor's poor cash-flow
- Contractor's poor credit rating
- Selection of projects that are incompatible with the contractor's available resources.
- Poor project scheduling and schedule control by the contractor
- Poor project financial planning and control in terms of budgets and expenditure curves by the contractor
- Poor quality planning and control by the contractor
- Poor relationship between the contractor's project resources
- Poor relationship between the project and the building firm's top management
- Poor motivation of the contractor's staff
- Poor communication within the contracting organisation
- Poor leadership within the building firm

The above list of potential causes of delay in completion of building construction projects is the responsibility of the contractor. If a project is delayed as a result of any of the above, then the contractor bears the consequences for such delay.

2.3.7 Concluding remarks on the management factor.

The foregoing discussion has brought to the fore issues in the managerial realms that are vital for the smooth functioning of a construction firm. The importance of planning, organising, leading and controlling has been discussed. Strategic management processes have also been discussed. The project management approach in the running of the construction enterprise has been stressed. Putting into practice all the above is essential if the construction firm has to succeed in its

endeavours. Success, as has been pointed out, includes the completion of projects within the allocated time period. Many times when contractors fail to complete projects, they point fingers at the client, the consultants or at the environment as the causes of delay. In reality, however, managerial deficiencies within the contracting firms contribute significantly to all such delays.

2.4 Previous Research Studies

2.4.1 Why Conduct Research on Delays?

According to Al-Khalil and Al-Ghafly (1999:101), investigation is required into the problem of delays in order to better manage delay situations and mitigate the consequences of such delay. He further asserts that assessing the frequency of delay, the extent to which delay occurs and the responsibility for delay can provide insights for early planning to control these factors and improve project performance.

2.4.2 How Prevalent is the Problem of Delays in the Completion of Projects?

The following provides some insight in regard to the prevalence of delays in completion of building projects:

- According to Al-Khalil and Al-Ghafly (1999:101), 70% of building projects undertaken by the Saudi Arabia ministry of housing and public works suffered from delays.
- 81.5% of public projects in Jordan suffered from delays – Al-Momani (2000:54)
- 88% of building construction projects in Australia are not completed within the planned building duration – Chan & Kumaraswamy (1997:59)
- 70% of Nigerian building construction projects surveyed by Aibinu & Jagboro (2002:593) suffered from delays.

2.4.3 Responsibility for Delays

Who is to blame for delays in completion of building projects? The following information obtained from previous research studies on the subject at hand attempts to provide answers to this question:

- According to a study conducted by Al-Khalil and Al-Ghafly on Saudi Arabia public sector projects, the employer/consultant is responsible for the greater proportion of delays. The contractor's responsibility is however also high, averaging about 44% of the total delay.
- A study conducted in Bangkok, Thailand by Ogunlana and Promkuntong (1996:39) concluded that the contractor was to blame for most project delays.

2.4.4 Extent of Delay

What is generally the extent of delay on building construction projects? Information obtained from previous research studies provides the following as answers to the question:

- A study carried out in Nigeria by Aibinu and Jagboro (2002:597) showed that the average time overrun on building construction projects studied was 92.64% and 59.23% for the "0-10 million Naira [0-350 000Pula]" projects and those over 10 million Naira projects, respectively.
- The average time overrun on building projects in Australia is over 40%, according to Chan and Kumaraswamy.

2.4.5 Inexcusable Causes of Delay

Chan and Kumaraswamy (1997:59) give the following as being the major causes of inexcusable delays:

- Ineffective management of site operations at both the technical and managerial level
- Inadequate technical and managerial manpower
- Low level of productivity

Research studies have also identified specific inexcusable delay factors. These include studies by Ogunlana & Promkuntong in Bangkok Thailand, Okpala and Anieku in Nigeria, Arditi et al in Ankara Turkey and Chan and Kumaraswamy in Hongkong. Table 2 summarises a section of the findings in the four studies. The first column, for example, contains the prominent inexcusable delay factors on building projects in Nigeria. The delay factors are recorded in the table in order of their relative importance, starting with the most significant.

TABLE 2: A summary of the findings of research studies carried out in various countries on the subject of delays in completion of building projects.

NIGERIA	**BANGKOK THAILAND**	**ANKARA TURKEY**	**HONGKONG**
Materials procurement	Material procurement	Materials procurement	Contractor's poor management and supervision
Monthly payment difficulties	Shortage of labour	Monthly payment difficulties	Improper control over resource allocation
Escalation in material prices	Construction plant shortage	Contractor's financial difficulties	Inadequate contractor experience
Poor management by contractor	Planning and scheduling efficiencies	Poor management by contractor	Unsuitable management structure and style
Unrealistic building periods	Poor management		Poor procurement programming of materials

2.5. Summary of the review of literature

The foregoing discussion focussed on the legal framework within the building construction environment in the Botswana public sector. This was because one has to have a clear understanding the legal complexities within this important sector of economy before being able to grasp the phenomenon of delays in completion of projects. The management of building projects was also discussed because it was suspected that management deficiencies within contracting companies was to blame for the prevalence of delays in completion of projects, especially, by 100% citizen contractors. Finally, the outcome of previous research studies on the subject of delays in completion of building projects was discussed. It became clear that the problem of delays was universal in nature, only varying in terms of the extent of delays and the reasons for the delays. The next chapter looks at the research method adopted for this study.

CHAPTER 3
THE RESEARCH METHOD

3.1 The Data

3.1.1 Introduction

The data required for this study was empirically based on what actually transpired during the construction phase of each of the building projects that were surveyed. Data for sub-problems one and two was based on what was recorded in the project "extension of time" files in regard to each of the projects. Data for sub-problem number three was obtained partly from the project files and partly from the observations of the supervising team members of each of the projects. All the data collected was primary data as it was based on the accounts of the people who supervised the various projects that were studied. According to Leedy (2001:95), primary data are "the most valid, the most illuminating, and the most truth manifesting". It is, however, admitted that there is a possibility of distortions of data as a result of what Leedy (2001:97) describes as the inability of two human beings to witness the same event and report it precisely as duplicate accounts. The possibility is that if, for example, the project Quantity Surveyor for project X and the project Architect for project X were asked to complete the questionnaire in connection with project X, the feedback from the two may not be the same. Previous researchers have solved this problem by soliciting information from more than one party and comparing the two or three accounts. The data based on the accounts of more than one party is then considered to be closer to the absolute truth. It is, however, argued in this instance that a consultant is a professional person and that professional judgement of any one of the professionals involved with the projects should be trusted. It is also argued that data in regard to the first two sub-problems is recorded in project files and that there is little chance of getting different versions of the story based on identical records.

3.1.2 The Data that was needed for each of the Projects Surveyed

The following data was required for all the sub-problems:

- The planned or contractual building period
- The actual building period
- The total delay
- The delay attributable to the employer and/or consultants
- The delay attributable to the contractor
- The delay outside the control of the parties
- The various causes of delay attributable to the contractor and the extent of delay in regard to each of these causes of delay

3.1.3 The Location of the Data

Data needed was obtained from responses to the questionnaire. Data for sub-problems one and two can be found in responses to questions 1, 2, 3, and 5 of the questionnaire. Data for sub-problem three, on the other hand, was obtained from analysed data for sub-problems one and two.

3.1.4 Data Collection

The respondents were contacted telephonically and requested to take part in the research study by responding to the questionnaire. Each of them was told that the research was part of an MSc.(Project management) degree programme at the University of Pretoria. In the event that the respondents accepted the questionnaire, which they all did, the following was availed to them:

- The questionnaire: The respondents were requested to complete one questionnaire per project. To avoid the possibility of surveying one project more than once by the various respondents in regard to the ministry of works projects, in the majority of the cases, required each of the respondents to complete questionnaires for particular pre-identified

projects. The projects had been pre-identified based on information received from DBES. The pre-identification was accomplished through the distribution of the completed projects that were in the system at DBES to the various respondents in such a way that a project was allocated to only one respondent. For instance, if project A was allocated to the project Architect A, then the project Quantity Surveyor A was not required to provide data for project A and vice-versa.

The questionnaire was accompanied by:

- A letter of introduction from the faculty of Engineering, Built environment and Information Technology, University of Pretoria
- A research permit that had earlier been issued to the researcher by the permanent secretary, ministry of works and communications, Botswana.

The distribution of the questionnaires was done either physically, by fax or by e-mail to suit the convenience of each of the respondents. Questionnaires were issued to the following:

- Fourteen architectural firms
- Sixteen Quantity Surveying firms
- One civil/structural engineering firm
- Seven project co-ordinators at DBES
- Buildings departments at three local authorities
- Boipelego education project unit (BEPU)

3.1.5 Treatment of Data for Each Sub-Problem

3.1.5.1 To identify the extent of delay and the inexcusable causes of delay on building projects undertaken by 100% citizen construction firms, the data was organised as illustrated in table 3 and table 4 for the projects under study.

TABLE 3: Fourteen Project Variables from A-K for Projects 1-N, where N is the Nth and Last Project Surveyed for each of the Two Groups of Contractors

PRJ	A	B	C	D	E	F	G	H1	H2	H3	J1	J2	J3	K
1														
2														
3														
4														
5														
6														
7														
8														
9														
10														
N														
AVERAGE														

TABLE 4: Inexcusable Causes of Delay for Each of the Projects Surveyed Ranging from Project 1 to Project N

PRJ	A	B	G	L	M	N
1						
2						
3						
N						

TABLE 5: Legend

PROJ	Project
A	Category of firm
B	Planned or original contractual building period in weeks or days
C	Actual building period in weeks or days
D	Total delay in weeks
E	Delay caused by employer (excusable delay) in weeks or days
F	Delay outside the control of the parties (excusable delay) in weeks or days
G	Delay caused by the contractor (inexcusable delay) in weeks or days
H1	Delay caused by the contractor expressed as a % of total delay
H2	Delay caused by the employer expressed as a % of total delay
H3	Delay outside the control of the parties expressed as a % of total delay
J1	Delay caused by the contractor expressed as a % of planned or contractual building period
J2	Delay caused by the employer expressed as a % of planned or contractual building period
J3	Delay outside the control of the parties expressed as a % of planned building period
K	Total delay expressed as a % of planned building period (J1+J2+J3)
L	Actual contractor related delay factors (inexcusable delay factors)
M	The impact/effect of each of the delay factors in weeks or days
N	The impact of each delay factor expressed as a % of the planned building period

3.1.5.2 To identify the extent of delay and the inexcusable causes of delay on building projects undertaken by non-citizen construction firms, the data was also organised as illustrated in table 3 and table 4 for the projects under study.

3.1.5.3 To compare the extent of delay and the inexcusable causes of delay between the two groups of building construction firms and to explain the high incidence of delay in completion of building construction projects by 100% citizen construction firms, the data for each group was analysed in various formats shown in tables 6 and 7. Based on the analysis, comparisons were made between the two groups. The values for the extent of delay in table 6 are obtained from tables 3 and 4.

TABLE 6: A Summary of the Extent of Delay Arising from Each Inexcusable Delay Factor Identified

Cause of delay (contractor caused delay only)	**Extent of delay (% of Total delay): - Project A**	**Extent of delay. (% of Total delay): - Project B**	**Extent of delay. (% of Total delay): - Project C**	**Extent of delay. (% of Total delay): - Project P**	**Total extent of delay**	**Average**
1.	A1	B1	C1	P1	A1+B1+ - - +P1 = X1	X1 divide by P [Where P is the total number of projects investigated]
2.	A2	B2	C2	P2	A2+B2+ - - + P2 = X2	X2 divide by P
N.	AN	BN	CN	PN	A3+B3+ - - + PN = X3	X3 divide by P

TABLE 7: A Comparison of the Impact of the Various Inexcusable Delay Factors on the Two Groups of Contractors

	Delay Factor	Average Impact/weighted frequency (100% Citizen)	Average Impact/weighted frequency (Non-Citizen)
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			

3.2 Research Type

The study involved the collection data on previously completed building projects and the use of the data to make deductions in regard to building projects within the Botswana public sector. The findings of the study were presented in the form of numbers, statistics, tables and bar charts. This fits in with the definition of a positivist-quantitative research.

3.3 The Population

The population under scrutiny comprised building construction projects that commenced not earlier than January 2000, and were completed not later than July 2004, by category C, D, and E contractors within the Botswana public sector. The public sector in this regard includes the following:

- The ministry of works and transport
- Local authorities under the ministry of local government
- The Boipelego education project unit under the ministry of education [BEPU]

Projects undertaken by quasi' government organisations such as the Botswana housing corporation, therefore, did not form part of the population for the study. The study also involved projects that were undertaken using either the ministry of works standard form of building contract or the BIDP form of building contract. It was found that of the local authorities in Botswana, only three of them made use of the above forms of contract. The target population is therefore as per Table 8.

TABLE 8: The Target Population

Source of Data	**Number of Building Projects Commenced by January 2000 and completed by July 2004 Involving Category C, D, and E Contractors.**
Central District Council	8
Gaborone City Council	12
Francistown City Council	2
Boipelego education unit	10
Department of building and engineering services – Ministry of Works	64
Total	**96**

A problem, however, arose when it came to establishing the number of projects under the ministry of works due to the following:

- The relatively greater number of projects involved.
- The constant turnover in staff: Personnel who were recruited recently may not recall the projects that were initiated in the year 2000 and were completed and deleted from the system before their recruitment. They are only aware of the projects that were in the system at the time of their recruitment.

