

# **AN INTEGRATED APPROACH TO RISK MANAGEMENT DURING COMPETITIVE TENDERING FOR LOCAL AUTHORITIES BY EMERGING BUILDING CONTRACTORS IN BOTSWANA**

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## **Abstract: -**

The construction industry in Botswana has in the recent years come under severe pressure due to increased competition and a critical shortage of construction work. The competition has been as a result of a dramatic influx of foreign firms that have set up base in Botswana in recent years due to Botswana's good economic performance. The abundant diamond resources coupled with the government's sound macroeconomic policies have largely driven this economic growth. As a result of the shortage of construction work, locally owned emerging construction companies have had to change their bidding strategies in order to be competitive and secure construction work. This in turn has led these companies tendering at very low prices and sometimes submitting sub-economic bids. In doing so, these construction companies do not price for all the risks they are expected to carry if their bids mature into a construction contract. This paper investigates the sources of risk due to the client (Botswana local authorities) and due to statutory requirements and whether these sources are perceived by the emerging building contractors to have an influence in their (contractors) pricing strategies. The paper also investigates the risk management strategies, which are employed by these contractors in order to minimize risks during competitive tendering. The study concentrated on those building projects tendered in the public sector within the local

authorities in Botswana. This was further narrowed down to specifically those projects tendered for the district councils located in the southern region of Botswana. The study concentrated on building projects and excluded civil engineering projects and projects that are overwhelmingly of specialized electrical or mechanical installations.

## **Introduction**

The construction industry is subject to greater risk and uncertainty than other industries and often has suffered poor performance as a result. This is partly due to the nature of the construction

industry. The industry is fragmented, being made up of many small and specialized firms.

This characteristic of the construction industry as well as many of its other features have arisen largely in response to demands placed upon the industry such as non-standardization of the operations and the production processes being different between various projects.

Tendering (or bidding) is the usual means by which contractors in the construction industry solicit business. Bidding models have been devised to help contractors bid for projects but these tend to have limited applications because they generally treat uncertainties randomly. Contractors react to these uncertainties by rules of thumb. In recent years, risk management in the construction industry has become popular and has been accepted as a means to address some of the uncertainties inherent in construction works. The modeling of the perception of risk is one of the most crucial steps in the whole risk management process. The ever-evolving business context seems to get increasingly populated by complex projects. The use of project-based organisation forms has exploded over the last couple of decades. Risk management in projects is,

according to Raz & Michael (2001), a main topic of interest for researchers and practitioners working in the area of project management. The Project Management Institute (PMI), the largest professional organisation in the project management field, has emphasised risk management as one of nine areas covered in the Project Management Body of Knowledge (PMI, 2000).

According to Bystrom & Pierre (2003) risk can be defined as the possibility of something unexpected with negative consequences to happen. Businesses are constantly exposed to risks affecting fundamental decision-making. Doing business can actually be described as coping with risk. Risk is a natural part of business and must be successfully managed before one can make a profit. The market conditions are constantly changing in all industries. One condition that has drastically changed and that affect businesses today is competition. Competition has increased both locally and globally due to increased availability of capital, better conditions for starting a business and due to the more recent electronic information revolution. For each business contract there are usually several potential sellers participating in a bidding process. Because of the increased competition the bidding process is gaining importance.

The construction industry in Botswana has in recent years been undergoing radical changes. New markets are opening up as traditional ones close. There is increased competition for a limited amount of construction work. Locally owned emerging construction companies are also facing increased competition from foreign owned companies that have set up base in Botswana. New technologies have also emerged making it difficult for local firms that have not adopted these technologies to compete.

The construction industry in Botswana plays a critical role in the country's economy. According to the Central Statistics Office (2005), construction related activities accounted for 5.4% of the Gross Domestic Product (GDP) in the 2003/2004 financial year.

Traditionally, the government is the major source of construction work in Botswana. Recent government cutbacks on funding for construction projects have left many emerging construction companies without work. In order to get work, many companies are tendering at very low and sometimes unrealistic prices aiming at just to keeping the company afloat and retain their experienced members of staff whilst keeping their equipment and plant occupied.

These changes have left many emerging construction companies without a choice but to move into markets in which they have little experience or entering into contracts, which allocates risks to them, which have previously been carried by others. There is also the problem of lack of or insufficient information, both within and from outside the contractor's organization in so far as establishing what risks the company is expected to carry in a building project.

The tendering stage constitutes an important area where emerging building contractors could apply risk management strategies. This is the critical stage for tendering decision making. The tendering stage is the most important phase for applying risk management practices primarily through an effective bidding approach.

A fundamental condition that affects a project is that the knowledge about the project and

its environment is very limited in the beginning but rises as the time goes on and the project continues. A second fact is that decisions taken in the initial stages of the project or even before the project started are usually the ones that affect the project the most. The importance of decisions and their effects on the project are less as the project continues.

Bids represent potential or hypothetical projects that pose some probability of becoming

A business contract (Artto & Hawk, 1999). The bidding phases of projects are very important to project success but also very uncertain. Decisions taken regarding the project scope, budget and schedule during the bidding phase seriously affect the forthcoming project's possibility to succeed. The structured management of uncertainties inherent in budgets and schedules should consequently be emphasised during the bidding phase. Artto & Hawk (1999) emphasise risk management associated with bids and bidding as one of two important areas for future development in the risk management area.

The objective of the treatise was to study the relative importance of the risks experienced by emerging building contractors during competitive tendering within the local government authorities in Botswana and to evaluate the relative effectiveness of the risk management strategies employed by these contractors.

This study investigated and attempted to identify the relative importance of the risks experienced by emerging building contractors emanating from both the client (local authorities) and the statutory requirements during competitive tendering within the local government authorities in Botswana and to evaluate the relative effectiveness of the risk management strategies employed by these contractors.

The importance of the study emanated from the increased competition in the construction industry in Botswana. This competition has led to a serious shortage of construction work for emerging building contractors, which in turn has led to contractors

tendering at very low prices in order to secure tenders. In so doing, they do not price for all the risks they are expected to carry under the contract. This has led to contractors submitting unrealistic low or high tender prices and later abandonment, time and cost over-runs and a multiplicity of claims during the construction stage.

The practice within the local authorities in Botswana, and indeed within the greater public sector construction procurement, has been to award contracts to the lowest bidders within a certain range approximately ten percent higher or lower than the local authority's estimated construction cost. The justification of this practice is that the economy and convenience of awarding to the very lowest tenderer is overridden by the fact that the lowest contractor will not necessarily be the most cost effective during the construction stage and may pose serious problems in financing the project due to the non-pricing of certain risks that the tenderer is expected to carry under the building contract.

The study was carried out through a questionnaire survey and literature review. A comprehensive literature study preceded the empirical data analysis.

### **Theoretical Framework And Literature Review**

The researcher endeavored to use, where possible, research literature and articles primarily collected from books and other research material published during the last ten years. The researcher also quoted widely from "A guide to the project management body of knowledge" (PMI, 2000), Risk Management Guide for DOD Acquisition (2003) and the Project Management Handbook by Harold Kerzner (2003). In the researcher's judgment,

these sources are considered a reference work in the field by other researchers and the differences from other theories in the field are therefore marginal.

### **Construction Industry In Botswana**

Botswana is a landlocked country in Southern Africa. It is bordered by South Africa, Namibia and Zimbabwe. Botswana's economy is one of the healthiest in Africa and the country has one of the highest growth rates, largely attributed to abundant diamond resources coupled with sound macroeconomic policies. The construction industry in Botswana has been involved in the creation of physical infrastructure, which has facilitated the country's economic development. Mining stimulated the growth of the construction industry in Botswana.

According to a research by the Botswana Institute of Development Policy Analysis (BIDPA, 2003), the construction sector in Botswana has played a significant role in economic growth. Its share of Gross Domestic Product (GDP) ranged from 7.6% in 1990/91 to 6.1% in 1999/2000 (CSO, 2000). These figures compare favorably with industrialized countries whose share of construction in total GDP ranges between 5% and 7%. The share of the construction sector in total paid employment ranged from 12.5% in 1993 to 10.5% in 1999 (CSO, 1999). The share of employment in construction is higher than in most European countries that range between 5% and 7%. In 2003, the construction industry contributed 5.4% of GDP. Employment in the sector was recorded at 29,750 people (CSO, 2004).

The BIDPA research found that the construction sector in Botswana has largely been driven by the Government's investment in infrastructure and the mining sector. With regard to the latter, construction activities have been associated with direct development

of mines and, indirectly, with infrastructure related to mining such as roads, utilities and residential houses. Growth in the construction industry has therefore been closely linked to and influenced by Government's investment in physical infrastructure. For example, the research found that in 1984 the construction sector grew steadily after facing a long and severe nationwide drought. The drought resulted in the suspension of various national development projects including construction projects (Bank of Botswana, 1999). A construction boom was experienced in 1988-92. The boom was a result of an increase in Government's expenditure which rose by 40% from 1986/87 to 1989/90 (Bank of Botswana, 1999). The boom resulted in the emergence of several citizen owned construction firms as well as the entry of some international firms to the local market.