As a result of the foregoing problems, it was decided that the study should focus only on the projects that were currently active in the system. This was how the target population under the ministry of works as per table 8 was established.

3.4 Sampling

Leedy (2001:221) states the following:

"For small populations (N<100), there is no need for sampling; survey the entire population".

Since the population as per table 8 is less than 100, it was decided that a survey of the whole target population should be carried out. Five of the sixty-four projects identified for study at the ministry of works were however not covered by the survey because the researcher was unable to locate the current address of the consultants who had been involved

3.5 Treatment of Bias

According to Leedy (2001:221):

"Bias is any influence, condition, or set of conditions that singly or together distort the data".

The most common form of bias occurs as a result of the manner in which the sample population is chosen. As mentioned in section 3.4, five projects were eliminated from the survey due to difficulties in locating the consultants that had been involved. The elimination of the five projects from the study was not

influenced in any way by the researcher and was a result of pure chance. The 59 projects surveyed therefore were a fair representation of the target population. It is also pointed out that though this was a form of non-probability – convenience - sampling technique which is normally viewed with suspicion, the fact that only five of the projects were eliminated by the technique validates the study. A second form of bias may have been introduced into the study as a result of the response rate to the questionnaires and the differences between the respondents and non-respondents. Of the 91 questionnaires that were distributed, 49 were completed and returned, representing a return rate of 54%. The reasons for failure to complete and return the questionnaire included the following:

- The respondents were too busy and therefore had no time to complete the questionnaires
- The respondents expressed a lot of willingness to complete the questionnaire, but kept postponing the collection date until they were abandoned.
- The respondents were recent recruits and therefore despite having been willing to complete the questionnaires, they were hampered by lack of information on the projects being investigated.

The distribution of projects among those who responded and those who failed to respond for the above reasons was a result of pure chance. It may therefore be concluded that the respondents are a fair representation of the target population and that there is no bias in this regard.

CHAPTER 4
ANALYSIS OF DATA

4.1 Sub-Problem 1

Sub-problem one is:

To identify the extent of delay and the inexcusable causes of delay among projects carried out by 100% citizen building construction firms:

The purpose of the study, in this instance, was first to identify the extent to which each party to the building contract was responsible for delay in completion of projects. Secondly, the purpose was also to identify the causes of delay for which the contractor takes responsibility.

Tables 9 and 10 contains data on 28 building projects undertaken by 100% citizen building contractors ranging from project 1C to project 28C in column one. The tables contain 15 different variables on each of the projects ranging from PRJ to K. Table 11 is the legend in regard to the 15 variables in tables 9 and 10. Notice that the last row of table 12 gives the mean or average values of a selected number of these variables. These average values will, later on, be used for purposes of comparison between the two groups of construction firms.

TABLE 9: Fourteen Delay Variables from A to K for 28 projects undertaken by 100% Citizen Firms

PRJ	A	B	C	D	E	F	G	H1	H2	H3	J1	J2	J3	K
1C	D	48	76	28	14	4	10	36	50	14	21	29	8.3	58
2C	E	52	59	7	7	0	0	0	100	0	0	14	0	14
3C	D	42	52	10	2	2	6	60	20	20	14	4.8	4.8	24
4C	D	35	75	40	2	10	28	70	5	25	80	5.7	29	114
5C	C	32	88	56	11	26	19	34	20	46	59	34	81	175
6C	C	32	68	36	6	10	20	56	17	28	63	19	31	113
7C	D	44	68	24	6	3	15	63	25	13	34	14	6.8	55
8C	D	52	100	48	8	0	40	83	17	0	77	15	0	92
9C	E	48	82	34	32	2	0	0	94	5.9	0	67	4.2	71
10C	E	55	107	52	38	8	6	12	73	15	11	69	15	95
11C	E	52	96	44	21	1	22	50	48	2.3	42	40	1.9	85
12C	D	40	55	15	0	4	11	73	0	27	28	0	10	28
13C	C	28	61	33	0	14	19	58	0	42	68	0	50	118
14C	D	32	70	38	10	8	20	53	26	21	63	31	25	119
15C	C	30	94	64	3	0	61	95	4.7	0	203	10	0	213
16C	C	52	89	37	7	25	5	14	19	68	9.6	14	48	71
17C	C	52	112	60	3	2	55	92	5	3.3	106	5.8	3.9	115
18C	E	52	67	15	0	0	15	100	0	0	29	0	0	29
19C	D	52	64	12	2	0	10	83	17	0	19	3.9	0	23
20C	E	32	74	42	0	0	42	100	0	0	131	0	0	131
21C	D	52	73	21	5	16	0	0	24	76	0	9.6	31	40
22C	E	70	90	20	20	0	0	0	100	0	0	29	0	29
23C	C	40	82	42	22	2	18	43	52	4.8	45	55	5	105
24C	D	48	68	20	9	3	8	40	45	15	17	19	6.3	42
25C	D	61	81	20	12	4	4	20	60	20	6.6	20	6.6	33
26C	E	27	76	49	0	49	0	0	0	100	0	0	182	182
27C	C	24	72	48	8	14	26	54	17	29	108	33	58	200
28C	C	35	87	52	12	5	35	67	23	9.6	100	34	14	149
Average								48	31	21	48	21	22	90

TABLE 10: Fourteen Delay Variables from A to K for 28 Projects Undertaken by 100% citizen Firms Re-arranged in Terms of Size or Registration Category

PRJ	A	B	C	D	E	F	G	H1	H2	H3	J1	J2	J3	K
1	C	32	88	56	11	26	19	34	20	46	59	34	81	175
2	C	32	68	36	6	10	20	56	17	28	63	19	31	113
3	C	28	61	33	0	14	19	58	0	42	68	0	50	118
4	C	30	94	64	3	0	61	95	47	0	203	10	0	213
5	C	52	89	37	7	25	5	14	19	68	9.6	14	48	71
6	C	52	112	60	3	2	55	92	5	3.3	106	5.8	3.9	115
7	C	40	82	42	22	2	18	43	52	4.8	45	55	5	105
8	C	24	72	48	8	14	26	54	17	29	108	33	58	200
9	C	35	87	52	12	5	35	67	23	9.6	100	34	14	149
10	D	48	76	28	14	4	10	36	50	14	21	29	8.3	58
11	D	42	52	10	2	2	6	60	20	20	14	4.8	4.8	24
12	D	35	75	40	2	10	28	70	5	25	80	5.7	29	114
13	D	44	68	24	6	3	15	63	25	13	34	14	6.8	55
14	D	52	100	48	8	0	40	83	17	0	77	15	0	92
15	D	40	55	15	0	4	11	73	0	27	28	0	10	28
16	D	32	70	38	10	8	20	53	26	21	63	31	25	119
17	D	52	64	12	2	0	10	83	17	0	19	3.9	0	23
18	D	52	73	21	5	16	0	0	24	76	0	9.6	31	40
19	D	48	68	20	9	3	8	40	45	15	17	19	6.3	42
20	D	61	81	20	12	4	4	20	60	20	6.6	20	6.6	33
21	E	52	59	7	7	0	0	0	100	0	0	14	0	14
22	E	48	82	34	32	2	0	0	94	5.9	0	67	4.2	71
23	E	55	107	52	38	8	6	12	73	15	11	69	15	95
24	E	52	96	44	21	1	22	50	48	2.3	42	40	1.9	85
25	E	52	67	15	0	0	15	100	0	0	29	0	0	29
26	E	32	74	42	0	0	42	100	0	0	131	0	0	131
27	E	70	90	20	20	0	0	0	100	0	0	29	0	29
28	E	27	76	49	0	49	0	0	0	100	0	0	182	182
Mean								48.4	32.3	20.9	47.7	20.6	22.2	90.1
Median								53.5	21.5	14.5	31.5	14.5	6.7	88.5
Inter-quartile Range								50	31	25	57	25	27	78
Standard Deviation								30.5	25.3	48.8	19.5	37.6	57.3	32.9

TABLE 11: Legend

PRJ	PROJECT
A	Category of firm
B	Planned/original building period in weeks or days
C	Actual building period in weeks or days
D	Total delay in weeks or days
E	Delay caused by employer (excusable delay) in weeks or days
F	Delay outside the control of the parties (excusable delay) in weeks or days
G	Delay caused by the contractor (inexcusable delay) in weeks or days
H1	Delay caused by the contractor expressed as a % of total delay
H2	Delay caused by the employer expressed as a % of total delay
H3	Delay outside the control of the parties expressed as a % of total delay
J1	Delay caused by the contractor expressed as a % of planned or contractual building period
J2	Delay caused by the employer expressed as a % of planned or contractual building period
J3	Delay outside the control of the parties expressed as a % of planned or contractual building period
K	Total delay expressed as a % of planned building period (J1+J2+J3)
L	Actual contractor related delay factors (inexcusable delay factors)
M	The impact/effect of each of the delay factors in weeks or days
N	The impact of each delay factor expressed as a % of the planned or contactual building period

Tables 9 and 10 contain general information in regard to the extent to which the parties were responsible for delays on each of the 28 projects analysed. Tables 12, 13, 14, and 15, on the other hand, provide more specific information about

the actual contractor related delay factors and their impact on each of the projects. Column five of these tables contains the contractor related delay factors for each project while column 6 contains the actual impact of the delay factors in weeks. Table 11 is the legend for tables 9, 10, 12, 13, 14, and 15.

TABLE 12: The Impact of each Identified Inexcusable Delay Factor for 8 Projects Undertaken by Citizen Firm Ranging from Project 1C to 8C

PRJ	A	B	G	L	M	N
1C	D	48	10	Poor management	10	21
2C	E	52	0	N/A	0	0
				Inadequate labour on site	4	9.5
3C	D	42	6	Late procurement of materials	2	4.8
				Contractor's cashflow problems	10	29
				Inadequate labour on site	4	11
4C	D	35	28	Late procurement of materials	4	11
				Contractor was not diligent / laxity	10	29
				Late procurement of materials	9	28
				Failure to notify architect in time		
5C	C	32	19	Regarding lack of specified materials		
				On the market	6	19
				Inadequate labour on site	1	13
				Late procurement of materials	3.5	11
				Inadequate labour on site	3.5	11
6C	C	32	20	Delay in commencement of works	3	9.4
				Owner -manager sick	1	3.1
				Nonpayment of workers resulting in		
				Stoppages	5	16
				Inadequate plant/equipment	4	13
				Late procurement of materials	6	14
7C	D	44	15	Breakdown of plant/equipment	1	2.3
				Inadequate skilled labour	2	4.6
				Contractor's cashflow problems	4	9.1
				Wrong setting out	2	4.6
				Poor management	30	58
8C	D	52	40	Lack of construction knowledge	10	19

TABLE 13: The Impact of each Identified Inexcusable Delay Factor for 8 Projects Undertaken by Citizen Firm Ranging from Project 9C to 16C

PRJ	A	B	G	L	M	N
9C	E	48	0	N/A	0	0
10C	E	55	6	Poor workmanship resulting in re-do	3	5.5
				Poor management of site	3	5.5
				Complexity of project	7	13
11C	E	52	22	Confined site	7	13
				Inadequate supervision/ poor site		
				Management	8	15
				Delay by nominated sub-contractor	11	28
12C	D	40	11			
				Poor management	9.5	34
				Lack of resources	9.5	34
13C	C	28	19			
				Poor site management	20	63
14C	D	32	20			
				Late procurement of materials		
				As a result of low credit rating	53	177
15C	C	30	61			
				Poor decision making	4	13
				Poor workmanship resulting in re-do	2	6.7
				Inadequate labour on site	2	6.7
				Poor coordination with subcontractors and		
16C	C	52	5	suppliers	5	9.6

TABLE 14: The Impact of each Identified Inexcusable Delay Factor for 8 Projects Undertaken by Citizen Firm Ranging from Project 17C to 24C

PRJ	A	B	G	L	M	N
17C	C	52	55	Poor management	20	38
				Poor financial management	10	19
				Late procurement of materials	20	38
				Poor workmanship resulting in re-do	5	9.6
18C	E	52	15			
				Poor supervision	15	29
19C	D	52	10			
				Inadequate labour on site	3	5.8
				Poor management	4	7.7
				Priority given to other projects	3	5.8
20C	E	32	42			
				Poor financial management	14	44
				Lack of construction knowledge	14	44
				Poor supervision	14	44
21C	D	52	0	N/A	0	0
22C	E	70	0			
				N/A	0	0
23C	C	40	18			
				Cash flow problems	10	25
				Poor supervision	4	10
				Late procurement of materials	4	10
24C	D	48	8			
				Poor site management	8	17

TABLE 15: The impact of each of the identified inexcusable delay factors for 4 Projects undertaken by Citizen firms ranging from Projects 25C to 28C

PRJ	A	B	G	L	M	N
25C	D	61	4	Poor site management	4	6.6
26C	E	27	0	N/a	0	0
				Poor organization	5	21
27C	C	24	24	Late procurement of materials	5	21
				Poor workmanship resulting in re-do	10	42
				Lack of diligence / laxity by management	4	17
				Poor relations with subcontractors	10	29
28C	C	35	35	Poor workmanship resulting in re-do	5	14
				Poor management	20	57

4.2 Sub-Problem 2

Sub-problem two is:

To identify the extent of delay and the inexcusable causes of delay among projects carried out by non-citizen building construction firms:

The purpose of the study, in this instance, was first to identify the extent to which each party to the building contract was responsible for delay in completion of projects.

Secondly, the purpose was also to identify the causes of delay for which the contractor takes responsibility.

Tables 16 and 17 contain data on 21 building projects undertaken by non-citizen building contractors ranging from project 1E to project 21E in column one. The same tables also contain 15 different variables on each of the projects ranging from PRJ to K. Table 11 is the legend in regard to the variables in tables 16 and 17.

Tables 16 and 17 provide general information in regard to the extent to which the parties are responsible for delays on each of the 21 projects analysed. Tables 18,19 and 20, on the other hand, provide more specific information about the actual contractor related delay factors and their impact on each of the projects. Column five of the tables contains the contractor related / inexcusable delay factors for each project while column 6 contains the actual impact of the delay factors in weeks. Table 11 is the legend for tables 18 to 20.

TABLE 16: Fourteen Delay Variables from A to K For 21 Projects Undertaken by Non-Citizen Firms

PRJ	A	B	C	D	E	F	G	H1	H2	H3	J1	J2	J3	K
1E	E	52	84	32	32	0	0	0	100	0	0	61.5	0	61.5
2E	E	70	103	33	0	33	0	0	0	100	0	0	47.1	47.1
3E	E	78	93	15	6	3	6	40	40	20	7.69	6.69	3.85	18.2
4E	E	52	64	12	8	4	0	0	66.7	33.3	0	15.4	7.69	23.1
5E	E	70	86	16	13	0	3	18.8	81.3	0	4.29	18.6	0	22.9
6E	E	56	100	44	14	10	20	45.5	31.8	22.7	35.7	25	17.9	78.6
7E	E	52	89	37	15	3	19	51.4	40.5	8.11	36.5	28.9	5.77	71.2
8E	E	75	115	40	37	3	0	0	92.5	7.5	0	49.3	4	53.3
9E	E	45	64	19	14	2	3	15.8	73.7	10.5	6.67	31.1	4.44	42.2
10E	C	52	56	4	4	0	0	0	100	0	0	7.69	0	7.69
11E	D	56	108	52	16	6	30	57.7	30.8	11.5	53.6	28.6	10.7	92.9
12E	E	48	57	9	1	8	0	0	11.1	88.9	0	2.08	16.7	18.8
13E	E	40	48	8	8	0	0	0	100	0	0	20	0	20
14E	E	32	42	10	6	2	2	20	60	20	6.25	18.8	6.25	31.3
15E	C	38	43	5	1	2	2	40	20	40	5.26	2.63	2.63	10.5
16E	E	48	98	50	37	7	6	12	74	14	12.5	77.1	14.6	104
17E	E	58	104	46	44	2	0	0	95.7	4.35	0	75.9	3.45	79.3
18E	D	40	88	48	48	0	0	0	100	0	0	120	0	120
19E	E	52	56	4	0	4	0	0	0	100	0	0	7.69	7.69
20E	D	24	44	20	12	1	7	35	60	5	29.2	50	4.17	83.3
21E	E	52	110	58	14	4	40	69	24.1	6.9	76.9	26.9	7.69	112
Average								19.3	57.2	23.5	13.1	31.7	7.84	52.6

TABLE 17: Fourteen Delay Variables from A to K for 21 Projects Undertaken by Non-Citizen Firms Re-Arranged in Terms of Size or Registration Category

PRJ	A	B	C	D	E	F	G	H1	H2	H3	J1	J2	J3	K
1	C	52	56	4	4	0	0	0	100	0	0	7.69	0	7.69
2	C	38	43	5	1	2	2	40	20	40	5.26	2.63	2.63	10.1
3	D	56	108	52	16	6	30	57.7	30.8	11.5	53.6	28.6	10.7	92.9
4	D	40	88	48	48	0	0	0	100	0	0	120	0	120
5	D	24	44	20	12	1	7	35	60	5	29.2	50	4.17	83.3
6	E	52	84	32	32	0	0	0	100	0	0	61.5	0	61.5
7	E	70	103	33	0	33	0	0	0	100	0	0	47.1	47.1
8	E	78	93	15	6	3	6	40	40	20	7.69	6.69	3.85	18.2
9	E	52	64	12	8	4	0	0	66.7	33.3	0	15.4	7.69	23.1
10	E	70	86	16	13	0	3	18.8	81.3	0	4.29	18.6	0	22.9
11	E	56	100	44	14	10	20	45.5	31.8	22.7	35.7	25	17.9	78.6
12	E	52	89	37	15	3	19	51.4	40.5	8.11	36.5	28.9	5.77	71.2
13	E	75	115	40	37	3	0	0	92.5	7.5	0	49.3	4	53.3
14	E	45	64	19	14	2	3	15.8	73.7	10.5	6.67	31.1	4.44	42.2
15	E	48	57	9	1	8	0	0	11.1	88.9	0	2.08	16.7	18.8
16	E	40	48	8	8	0	0	0	100	0	0	20	0	20
17	E	32	42	10	6	2	2	20	60	20	6.25	18.8	6.25	31.3
18	E	48	98	50	37	7	6	12	74	14	12.5	77.1	14.6	104
19	E	58	104	46	44	2	0	0	95.7	4.35	0	75.9	3.45	79.3
20	E	52	56	4	0	4	0	0	0	100	0	0	7.69	7.69
21	E	52	110	58	14	4	40	69	24.1	6.9	76.9	26.9	7.69	112
Average								19.3	57.2	23.5	13.1	31.7	7.84	52.6
Median								12	60	10.5	4.29	25	4.44	47.1
Inter-quartile Range								40	72	19	13	42	5.1	59
Standard Deviation								23	34.9	32.4	21.2	30.9	10.5	36.5

Table 18: The Impact of the Delay Factors on 8 Projects Ranging from Project 1E to 8E for Projects Undertaken by Non-Citizen Firms

PRJ	A	B	G	L	M	N
1E	E	52	0	N/A	0	0
2E	E	70	0	N/A	0	0
3E	E	78	6	Poor management	6	7.7
4E	E	52	0	N/A	0	0
5E	E	70	3	Late procurement of materials	1	4.3
				Inadequate number of workers on site	1	4.3
				Poor coordination of subcontractors	1	4.3
6E	D	56	20	Poor management	20	36
7E	E	52	19	Difficult soil conditions resulting in Earthworks delays	12	23
				Defective materials/roof trusses	7	13
8E	E	75	0	N/A	0	0

TABLE 19: The Impact of the Delay Factors on 8 Projects Ranging from Project 9E to 16E for Projects Undertaken by Non-Citizen Firms

PRJ	A	B	G	L	M	N
9E	E	45	4	Late procurement of materials	2	4.4
				Poor coordination with subcontractors	2	4.4
10E	C	52	0			
				N/A	0	0
11E	D	56	30	Late payment of domestic sub-contractors		
				Resulting in their slow progress	2	3.6
				Shortage of skilled labour in the locality	20	36
				Late procurement of materials	5	8.9
				Poor workmanship resulting in re-do of work	3	5.4
12E	E	48	0			
				N/A	0	0
13E	E	40	0			
				N/A	0	0
14E	E	32	0			
				N/A	0	0
15E	C	38	2			
				Delay in commencement of work	1	2.6
				Late procurement of materials	1	2.6
16E	E	48	6			
				Late procurement of materials	3	6.3
				Poor site management	3	6.3

TABLE 20: The Impact of the Delay Factors on 5 Projects Ranging from Project 17E to 21E for Projects Undertaken by Non-Citizen Firms

PRJ	A	B	G	L	M	N
17E	E	58	0	N/A	0	0
18E	E	40	0	N/A	0	0
19E	E	52	0	N/A	0	0
				Late procurement of materials	3	13
20E	D	24	10	Poor programming of works	4	17
				Delay in commencement of works	14	27
21E	E	52	40	General lack of resources	13	25
				Frequent change in personnel	13	25

4.3 Sub-Problem 3

Sub-problem 3 is:

To compare the extent of delay and the inexcusable causes of delay between projects carried out by 100%citizen construction firms and those carried out by non-citizen construction firms.

4.3.1 A General Comparison of the Extent to which each of the Parties is Responsible for the Delay in Completion of Projects for the Two Groups of Construction Firms

It can be noticed from table 10 and table 17 that the sample of projects carried out by 100% citizen contractors is biased towards the smaller sized category C and D firms. The sample of projects carried out by non-citizen contractors is, however, biased towards the larger sized category E firms. It should be noted that, of the three categories, category C comprise the smallest sized firms, whereas category E is composed of the biggest sized firms. It is, therefore, acknowledged that conclusions based on data at hand may be influenced to some degree by the fact that the citizen projects sample had more of the projects carried out by the smaller sized (category C and D) contractors as opposed to the non-citizen sample which had more of the projects carried out by the larger (category E) firms. Bigger sized firms are known to perform at a higher level compared to the smaller firms. Table 21 is an illustration of the comparative analysis based on both the size of the contractor for the project and the group under which the project falls. Average values for H1, J1, and K are the most relevant in this particular case. The average or mean value for H1 [proportion of inexcusable delay to total delay] for the citizen group for projects carried out by the combined category C & D firms is 55%. When this figure was compared with the corresponding mean H value of 33% for projects carried out by category E citizen firms, it became obvious that the bigger firms performed better than the smaller firms within the same group. A further comparison of the above two average H1 values with the combined average figure of 48% revealed that the performance of the smaller sized firms was below the combined average whereas the performance of the bigger category E firms surpassed that of the combined average. Similar trends exist within the non-citizen group. It would appear reasonable therefore to suggest that any comparison of the performance on projects carried out by the two groups of contractors can only be fair if the samples of projects representing each group has an identical proportion of larger firms to smaller firms. It is acknowledged that there is bias in the analysis and

conclusions that will follow as a result of the above. It would appear that if for instance the proportion of projects undertaken by smaller sized firms within the non-citizen group was increased to match that of the citizen group, then the difference in performance between the two groups would be less than that contained in the analysis that will follow. Note that this affects analysis in regard to all the sub-problems. Note also that a comparison of the performance of the two groups based on projects carried out by both the smaller sized category C & D and the bigger category E firms on the other hand reveals that the performance of the non-citizen firms exceeds that of the citizen firms

The foregoing has been an acknowledgement of the possibility of the presence of bias in the data. The next section presents the data in regard to this sub-problem and the analysis of the same.

TABLE 21: A Comparison of the Performance of the Two Groups of Contractors Taking into Account their Relative Size

DELAY VARIABLE	CATEGORY C & D		CATEGORY E	
	Citizen	Non-Citizen	Citizen	Non-Citizen
Delay caused by the contractor expressed as a % of total delay [AVERAGE H1]	55	27	33	17
Delay caused by the employer expressed as a % of total delay [AVERAGE H2]	24	62	52	56
Delay outside the control of the parties expressed as a % of total delay [AVERAGE H3]	23	11	15	27
Delay caused by the contractor expressed as a % of planned building period [AVERAGE J1]	56	18	27	12
Delay caused by the employer expressed as a % of total delay [AVERAGE J2]	18	42	27	29
Delay outside the control of the parties expressed as a % of total delay [AVERAGE J3]	21	4	25	9
Total delay expressed as a % of planned building period [AVERAGE K]	94	63	80	49

Based on the information contained in tables 9, 10, 16, and 17, a comparison of the trends displayed by the data from the two groups is illustrated by table 21.

TABLE 22: Comparison of the Two Groups of Projects in Terms of Seven Significant Delay Variables, H1 to K

ITEM	C-H1	E-H1		C-H2	E-H2		C-H3	E-H3		C-J1	E-J1		C-J2	E-J2		C-J3	E-J3		C-K	E-K
1	0	0		0	0		0	0		0	0		0	0		0	0		14	7.7
2	0	0		0	0		0	0		0	0		0	0		0	0		23	7.7
3	0	0		0	11		0	0		0	0		0	2.1		0	0		24	10
4	0	0		0	20		0	0		0	0		0	2.6		0	0		28	18
5	0	0		0	24		0	0		0	0		0	6.7		0	0		29	19
6	12	0		5	31		0	4.4		6.6	0		3.9	7.7		0	2.6		29	20
7	14	0		5	32		0	5		9.6	0		4.8	15		0	3.5		33	23
8	20	0		17	40		2.3	6.9		11	0		5.7	19		1.9	3.9		40	23
9	34	0		17	41		3.3	7.5		14	0		5.8	19		3.9	4		42	31
10	36	0		17	60		4.8	8.1		17	0		9.6	20		4.2	4.2		55	42
11	40	12		17	60		5.9	11		19	4.3		10	25		4.8	4.4		58	47
12	43	16		19	67		9.6	12		21	5.3		14	27		5	5.8		71	53
13	50	19		20	74		13	14		28	6.3		14	29		6.3	6.3		71	62
14	53	20		20	74		14	20		29	6.7		14	29		6.6	7.7		85	71
15	54	35		23	81		15	20		34	7.7		15	31		6.8	7.7		92	79
16	56	40		24	93		15	23		42	13		19	49		8.3	7.7		95	79
17	58	40		25	96		20	33		45	29		19	50		10	11		105	83
18	60	46		26	100		20	40		59	36		20	62		14	15		113	93
19	63	51		45	100		21	89		63	37		29	76		15	17		114	104
20	67	58		47	100		25	100		63	54		29	77		25	18		115	112
21	70	69		48	100		27	100		68	77		31	120		29	47		118	120
22	73			50			28			77			33			31			119	
23	83			52			29			80			34			31			131	
24	83			60			42			100			34			48			149	
25	92			73			46			106			40			50			175	
26	95			94			68			108			55			58			182	
27	100			100			76			131			67			81			200	
28	100			100			100			203			69			182			213	
Average	48	19		32	57		21	23		48	13		21	32		22	7.8		90	53
Median	54	12		22	60		15	11		32	4.3		15	25		6.7	4.4		89	47
Standard Deviation	33	23		30	35		25	32		49	21		20	31		38	10		57	37
Inter-quartile range	50	40		31	72		25	19		57	13		25	42		27	5		78	59

Table 22 combines the delay variables for projects undertaken by the two groups of contractors into one table. Table 22 is the legend table 23. Notice Table 22 makes it easier to compare the two groups of contractors based on the seven significant delay variables. The last four rows of table 22 contains two measures of central tendency, namely the arithmetic mean or average and the median and two measures of dispersion, namely the standard deviation and the inter-quartile range, corresponding to each of the seven delay variables for the two groups of contractors. The values or variables in each of the columns have been arranged in ascending order so as to reveal any trends being displayed by the data. For instance the data in columns E-H1 and E-J1 are extremely skewed. In column E-H1, the values for the first ten items is zero while the values for the remaining eleven items ranges between twelve and sixty-nine. Column E-J1 displays a similarly skewed distribution of the data. A closer inspection of other columns reveals that the distribution of all data is not uniform or even, although in most of the cases it is not skewed to the same extreme extent, as is the case with columns E-H1 and E-J1.