### **Risk In The Construction Industry**

According to Jaafari (1996), construction as an industry is different from manufacturing due to the following:-

1. Fragmented structure of the industry with the bulk of the construction business being generated by a large number of firms, often small in size and less inclined to formal methods of work study and management.
2. Diffused responsibility, that is, on normal construction projects, typically, many individual professionals and firms share the responsibility for the specification, design and construction of these projects.
3. Prototype nature, that is, projects typically resemble 'prototype' products in the manufacturing industry, often carrying unique design features, site characteristics and functions. Thus, the potential for errors to creep in is always present due to the once off nature of the relevant activities and production processes.
4. Influence of the public, the regulatory agencies and interest groups, which



- will ultimately affect the functions and configuration of projects, including construction methods and associated safeguards to the environment, third party issues and beneficiaries.
5. Transient and itinerant labour force, who are not trained to operate under the quality assurance mode of construction, that is, the training in the skilled labour has generally been based on learning how to do the work, not necessarily being one's own inspector to produce at zero defect.
  6. Virtual lack of research and development (R&D). Typically R&D work in construction is confined to that undertaken by the manufacturers of materials and components incorporated into projects; there is little R&D work on lines of projects, such as commercial buildings as a 'product line' or managerial processes in infrastructure works, etc.

The above points are the reasons for the rather slow pace of change in the construction industry with major innovations often getting established at a creeping speed and over many years. Thus, application of risk management and workers' empowerment principles in construction can be different to those of manufacturing industries and the direct application of the body of knowledge available from the latter is not necessarily helpful.

### **Risk Management In Construction**

It is important that a risk management strategy is established early in a project and that risk is continually addressed throughout the project life cycle. Risk management includes several related actions involving risk.

According to Basson (2004), response to risk is the choice between alternatives as well as the allocation of risks between parties involved. Both independent risks and interrelated risks should be considered as a group although the later would most probably be analyzed individually. The purpose is to establish the full impact of risks both quantitatively and qualitatively. This is used to determine the most and least favourable as well as the most probable final outcome of the project or undertaking analyzed as a whole. The route or plan with the minimum total risk is mostly chosen. Exceptions are when certain risks are unacceptable in terms of the organizational policies, other factors not related to risk *per se*, etc. The overriding rules are that the cost or impact of any action should be less than that (those) of the risk under consideration and the end result or objective should not be affected adversely.

Basson (2004) defines risk management as the systematic process of managing an organization's risk exposures to achieve its objectives in a manner consistent with public interest, human safety, environmental factors and the law. It consists of planning, organizing, leading, coordinating and controlling activities undertaken with the intent of providing an efficient pre-loss plan that minimizes the adverse impact of risk on the organization's resources, earnings and cash flows.

According to Rwelamila (2001), risk and uncertainty are inherent in all major projects and the success or failure of such projects depends on how these risks are managed. Slight increases in capital costs, operational costs and finance charges, coupled with a slight decrease in demand, can turn an investment into a loss-making venture. Furthermore, the construction industry itself poses particular challenges in bringing projects to completion on time, to budget and with required quality and functionality.

Whatever forms of concessions, contracts, guarantees and regulatory frameworks are introduced to a project, all parties to the project will be susceptible to some degree of risk. The sooner this is recognized the sooner the parties may set about managing risk positively, in the knowledge that there is an optimum balance of risk and reward for all concerned.

The consequences of occurrence of risk are cumulative, sometimes by addition, but frequently by multiplication. Furthermore occurrence of one risk may render the project vulnerable to another risk, or may even cause the occurrence of such risk, resulting in a cascade of effects, with a 'welling up' of consequences that may threaten the viability of the project and even its sponsors and lenders.

Rwelamila (2001) further argues that risks on a project must be analysed quantitatively and qualitatively. Risk analysis will usually be carried out by the financial advisors in conjunction with engineering and legal advisors. It is necessary to identify the risk, determine the probability of it occurring, 'price' the risk and then ultimately decide where it should lie. As a general rule risk links with control, the risk will be allocated to the party best able to manage it. It is usual practice to develop some form of risk matrix for the project and determine this issue as a part of the overall risk-management strategy.

For each major risk area a study should indicate optional strategies for risk management. It should be possible then to estimate the residual level of risk that cannot be managed out, or transferred economically, and which has to be accepted and covered by contingent allowances of time and money and by equity funds of the risk taker.