The foregoing discussion on the manner in which the data is distributed is important because the distribution of data in any particular data set has an influence on the choice of the measures of central tendency and of dispersion. Commenting on the choice of the measure for central tendency that is best suited for a particular data set, Leedy (2001:265) states the following:

“The median is also used frequently when a researcher is dealing with a data set that is highly skewed in one direction or the other.”

And,

“The median may be a better reflection of central tendency in such a skewed distribution because it is not affected by extreme scores.”

It appears that the arithmetic mean or average in the case of skewed data does not give a good indication of the position where most of the data is likely to be found. It would appear that the arithmetic mean is the preferred choice as a measure of central tendency of a data set that is relatively evenly distributed. The above clearly leads to the conclusion that, based on the nature of the data set contained in table 22, the most reliable measure of central tendency is the median. There is yet another measure of central tendency that could have been used, i.e. the mode. The mode is, however, not regarded very highly and as such it is used predominantly as a measure of central tendency for nominal data.

Another important statistical measure that is required for the purpose of analysing the above data is the measure of dispersion. The two most commonly accepted and fairly reliable measures that could be adopted in this particular case are interquartile range and the standard deviation. Of course, there is also the range, but this is considered very unreliable, especially when dealing with skewed data. The interquartile range is the range of the middle 50% of the data and is the preferred choice as a measure of dispersion whenever the measure for central tendency is the median. The standard deviation, on the other hand, is preferred in cases where the arithmetic mean is the measure for central tendency. This, naturally, leads to the conclusion that the inter-quartile range is the better choice as a measure of dispersion for this particular data set.

There is, however, one drawback when it comes to using the median as a measure of central tendency in this particular case. The sum of the measures for central tendency for columns C-H1, C-H2, and C-H3 should, naturally, be100% or thereabout, in order for the analysis to make sense. A similar argument applies in the case of E-H1, E-H2 and E-H3. In this particular case, the sum of the arithmetic mean for the columns is about 100% in all cases. The sum in the case of the median is 91% and 83% respectively, which result does not make sense. If one is to cut an orange into three parts, then one should be able to put together these three parts to form a complete orange, not 0.91 or 0.83 of an orange. Although it is not possible to check the credibility of the median for

columns J1, J2 and J3 in a similar manner, there is, nevertheless, a lingering suspicion that even these values may not be as sensible as the arithmetic mean values. There is a case, therefore, for the adoption of the arithmetic mean as the measure of central tendency despite the fact that the median appeared to be the better choice. If the arithmetic mean is to be adopted for use in this analysis, the standard deviation would be the choice as the measure of variance since it is derived from the latter and literature on this subject appear to suggest that the two should always be used together.

A comparison of the values of the arithmetic mean or median for each of the delay variables between the two groups of building projects appears to suggest similar trends. In the case of the variable H1, for instance, the arithmetic mean for the 100% citizen, C-H1, is 48% as opposed to 19% for the non-citizen group, E-H1. The interpretation of this is that the proportion of the contractor's inexcusable delay to total delay is likely to be 48% in the case of projects undertaken by 100% citizen contractors and 19% in the case of projects undertaken by non-citizen contractors. These arithmetic mean values are giving us the best prediction (the best guess) in regard to this particular variable for the projects under investigation. Values of the median for the variable H1 are 54% and 12% for the 100% citizen group and the non-citizen group respectively. A comparison of "48% versus 19%" or "54% versus 12%" shows the same tendency, although the difference between the latter two is more emphatic than the former two. A similar argument applies to a comparison of the arithmetic mean versus the median of the variables C-H2/E-H2, C-H3/E-H3, C-J1/E-J1, C-J2/E-J2, and C-K/E-K. The only variable whereby this argument may not apply is C-J3/E-J3. In this case, the arithmetic mean is 22% and 7.8% for the 100% citizen group and the non-citizen group, respectively. The median on the other hand is 6.7% versus 4.4%. The median implies that the delay outside the control of the parties expressed as a percentage of the planned building period is roughly the same for both groups of contractors. The arithmetic mean values, however, imply that there is a significant difference between the two groups of contractors in terms of this variable. The median, in this case, appears to make

more sense as the factors outside the control of the parties should impact equally upon the two groups of contractors. One may also expect that the combined effect of the employer and any factors beyond the control of the contractors or employer should be the same on projects carried out by both groups of contractors. Thus, the sum of arithmetic mean or median for variables C-J2 and C-J3 should be roughly equal to the sum of the arithmetic mean or median for variables E-J2 and E-J3. The sum of the arithmetic mean for variables C-J2 and C-J3 is 43% while the corresponding sum for E-J2 and E-J3 is 40%. The sum of the median for variables C-J2 and C-J3 is 22% while the corresponding sum for E-J2 & E-J3 is 29%. In this case, the arithmetic mean appears to be more sensible, although the median is also not far off the mark. It would appear, therefore, that the choice of the arithmetic mean over the median may not alter the outcome of the study in any significant way.

The spread of the data will be discussed next. The last two rows of table 22 reveals that the data we are dealing with is widely spread out. Both the values for the interquartile range and the standard deviation are high. The values for the standard deviation are higher than the arithmetic mean values in about 50% of the cases. Leedy (2001:268) makes the following comments in connection with the spread of data:

“The probability of making a correct guess about any particular data point within a distribution rises with the tendency of the data to cluster about the point of central tendency; the further the data are dispersed from the central pivotal axis, the greater the margin of predictive error becomes.”

It appears that the logical conclusion to be made, based on the examination of the both the central tendency and the spread of this data set, is that reliability of the result of the analysis is not as high as had been hoped. A more reliable data set could probably have been obtained if the sample size had been higher.

Further analyses of the data are illustrated in the following tables and bar charts.

TABLE 23: Legend for Table 22

C-H1	Delay caused by the contractor/inexcusable delay – expressed as a % of total delay for projects undertaken by 100% citizen firms
E-H1	Delay caused by the contractor/inexcusable delay – expressed as a % of total delay for projects undertaken by non- citizen firms
C-H2	Delay caused by the employer expressed as a % of total delay for projects undertaken by 100%citizen firms
E-H2	Delay caused by the employer expressed as a % of total delay for projects undertaken by non-citizen firms
C-H3	Delay outside the control of the parties expressed as a % of total delay for projects undertaken by 100% citizen firms
E-H3	Delay outside the control of the parties expressed as a % of total delay for projects undertaken by non-citizen firms
C-J1	Delay caused by the contractor/inexcusable delay – expressed as a % of planned building period for projects undertaken by 100% citizen firms
E-J1	Delay caused by the contractor/inexcusable delay – expressed as a % of planned building period for projects undertaken by non- citizen firms
C-J2	Delay caused by the employer expressed as a % of planned building period for projects undertaken by 100%citizen firms
E-J2	Delay caused by the employer expressed as a % of planned building period for projects undertaken by non-citizen firms
C-J3	Delay outside the control of the parties expressed as a % of planned building period for projects undertaken by 100% citizen firms
E-J3	Delay outside the control of the parties expressed as a % of planned building period for projects undertaken by non-citizen firms
C-K	Total delay expressed as a % of planned building period for projects undertaken by 100% citizen firms
E-K	Total delay expressed as a % of planned building period for projects undertaken by non-citizen firms

TABLE 24: A General Comparison of Projects carried out by the Two Groups Based on a Selected few Delay Variables

VARIABLE	100% CITIZEN FIRMS	NON-CITIZEN FIRMS
The average of the delay caused by the construction firms expressed as a % of total delay (H1)	48%	19%
The average of the delay caused by the employer expressed as a % of total delay (H2)	31%	57%
The average of the delay outside the control of the parties expressed as a % of total delay (H3)	21%	24%
The average of the delay caused by the construction firms expressed as a % of the planned building period (J1)	48%	13%
The average of the delay caused by the employer expressed as a % of the planned building period (J2)	21%	32%
The average of the delay outside the control of the parties expressed as a % of the planned building period (J3)	22%	8%
The average of total delay expressed as a % of planned building period (K)	90%	53%

TABLE 25: A General Comparison of Projects Carried out by the Two Groups Based on a Few Selected Delay Variables

VARIABLE	100% CITIZEN FIRMS	NON-CITIZEN FIRMS
Average J2 + average J3.	43%	40%
Average J1	48%	13%

FIGURE 4: A General Comparison of Projects Carried out by the Two Groups Based on a Few Selected Delay Variables

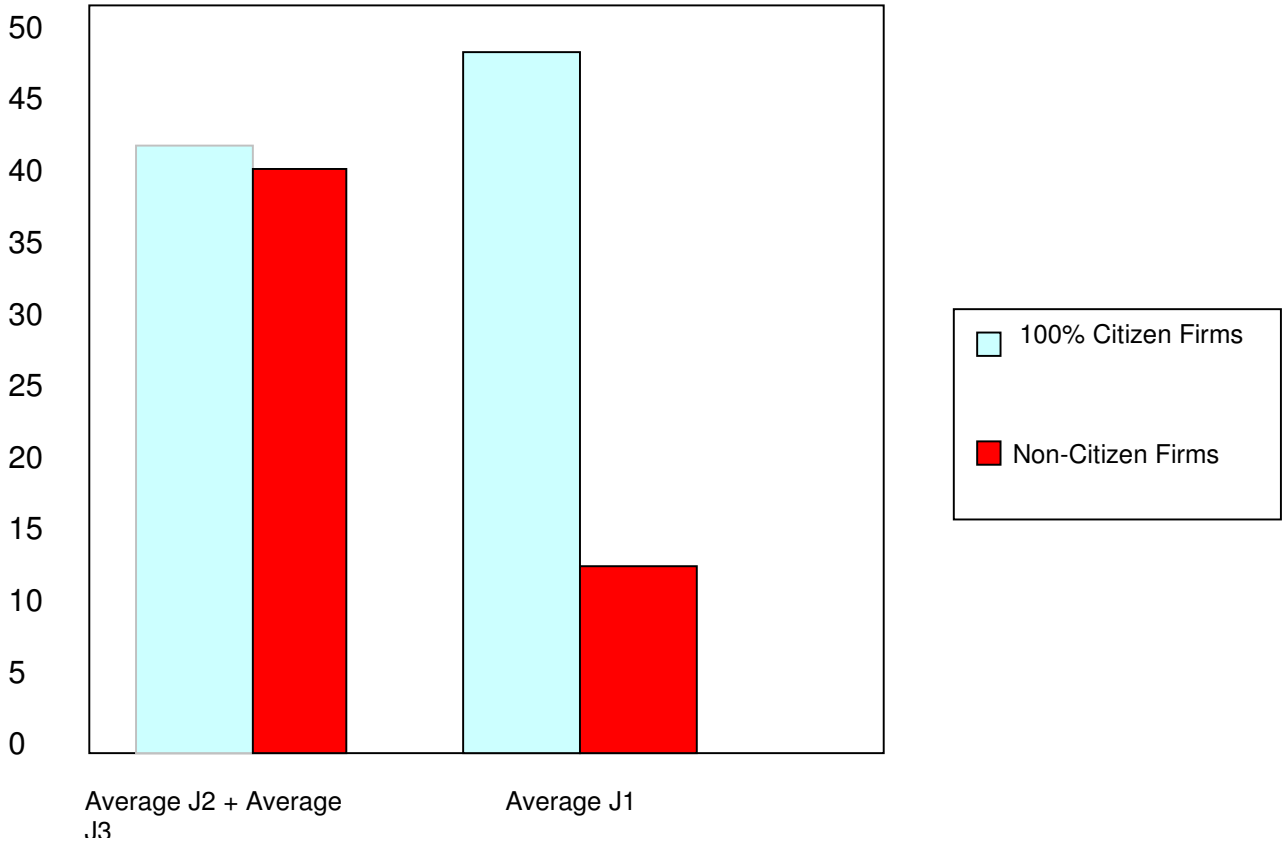
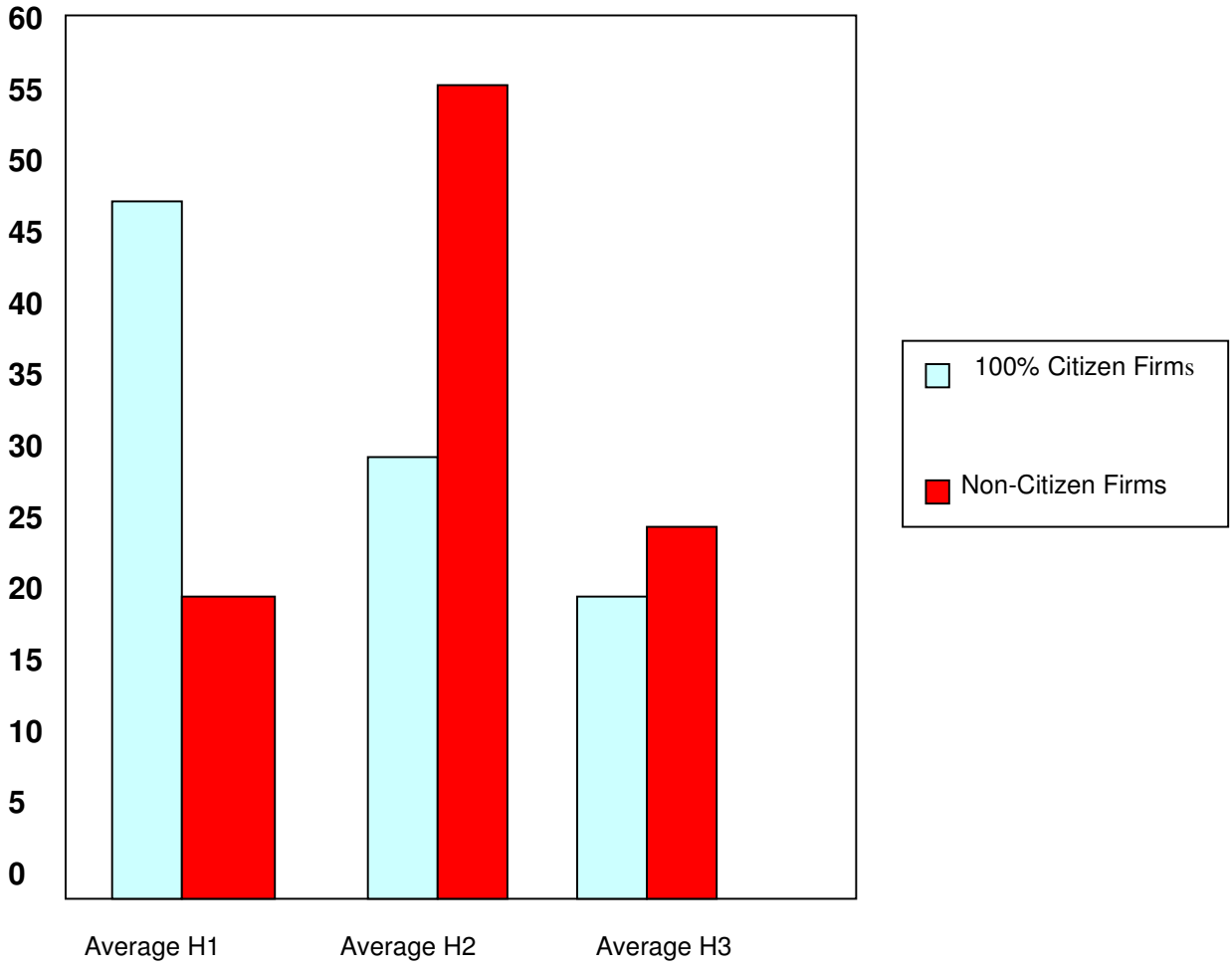


TABLE 26: A general comparison of projects carried out by the two groups of contractors based on a selected few variables.

VARIABLE	100% CITIZEN FIRMS	NON-CITIZEN FIRMS
The average of the delay caused by the contractor expressed as a percentage of total delay [H1]	48%	19%
The average of the delay caused by the employer expressed as a percentage of total delay [H2]	31%	57%
The average of the delay outside the control of both the contractor and the employer expressed as a percentage of total delay [H3]	21%	24%

FIGURE 5: A general comparison of projects carried out by the two groups based on a few selected variables



From table 25 and figure 4, it can be noted that, on average, the sum of the "employer related delays" and any "delays outside the control of the parties" [average J2 +average J3] is equivalent to 43% of the planned building period in the case of the citizen contractors and 40% in the case of non-citizen contractors. Clearly, 40% and 43% is quite close. Notice however that the average of the delays caused by the contractor, expressed, as a percentage of the planned building period [average J1], is 48% in the case of citizen contractors and 13% in the case of non-citizen contractors. There is thus a big difference between the two groups of contractors in regard to contractor caused delays on building

projects. It would, therefore, appear that the major difference between projects undertaken by the two groups of contractors is the result of contractor caused or inexcusable delays.

TABLE 27: A General Comparison of Projects Carried out by the Two Groups based on a Selected few Variables

VARIABLE	CITIZEN FIRMS	NON-CITIZEN FIRMS
Total delay expressed as a % of the actual building period	47%	35%
Planned building period expressed as a % of actual building period	53%	65%

FIGURE 6: A general Comparison of projects carried out by the two groups of contractors based on a selected few variables

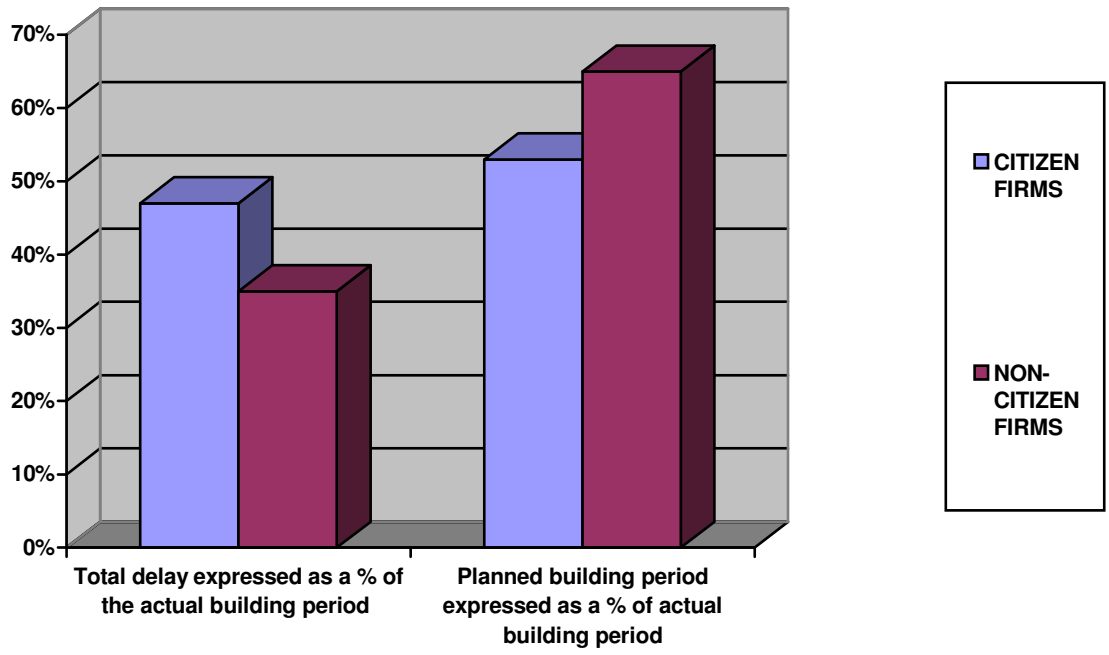


Table 27 and figure 6 illustrate even more of the differences between projects undertaken by the two groups of contractors. The total delay on projects undertaken by citizen firms is on average almost 50% of the actual building period. This means that, if the planned or original contract period is five months, then a citizen contractor will on average take ten months to complete the project. Delay on projects undertaken by non-citizen firms on the other hand take is on average 35% of the actual building period. Clearly, there exists a significant difference in the performance of the two groups of contractors. Based on table 25 and figure 4, this difference in performance appears to be the direct result of differences in delays caused by the contractor or contractor's inexcusable delays.

4.3.2 A Comparison in Terms of the Effect or Impact of the Identified Delay Factors on Projects Undertaken by the Two Groups of Construction Firms

Tables 28 and 29 contain summaries of the impact of actual inexcusable delay factors identified. Table 28 is in regard to 22 inexcusable causes of delay identified on 28 projects undertaken by 100% citizen firms ranging from project C1 to project C28. Table 29 on the other hand is in regard to 12 inexcusable causes of delay identified on 21 building projects ranging from project E1 to project E21. The last column of tables 28 and 29 contains average or arithmetic mean values of the impact of each delay factor on all the projects.

TABLE 28: A summary of the Impact of Delay Factors on 28 Projects Undertaken by 100% Citizen Firms

Causes of Delay (Inexcusable Delays Only)		Extent of Delay Expressed as a % of the Planned Building Period (N)																													
		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	Mean
1	Poor management	21	0	0	0	0	0	0	58	0	6	0	0	34	63	0	0	38	0	8	0	0	0	0	17	7	0	0	57	10.993
2	Inadequate labour on site	0	0	10	11	13	11	5	0	0	0	0	0	0	0	7	0	0	0	6	0	0	0	0	0	0	0	0	0	2.2
3	Late procurement of materials	0	0	5	11	28	11	14	0	0	0	0	0	0	0	177	0	38	0	0	0	0	0	10	0	0	0	21	0	11.243
4	Contractor's cashflow problems	0	0	0	29	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	0	0	0	0	0	2.2536
5	Lack of diligence	0	0	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	1.643
6	Failure to notify Architect regarding shortage of specified material in the market	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6786
7	Delay in commencement	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3357
8	Owner/manager sick	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1101
9	Non-payment of workers Caused go-slow	0	0	0	0	0	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5714
10	Inadequate plant/equipment	0	0	0	0	0	13	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5464
11	Wrong setting out	0	0	0	0	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.1643
12	Lack of construction knowledge	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0	0	0	0	0	44	0	0	0	0	0	0	0	0	2.25
13	Poor workmanship resulting in re-do	0	0	0	0	0	0	0	0	0	6	0	0	0	0	7	0	10	0	0	0	0	0	0	0	0	0	42	14	2.7786
14	Project complexity	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4643
15	Poor supervision	0	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	29	0	44	0	0	10	0	0	0	0	0	3.5
16	General lack of resources	0	0	0	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2143

Causes of Delay (Inexcusable Delays Only)		Extent of Delay Expressed as a % of the Planned Building Period (N)																													
		C1	C2	C3	C4	C5	C6	C7	C8	C9	C10	C11	C12	C13	C14	C15	C16	C17	C18	C19	C20	C21	C22	C23	C24	C25	C26	C27	C28	Mean
17	Poor decision-making	0	0	0	0	0	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4643
18	Poor coordination with Subcontractors	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0	0	0	0	0	29	1.3787
19	Delay by nominate Subcontractors	0	0	0	0	0	0	0	0	0	0	0	28	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
20	Poor financial management	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	19	0	0	44	0	0	0	0	0	0	0	0	2.25
21	Poor organization	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	21	0	0.75
22	Priority given to Other Projects	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	0.207

TABLE 29: A Summary of the Impact of Delay Factors on 21 Projects Undertaken by Non-Citizen Firms

Causes of delay (inexcusable Delays only)		Extent of delay expressed as a % of the planned building period (N)																				Mean
		E1	E2	E3	E4	E5	E6	E7	E8	E9	E 10	E 11	E 12	E 13	E 14	E 15	E 16	E 17	E 18	E 19	E 20	E 21	
1	Poor management	0	0	7.7	0	0	36	0	0	0	0	0	0	0	0	0	6.3	0	0	0	0	0	2.38095
2	Late procurement of materials	0	0	0	0	4.3	0	0	0	4.4	0	8.9	0	0	0	2.6	6.3	0	0	0	13	0	1.88095
3	Inadequate labour on site	0	0	0	0	4.3	0	0	0	0	0	36	0	0	0	0	0	0	0	0	0	0	1.91905
4	Poor coordination with subcontractors	0	0	0	0	4.3	0	0	0	4.4	0	0	0	0	0	0	0	0	0	0	0	0	0.41429
5	Difficult soil conditions	0	0	0	0	0	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.09524
6	Defective materials	0	0	0	0	0	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.61905
7	Late payments of domestic subcontractors	0	0	0	0	0	0	0	0	0	0	3.6	0	0	0	0	0	0	0	0	0	0	0.17143
8	Poor work-manship resulting in re-do	0	0	0	0	0	0	0	0	0	0	5.4	0	0	0	0	0	0	0	0	0	0	0.25714
9	Delay in commencement	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.6	0	0	0	0	0	27	1.40952
10	Poor programming	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	17	0	0.80952
11	Lack of resources	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	1.19048
12	Frequent change in Personnel	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	1.19048

TABLE 30: The various Inexcusable Delay Factors as per table 27, on Projects Undertaken by 100% Citizen Firms, arranged in descending order of their respective average impact. The frequency for the delay factors is also indicated.

Item	Delay Factor	Average Impact [AI]	Frequency [F]
1	Late procurement of materials	11.24	8
2	Poor management	10.99	10
3	Poor supervision	3.5	4
4	Poor workmanship resulting in re-do	2.78	5
5	Contractor's cash-flow problems	2.25	3
6	Poor financial management	2.25	2
7	Lack of construction knowledge	2.25	2
8	Inadequate labour on site	2.2	7
9	Lack of diligence	1.64	2
10	Poor co-ordination with sub-contractors	1.38	2
11	General lack of resources	1.21	1
12	Delay by nominated subcontractors	1	1
13	Poor organisation	0.75	1
14	Failure to notify architect regarding shortage of specified materials in the market	0.68	1
15	Non-payment of workers caused go-slow	0.57	1
16	Inadequate plant/equipment	0.55	2
17	Poor decision-making	0.46	1
18	Project complexity	0.46	1
19	Delay in commencement	0.34	1
20	Priority given to other projects	0.21	1
21	Wrong setting out	0.16	1
22	Owner/manager sick	0.11	1

TABLE 31: The Average Impact and Frequency of the Inexcusable Delay Factors among Projects undertaken by Non-Citizen Firms arranged in descending order of the average impact.

Rank	Delay Factor	Average Impact [AI]	Frequency [F]
1	Poor management	2.38	3
2	Inadequate labour on site	1.92	2
3	Late procurement of materials	1.88	6
4	Delay in commencement	1.41	2
5	Lack of resources	1.19	1
6	Frequent change in personnel	1.19	1
7	Difficult soil conditions	1.1	1
8	Poor programming	0.81	1
9	Defective materials	0.62	1
10	Poor co-ordination with sub-contractors	0.41	2
11	Poor workmanship resulting in re-do	0.26	1
12	Late payment of domestic sub-contractors caused go-slow	0.17	1

TABLE 32: Legend for Tables 28, 29, 30, 31, 33 & 35 and Figures 8, & 9

Average impact [AI]	The average/arithmetic mean of the "delay arising from each of the delay factors expressed as a % of the planned building period" in regard to the sample of projects. An AI of 10% for instance means that "on average", the delay factor caused a delay equivalent to 10% of the planned building period on the projects sampled.
Frequency [F]	The number of projects in the sample affected by the delay factor
Weighted frequency [WF]	The proportion of, "the number of projects within the sample affected by the delay factor, [i.e. Frequency]" to, "the total number of projects sampled". If the frequency corresponding to a delay factor is for example five, and the number of projects sampled is ten, then the weighted frequency is five divided by ten, giving the result of 0.5 as the weighted frequency. A weighted frequency (WF) for a delay factor of 0.5 implies that 50% or half of the projects within the sample were affected by the delay factor.

The data contained in tables 28 and 29 has the following characteristics:

- The distribution of the data is extremely skewed.
- The spread of the data is high in a few instances
- Due to the nature of these data, the preferred choice as a measure of location would be one of the non-parametric statistical measures such as the median or mode. These measures of central tendency are however meaningless since the measure of location would be zero in all the cases.
- The arithmetic mean therefore appears to be the only practical or sensible measure of central tendency in this case.
- The alternative to this would be to obtain a measure of location only for projects within the sample that were affected by each of the delay factors. For example, table 28 shows that the delay factor "poor management" had an effect on 10 projects, namely projects C1, C8, C10, C13, C14, C17,

C19, C24, C25, and C28. The arithmetic mean of the "extent of delay" in regard to this delay factor for these 10 projects is about 30. This measure of location would then be used in conjunction with the weighted frequency to describe the impact of the delay factor. Since the distribution of the data set from which the measure of location has been derived is not as extremely skewed, this measure of location would be more reliable. It is argued, however, that the two approaches eventually lead to similar conclusions.

It appears that the average AI values obtained from tables 28 and 29 are not very reliable as measures for central location. Despite this shortcoming, the AI approach appears to be a good and practical way of comparing the effect of delay factors upon the two groups of projects.

An alternative method that has been used in this study for comparing the impact of the various inexcusable delay factors on the projects within the two sample groups is what has been referred to in this study as the weighted frequency or WF method. The WF approach has been used to rank the various inexcusable delay factors in terms of the percentage of projects within each sample group that are affected by each of the delay factors. Unlike the AI method, the reliability of the WF method appears to be high. As a matter of fact, literature on previous research studies on the subject at hand suggests that it is a widely accepted approach. For instance, Chan and Kumaraswamy (1997) used a similar approach in their HongKong study.

In this study, the AI and the WF methods have both been used and the outcome appear to be quite revealing. As an illustration, it can be noticed from table 30 and table 31 that the delay factor "late procurement of materials" caused delay on about 29% of the projects carried out by both groups of contractors. This creates the impression that the delay factor impacts equally upon the two groups. This same delay factor, however, also caused a delay equivalent to about 11% of the planned building period in the case of 100% citizen group but only about 2%

in the case of the non-citizen group. The two approaches at comparing the effect of the delay factors on the groups, therefore, appear to be complementary. One approach tells us the proportion of projects that are affected by a delay factor within each sample group, while the other approach tells us the extent to which the delay factor affected the projects.

TABLE 33: A Comparison of Effect of the Inexcusable Delay Factors in Terms of their Average Impact [AI] on Projects carried out by citizen and non-citizen contractors

Delay Factor	Average Impact: Citizen	Average Impact: Non-citizen
Late procurement of materials	11.24	1.88
Poor management	10.99	2.38
Poor supervision	3.5	0
Poor workmanship resulting in re-do	2.78	0.26
Contractors' cash flow problems	2.25	0
Poor financial management	2.25	0
Lack of construction knowledge	2.25	0
Poor co-ordination with sub-contractors	1.38	0.41
General lack of resources	1.21	1.19
Delay by nominated subcontractors	1	0
Delay in commencement	0.34	1.41
Frequent change in personnel	0	1.19
Difficult soil conditions	0	1.1
Lack of diligence	1.64	0
Inadequate labour on site	2.2	1.92

FIGURE 7: A Comparison of Effect of the Inexcusable Delay Factors in Terms of their Average Impact [AI] on Projects carried out by citizen and non-citizen contractors

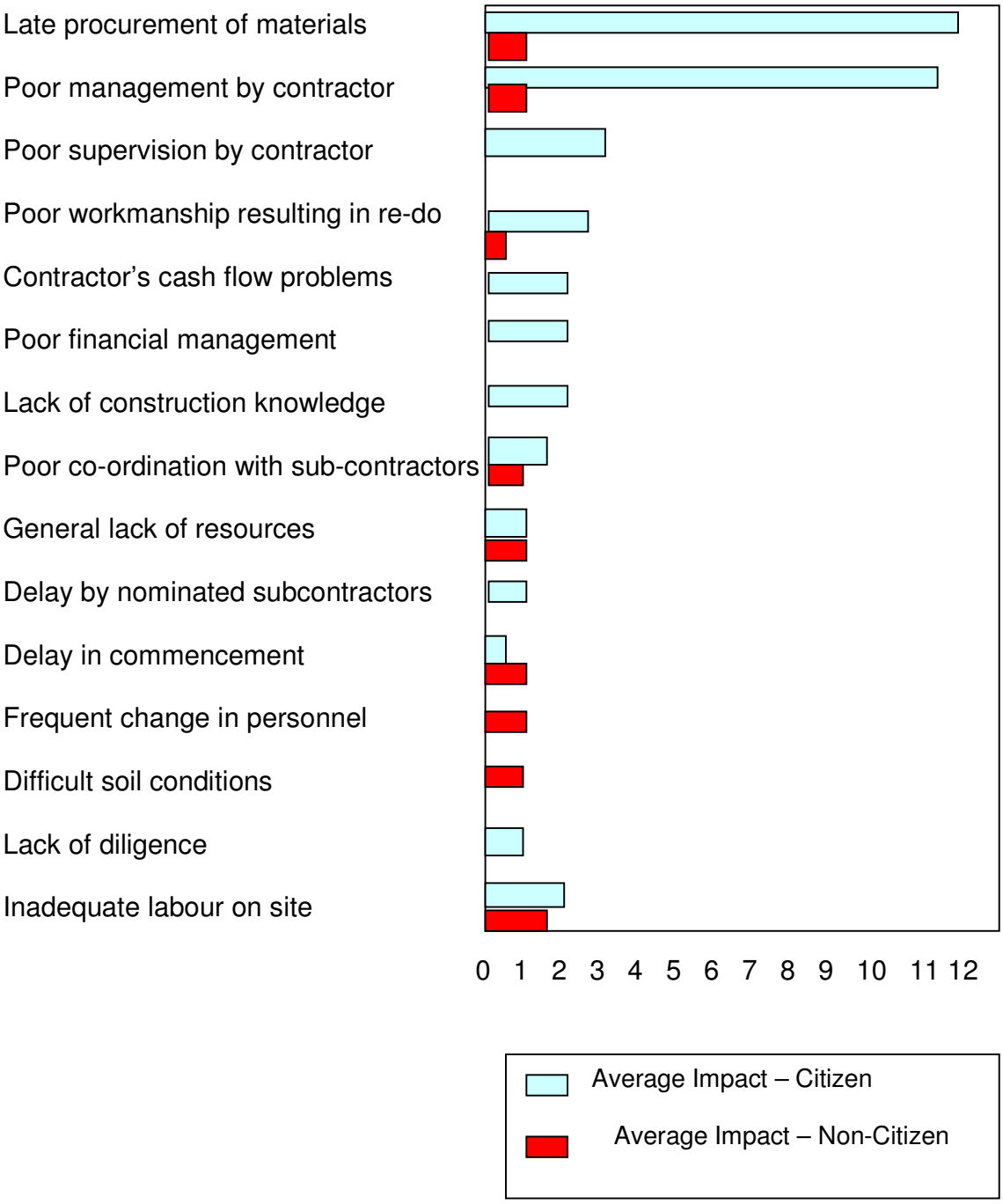


Table 34: A comparison of the effect of the Inexcusable Delay Factors on the projects carried out by the two Groups of contractors in Terms of Frequency

ID No	Delay Factor	Frequency-Citizen	Frequency - Non-Citizen
1	Late procurement of materials	8	6
2	Poor management	10	3
3	Poor supervision.	4	0
4	Poor workmanship resulting in re-do	5	1
5	Contractor's cash-flow problems	3	0
6	Poor financial management	2	0
7	Lack of construction knowledge	2	0
8	Inadequate labour on site	7	2
9	Lack of diligence	2	0
10	Poor co-ordination with sub-contractors	2	2
11	General lack of resources	1	1
12	Delay by nominated subcontractors.	1	0
13	Poor organisation	1	0
14	Failure to notify architect regarding shortage of specified materials in the market	1	0
15	Non-payment of workers/sub-contractors caused go-slow	1	1
16	Inadequate plant/equipment	2	0
17	Poor decision-making	1	0
18	Project complexity	1	0
19	Delay in commencement	1	2
20	Priority given to other projects	1	0
21	Wrong setting out	1	0
22	Owner or manager sick	1	0
23	Frequent change in personnel	0	1
24	Difficult soil conditions	0	1
25	Poor programming	0	1
26	Defective materials	0	1

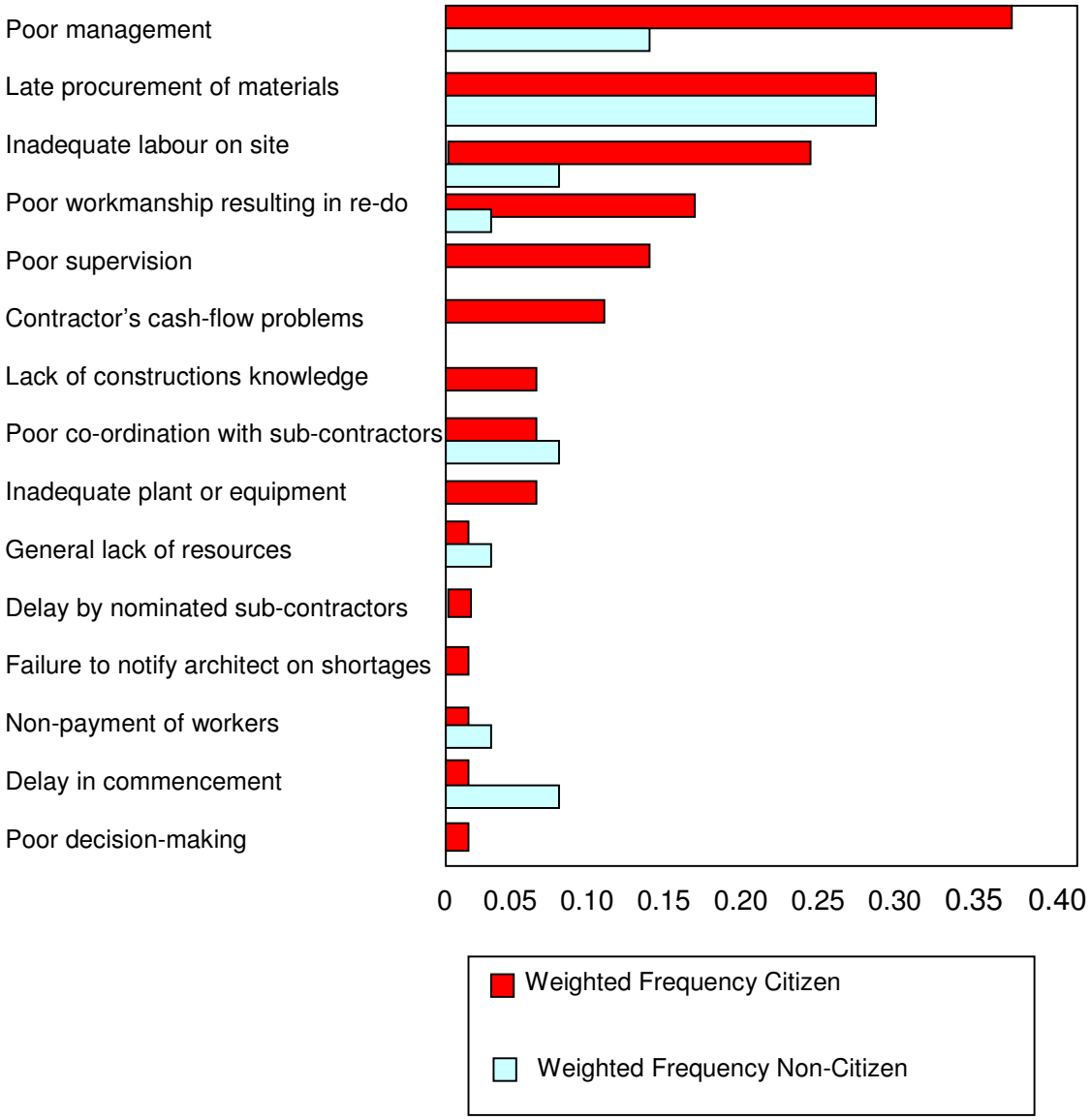
Table 34 above is a summary of the effect of the contractor caused' delay factors upon projects carried out by the two categories of contractors. There are 26 recorded delay factors in the table. Column three (Frequency – citizen) shows that of the 26 delay factors, only 22 affect the citizen group of contractors. This is

because there is four delay factors within the column with a frequency of zero, implying that the four have no effect on the citizen group. In the same way, column four (Non-citizen – frequency) shows that of the 26 delay factors within the table, only twelve affect the non-citizen group of contractors as the other 14 have a frequency of zero.

TABLE 35: A Comparison of Effect of the Inexcusable Delay Factors on Projects carried out by citizen and non-citizen contractors in Terms of their Weighted Frequency [WF]

Delay Factor	Weighted Frequency - Citizen	Weighted Frequency – Non-Citizen
Poor management	0.357	0.143
Late procurement of materials	0.286	0.286
Inadequate labour on site	0.25	0.095
Poor workmanship resulting in re-do	0.179	0.048
Poor supervision	0.143	0
Contractor's cash-flow problems	0.107	0
Lack of construction knowledge	0.071	0
Poor co-ordination with sub-contractors	0.071	0.095
Inadequate plant or equipment	0.071	0
General lack of resources	0.036	0.048
Delay by nominated sub-contractors	0.036	0
Failure to notify architect on shortages of materials on market	0.036	0
Non-payment of workers	0.036	0.048
Delay in commencement	0.036	0.095
Poor decision making	0.036	0

FIGURE 8: A Comparison of Effect of the Inexcusable Delay Factors on Projects carried out by citizen and non-citizen contractors in Terms of their Weighted Frequency [WF]



4.4 Discussion based on the WF approach

Based on this approach, the eleven most significant delay factors on the projects sampled for both groups of contractors were as listed below in order of importance, starting with the most important:

- Poor management
- Late procurement of materials
- Inadequate labour on site
- Poor workmanship
- Poor supervision
- Contractor's cash flow problems
- Poor co-ordination with subcontractors
- Delay in commencement
- Inadequate plant/equipment
- Lack of construction knowledge
- Lack of diligence

Each of the above delay factors affected at least five percent of the projects in either one or both of the two groups. Of the 11 delay factors listed above, 10 affected the citizen group while five affected the non-citizen group. The delay factors that affected the citizen group in order of their importance are as follows:

- Poor management
- Late procurement of materials
- Inadequate labour on site
- Poor workmanship
- Poor supervision
- Contractor's cash flow problems
- Lack of diligence
- Lack of construction knowledge
- Poor co-ordination with sub-contractors
- Inadequate plant/equipment on site

The delay factors that affected the non-citizen group in order of their importance are:

- Late procurement of materials
- Poor management
- Poor co-ordination with sub-contractors
- Delay in commencement
- Inadequate labour on site

The delay factors that appeared to predominantly affect the citizen group in order of importance are as follows:

- Poor workmanship
- Poor supervision
- Contractor's cash flow problems
- Inadequate plant/equipment
- Lack of construction knowledge
- Lack of diligence

The delay factors that appeared to affect both groups adversely, starting with the most important are as follows:

- Poor management
- Late procurement of materials
- Inadequate labour on site
- Poor co-ordination with subcontractors

Of the delay factors that affected both groups adversely, the following affected the citizen group far more adversely than the non-citizen group:

- Poor management
- Inadequate labour on site

Of the delay factors that affected both groups adversely, the following appeared to affect both groups equally:

- Late procurement of materials

Based on the foregoing, the conclusion is that the following delay factors could have caused the differences displayed by the data from the two groups. Put another way, these delay factors caused the high rate of delay among projects carried out by 100% citizen contractors. The effect of these delay factors was high, upon 100% citizen contractors and relatively lower, upon non-citizen contractors.

- Poor workmanship
- Poor supervision
- Contractor's cash flow problems
- Inadequate plant/equipment
- Lack of construction knowledge
- Lack of diligence
- Poor management
- Inadequate labour on site

Of the above delay factors, poor management, inadequate labour on site and poor supervision appeared to be the most important. As previously discussed, the WF approach as per the foregoing discussion is the more scientifically reliable way of interpreting the data at hand. The other approach, the AI approach, is less scientifically reliable, but it has served a very useful purpose of complementing the WF approach.

4.5 Discussion based on the AI approach

Based on this approach, it is obvious that the delay factor "late procurement of materials" and the delay factor "poor management" impact very strongly on citizen projects, each accounting for delay equivalent to about 11% of the planned building period. The combined effect of the two delay factors is a delay equivalent to 22% of the planned building period. The combined effect of these two delay factors on non-citizen projects is however equivalent to only about 4% of the planned building period. The delay factor "poor supervision" and the delay

factor “poor workmanship” each account for delays on citizen projects equivalent to about 3%. The effect of the two delay factors on non-citizen projects is however very insignificant as shown in figure 7. Contractor’s cash flow problems, poor financial management, lack of construction knowledge and lack of diligence are the other four delay factors whose combined effect on citizen projects is a delay equivalent to about 8% of the planned building period. Again, these four delay factors have an insignificant impact on non-citizen projects. The above are the eight major delay factors that contribute to the differences displayed by the data between projects undertaken by the two groups.

These eight major delay factors appear to be responsible for the differences in contractor caused (inexcusable delays) between projects undertaken by the two groups of construction firms. As previously discussed, the difference in the extent of delays in projects undertaken by the two groups of firms appears to be the direct result of inexcusable delays. A general analysis of the data under section 4.3.1 pointed to the fact that total excusable delays on projects undertaken by the two groups of contractors appeared to be quite comparable. If it is true, as the data appears to suggest, that differences in performance between the two groups is a result of inexcusable delay factors, then it may be concluded that the eight delay factors mentioned above are the major reason for the high incidence of delays on projects undertaken by citizen contractors. The eight are:

- Late procurement of materials
- Poor management
- Poor supervision
- Poor workmanship resulting in re-do
- Contractor’s cash-flow problems
- Poor financial management
- Lack of construction knowledge
- Lack of diligence

The above delay factors account for over 90% of the differences in the trends displayed by the data from the two groups. Of the above eight however, the most important of them are poor management and late procurement of materials which

together account for about 60% of the total impact of these factors. The delay factor “late procurement of materials” is the most significant based on the AI approach, but is missing from the list of the most significant delay factors based on the WF approach. This is because this delay factor affected about 29% of the projects in each of the groups. It was then concluded that the delay factor could not have contributed to the differences displayed by the data between the two groups. It appears, however, that the WF approach is superficial. It appears that the AI approach, with all its shortcomings, actually probes deeper. Using this approach, it was found that although the delay factor impacted negatively on a similar proportion of projects within the two groups, the impact in terms of the extent of delay was far more significant among the citizen projects than the non-citizen projects. As a matter of fact, the difference was big enough to cause the delay factor to be the number one contributor to the inexcusable delays among the citizen projects.

By combining the WF approach and the AI approach, it was concluded that the following 10 delay factors appear to be the cause of the high incidence of delay among projects undertaken by 100% citizen firms:

- Late procurement of materials
- Poor management
- Poor supervision
- Poor workmanship resulting in re-do
- Contractor’s cash-flow problems
- Poor financial management
- Lack of construction knowledge
- Lack of diligence
- Inadequate labour on site
- Inadequate plant/equipment

4.6. Conclusion

The foregoing analysis of the data confirmed some comparative trends in the nature of delays in completion of building projects in the Republic of Botswana, and more specifically, the Botswana public sector. One of the trends confirmed was that the performance citizen group of contractors was not as good as that of the non-citizen group of contractors. It was evident from the outcome of the analysis that the major reason for the differences observed in terms of performance between the citizen contractors and the non-citizen contractors was management related. Specific management related delay factors were highlighted as the cause of the differences in the performance of the two groups of contractors. Based on this analysis, the next chapter discusses the main conclusions and makes recommendations that, if taken into account, could reverse the undesirable comparative trends observed.

CHAPTER 5

SUMMARY, CONCLUSIONS, AND RECCOMENDATIONS

5.1 The Purpose of the Research Study

The study in general, investigated the extent of delay, and more specifically, the extent of delay arising from the various inexcusable causes of delay among building projects carried out by the following two groups of contractors:

- Citizen contractors
- Non-citizen contractors

Comparison was then made between the two groups of contractors in terms of the following:

- The extent of delay in general
- The inexcusable causes of delay affecting the two sample groups

The above was then used to explain the high incidence of delays among projects carried out by citizen contractors.

5.2 Review of the Findings

5.2.1 The study revealed that an extremely high proportion of public sector building projects in Botswana experience delays. As a matter of fact, 100% of the projects surveyed experienced delays. This can be compared to 70% in Saudi Arabia, 80% in Jordan, and 88% in Australia. The prevalence of delays in completion of projects in the Botswana public sector clearly appears to be quite high.

5.2.2 Projects undertaken by citizen contractors experienced higher levels of delay when compared with projects carried out by non-citizen contractors. The

data collected showed that projects carried out by citizen contractors, on average, required an additional period equivalent to 90% of the planned building period to complete as compared to an additional 53% for the non-citizen projects. When the above is rated against the extent of delay in other countries, for instance over 40% in Australia [Chan and Kumaraswamy:1997], 92% for small projects in Nigeria, and 59% for big projects in Nigeria [Ogunlana:1996], the conclusion is that the performance of the non-citizen group appears to be reasonable. The performance of the citizen sample group, however, appears to be below average, only comparable with the performance on small Nigerian projects whose value is less than 10 million Naira (approximately Pula 350, 000.00). It is noted that this study investigated projects carried out by medium to large contractors, who carry out work exceeding Pula four million (P4000,000). The above conclusions have been arrived at based on comparisons of data from studies carried out in only two other countries. The conclusion may not therefore be absolutely valid. More valid and reliable conclusions may have required data from previous studies in more countries, not just two countries as is the case here.

5.2.3 The level of inexcusable delays was higher on projects undertaken by 100% citizen firms as compared to these carried out by non-citizen firms. This was illustrated by the following findings:

- The average proportion of inexcusable delays to total delay was about 48% for projects carried out by citizen firms as compared to 19% for these carried out by non-citizen firms.
- The average proportion of inexcusable delay to planned building period was about 48% for projects undertaken by citizen firms as compared to about 13% for the non-citizen projects.

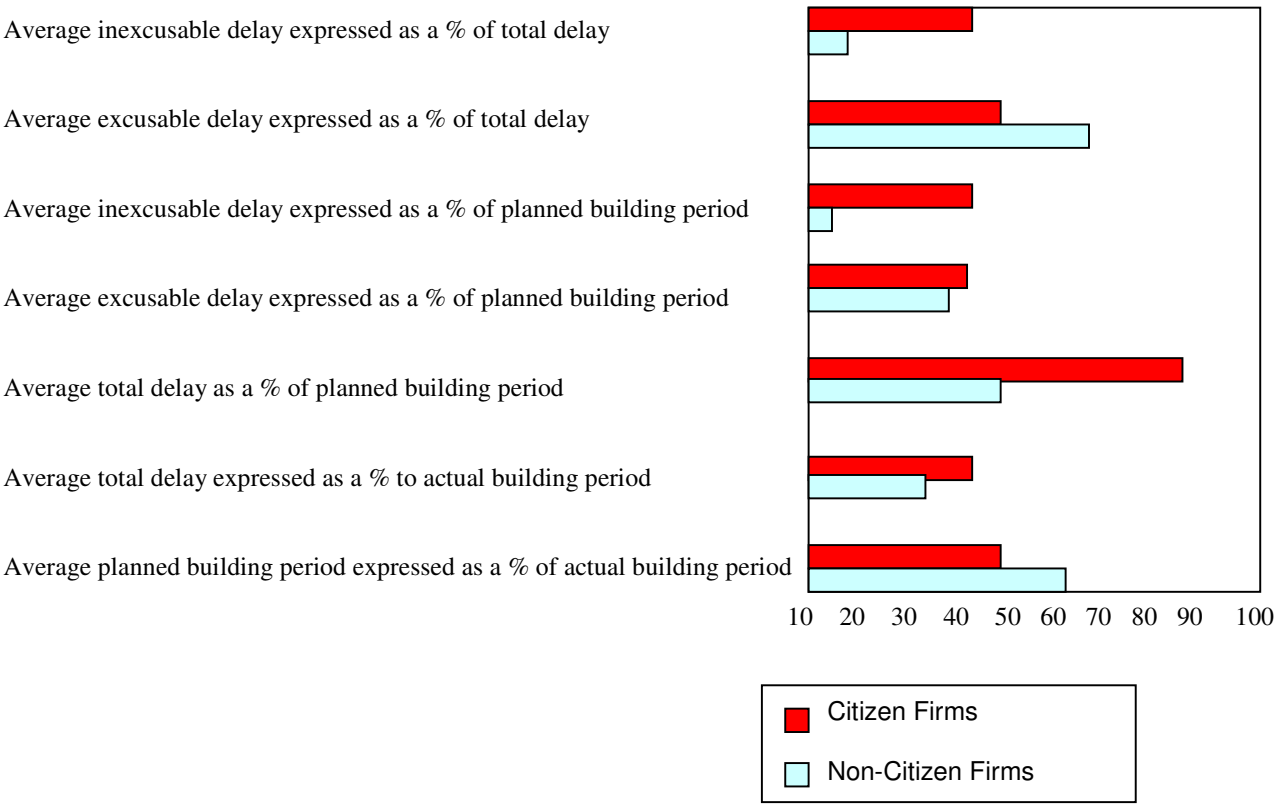
5.2.4 The proportion of excusable delays to the planned building period for the citizen group and the non-citizen group was 43% and 40% respectively. Clearly, there is very little difference between 40% and 43%. The conclusion to be drawn

from this is that since the impact of excusable delay factors on the two groups of projects appear to be equal, the higher level of delays on projects carried out by citizen contractors is due to the influence of inexcusable delay factors. Table 36 and figure 9 summarises the findings.

TABLE 36: A General Comparison of Projects Undertaken by Citizen Firms and those Undertaken by Non-Citizen Firms

Variable	**Citizen Firms**	**Non-Citizen Firms**
Average inexcusable delay expressed as a % of total delay	48	19
Average excusable delay expressed as a % of total delay	52	71
Average inexcusable delay expressed as a % of planned building period	48	13
Average excusable delay expressed as a % of planned building period	43	40
Average total delay expressed as a % of planned building period	90	53
Average total delay expressed as a % of actual building period	47	35
Average planned building period expressed as a % of actual building period.	53	65

FIGURE 9: A General Comparison of Projects Undertaken by Citizen Firms and those Undertaken by Non-Citizen Firms



5.2.5 Inexcusable Causes of Delay

Twenty-two inexcusable delay factors were recorded among the sample of citizen projects. The most prominent of them, in terms of their impact, were the following:

- Poor management
- Late procurement of materials
- Inadequate labour on site
- Poor workmanship
- Poor supervision

- Contractors cash flow problems
- Lack of diligence
- Lack of construction knowledge
- Poor co-ordination with sub-contractors
- Inadequate plant/equipment on site

Twelve inexcusable delay factors were recorded among the sample of non-citizen projects. The most significant, in terms of their relative impact on the project schedules, were the following:

- Late procurement of materials
- Poor management
- Poor co-ordination with sub-contractors
- Delay in commencement
- Inadequate labour on site

The inexcusable delay factors that appeared to predominantly affect only projects undertaken by citizen contractors are as follows:

- Poor workmanship resulting in re-work
- Poor supervision
- Contractors cash-flow problems
- Inadequate plant/equipment on site
- Lack of construction knowledge
- Lack of diligence
- Poor financial management

The following inexcusable delay factors appeared to impact adversely upon projects within both sample groups. These delay factors, however, affected citizen projects more severely.

- Poor management
- Late procurement of materials
- Inadequate labour on site

The conclusion based upon the foregoing discussion was that the following inexcusable delay factors were responsible for the higher levels of inexcusable delay among the citizen sample of projects. As discussed earlier, the differences in the pattern that was displayed by the data from the two sample groups of projects appeared to have been caused by higher levels of inexcusable delays among the citizen sample of projects. It, therefore, appeared logical to conclude that the same delay factors were responsible for the higher level of delays on the citizen sample of projects.

- Late procurement of materials
- Poor management
- Poor supervision
- Poor workmanship resulting in re-do
- Contractors cash flow problems
- Poor financial management
- Lack of construction knowledge
- Lack of diligence
- Inadequate labour on site
- Inadequate plant/equipment

Of the above delay factors, however, the following two appeared to be the most significant, having, on average, caused a combined delay equivalent to 22% of the planned building period.

- Late procurement of materials
- Poor management

5.2.6 Comparison of the findings of the study with the hypotheses

The first hypothesis was that the extent of delays in completion of building projects in the Botswana public sector is generally high among projects undertaken and completed by 100% citizen contractors. According to the findings

of this study, the hypothesis appears to be true. It was found that the average total delay among projects carried out and completed by citizen contractors was equivalent to 90% of the planned contractual building period. Citizen contractors were also on average responsible for 48% of the total delay experienced on their projects while the employer or the government was responsible for 31% of the delays. The rest of the delays were beyond the responsibility of both the contractors and the employer or the government.

The second hypothesis was that the extent of delays in completion of building projects in the Botswana public sector is generally low among projects undertaken and completed by non-citizen contractors. According to the findings of this study, the hypothesis appears to be true. It was found that the average total delay among projects carried out and completed by non-citizen contractors was equivalent to 53% of the planned contractual building period. Non-citizen contractors were also on average responsible for 19% of the total delay experienced on their projects while the employer or the government was responsible for 57% of the delays. The rest of the delays were beyond the responsibility of both the contractors and the employer or the government.

The third hypothesis was that the reason for the relatively higher extent of delays among projects carried out and completed by 100% citizen contractors was poor management. The results of this study appear to support this view. A look at the ten delay factors that caused the difference in performance between the citizen contractors and the non-citizen contractors reveals that eight of them are management related whereas the other two appear to be the result of technical shortcomings. It is also evident from the findings of this study that the total contribution of the two non-management related delay factors to the poor performance among the citizen projects is insignificant when compared with the contribution of the eight management related delay factors. It appears therefore that poor management is indeed the cause of the higher rate of delays among building projects undertaken and completed by 100% citizen contractors as was stated in the hypothesis.

The main problem and the sub-problems of this research study have also been solved. The extent of delay for the citizen group was found to be above average whereas that of the non-citizen group was average, the average extent of delay being that most commonly recorded in other countries as per the literature reviewed. The inexcusable delay factors, affecting both groups of contractors, is as discussed under section 5.2.5. Finally, a comparison of the two groups of contractors in terms of the inexcusable delay factors revealed that poor management by contractors is to blame for the high incidence of delay among projects carried out and completed by the 100% citizen group of contractors.

5.3 Implications of the research study

5.3.1 Who is affected by the findings?

As briefly discussed under section 1.7, delays in completion of building projects impact negatively upon both clients and contractors. It is expected, therefore, that government departments as clients for public sector building projects and contractors involved with public sector projects would be affected by these findings. The following are government departments that are likely to be affected:

- DBES – Ministry of Works and Communications, Botswana
- Buildings departments of city councils, town councils, and district councils, Botswana
- BEPU – Ministry of Education, Botswana

Others affected are:

- Building contractors working on public sector projects in Botswana
- Consultants on public sector projects in Botswana
- The association of Botswana citizen builders (Tshipiri Badiri Builders Association or TBBA)
- Botswana building and civil engineering contractors (ABCON)

- Researchers interested in the subject of delays in completion of building projects in other regions of the world, especially those from the developing world.

5.3.2 How the Research Findings will affect Policies/Attitudes

It is expected that the research findings will enlighten policy makers in government departments about the extent of delay in general and, more specifically, the inexcusable delay factors that cause delay, especially among projects undertaken by citizen contractors. The result is that policies addressing the problem of delays in the completion of projects may be enacted based on the findings of this study. Projects' implementation personnel will find the results of the study quite useful as a guideline for predicting the extent of delays on projects. Being aware of the significant inexcusable delay factors also gives project implementers an opportunity to take mitigating action in advance to lessen their impact.

5.4 Weaknesses of the Study

The first weakness of this study was that the citizen sample of projects comprised mostly the smaller (category C and D) projects whereas the non-citizen sample was made up of mostly the larger (category E) projects. It was demonstrated, using the data collected, that within each sample group, the bigger the project, the better the performance. The fact that the citizen sample group comprised mostly the smaller projects implies that the data from this sample was biased towards the smaller, poorly performing contractors. The data from the non-citizen sample group was also biased, but towards the bigger and high performing contractors. It was therefore not an absolutely fair comparison. A fair comparison would require that both sample groups are similar in terms of the proportion of big projects to small projects. The presence of bias as a result of the above does not, however, warrant the nullification of the outcome of the

study, since a comparison of data for projects of the same size from the two groups does not change the results in any significant way.

The second weakness of the study was that the data upon which the conclusions were based, was in most cases extremely skewed and widely spread. This fact, in a way, diminished the reliability or validity of the findings.

The third weakness was that the data was collected from consultants and project co-ordination staff from the relevant government departments. The views of the contractors who carried out the projects were not taken into account. It would appear that contractors' views should have been taken into account to remove any doubts concerning the accuracy of the data. However, the views of the consultants should be taken more seriously due to the fact that they are not parties to the building contract and should, therefore, have less inclination to distort project data. Contractors, on the other hand, have more intimate knowledge of the various inexcusable delay factors, assuming they are willing to pass on this knowledge to researchers.

The fourth weakness was that the sample size was not big enough. Bigger sample sizes would have had the effect of improving upon the reliability or validity of the results of this study.

5.5 Future Research that ought to be Conducted and how this Study Helps

Previous research studies focussing on the causes of delay in completion of building projects has shown that the views of the consultants and clients and those of the contractors may not necessarily be the same. Interested researchers are therefore invited to conduct a similar study, but based on the views of the contractors. The outcome of such a study may then be combined with the findings of this study to give a more valid and reliable conclusion.

This study also revealed interesting trends with respect to the responsibility of the employer for delays in completion of building projects. Table 26 for instance shows that the employer caused 57% of the recorded delays for projects carried out and completed by non-citizen contractors as compared to 31% in the case of 100% citizen contractors. Why is the employer responsible for a greater proportion of the recorded delays on projects carried out by non-citizen contractors compared to projects carried out by citizen contractors? To answer questions such as the above, interested researchers are invited to conduct studies similar to this study, but focussing on delays caused by the employer.

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ANNEXURE A

THE QUESTIONNAIRE ISSUED, ON DELAYS IN COMPLETION OF BUILDING PROJECTS IN THE BOTSWANA PUBLIC SECTOR, BY MEDIUM TO LARGE CONTRACTORS.

1. Indicate by an appropriate tick the status of the construction firm that carried out the project under study:

- Citizen contractor (100% citizen)
- Majority owned (51% and over citizen owned)
- Joint venture contractor (25% - 50% citizen owned)
- Expatriate contractor (less than 25% citizen owned)

2. Indicate with an appropriate tick the category of the contractor that carried out and completed the project:

- Category C
- Category D
- Category E

3. The following relates to building construction projects that commenced not earlier than January 2000 and were completed not later than July 2004.

- What was the original or planned contractual duration of the project? ----------(weeks/days)
- What was the actual duration of the project? ----------(weeks /days)
- What was the total delay? ---------- (weeks/days)

- Of the total delay, how much was caused by the contractor? ---------- (weeks / days)
- Of the total delay, how much was caused by the employer? ---------- (weeks / days)
- Of the total delay, how much was caused by circumstances beyond the control of the contractor and the employer?---------- (weeks / days)

4. what type or form of building contract was used for the project? ----------

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5. List down the causes of delay attributable to the construction firm, or caused by the construction firm, in regard to this project. For each cause of delay, indicate the extent of delay in weeks or days.

(a). Cause ----------

---Delay ---------- (weeks / days)

(b). Cause ----------

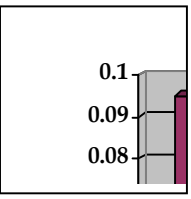
Delay ---------- (weeks / days)

(c). Cause ----------

Delay ---------- (weeks / days)

(d). Cause ----------

Delay ---------- (weeks / days)



(e). Cause ----------

Delay ----------(weeks / days)

(f). Cause ----------

----------Delay

---------- (weeks / days)

(g). Cause ----------

Delay ---------- (weeks /days)