## **Bidding And Procurement**

Latham (1994) refers to 'a procurement system' as 'a procurement route'. He argues that a procurement route should precede the preparation of the outline (project) brief, since it necessarily affects who shall assist with the design brief as well. Hence a definition of 'a procurement route' could be formulated as:

“The organization structure adopted by the client within which the construction project is brought about, acquired or obtained (including preparation of project outline)”

The Chartered Institute of Building (CIOB) (1996) Project Management Manual defines procurement as:

“the process by which the necessary contributions of the various participants in the design and construction phases of the project are secured.”

A general definition of a project delivery/procurement system based on the above definitions can be summarized as:

“The organization structure adopted by the client to manage all stages of the project from inception to completion and in certain situations including post-completion phase(s)” (Rwelamila, 2001).

## **Data Analysis And Evaluation**

### **Introduction**

The objective of the questionnaire was to collect sufficient and qualitative data from the field. The questionnaire was analyzed to answer the questions raised by the sub-problems. Answers to these sub-problems were found by testing the hypotheses.

Conclusions were then made on whether the hypotheses were answered in the affirmative or not.

One hundred and fifty questionnaires were distributed, one hundred and twenty to contractors and another thirty to building consultants such as architects, quantity surveyors, project managers and civil/structural engineers. The questionnaires were hand delivered or e-mailed to contractors and consultants with their offices in Gaborone and the outlying towns. Out of the one hundred and fifty questionnaires issued out, eighty four were returned. Fifty seven of the respondents were contractors and twenty seven were consultants. The eighty four returned questionnaires represented 56% response rate and this was considered adequate for the analysis process.

### **Research Findings**

The results of the study from the data collected and analyzed came up with the following findings: -

Relative importance of the risks emanating from the client: -

1. A majority of consultants and contractors (66.67% and 54.39% respectively) consider tendering on schedule of rates and specifications in lieu of bills of quantities to be an extremely important factor affecting the contractors' pricing strategy. This can be explained by the fact that both contractors and consultants dislike tenders based on schedule of rates and specifications albeit for different reasons; for contractors, this kind of tender means the contractor carries most of the risk as to the sufficiency and accuracy of their tender price while for the consultants, it means having to deal with a multiplicity of claims from contractors during the project implementation stage intended to mitigate the effects of any insufficiency or inaccuracy in their tender price.

2. A majority of the contractors (50.88%) perceive ambiguous specifications and descriptions as affecting their pricing strategy with some inherent risks while 44.44% of the consultants perceive this as an extremely important source of risk and therefore affecting the contractors pricing strategy. The consultants view can be explained by the fact that this is an avenue for claims by contractors and every consultant would endeavor to have clear specifications and descriptions and thus their perception
3. As for the errors, omissions and discrepancies within the tender documents issued by client, it is interesting to note that the results show an even spread of contractors who perceive this source of risk as slightly important to important. On the other hand, 51.85% of the consultants perceive this source of risk as extremely important. This can be explained by the fact that, contractors have nothing to lose, so to speak, through errors, omissions and discrepancies in the tender documents as they can always use this to claim during the currency of the contract. Consultants would however perceive this as an important source of risk since it would play havoc with their budgets during implementation through claims by the contractors and thus the above results.
4. A slight majority of both the contractors and the consultants indicated that too short or inadequate tendering period is an important source of risk during tendering with the rest being evenly spread on both ends of the continuum. This result can be explained by the fact that there is a twenty eight (28) days minimum statutory requirement for tendering period for all local authority projects. This period can only be extended but cannot be reduced. This may explain why very few of the respondents chose the 'very important' and 'extremely important' options. They nevertheless consider this as an important source of risk during the tendering stage.

5. A majority of the contractors perceive high quantum of proposed liquidated damages for delays to completion as an important to very important source of risk (35.09% and 33.33%) with the same trend shown by the consultants (33.33% and 25.89%). This can be explained by the fact that because of a multiplicity of factors in the Botswana construction industry (e.g. poor labour productivity, monopoly of some essential material suppliers etc), many contractors rarely complete projects on time. Without a good basis for an extension of contract period, liquidated damages are levied at the rate of 0.5% of the contract amount per week's delay or part thereof. Both the contractors and consultants perceive this as an important source of risk and this would therefore support the above findings.
6. A majority of the contractors and consultants perceive inequitable contract terms as an extremely important source of risk to the contractors during tender stage. The possible explanation for this is that the current conditions of contract used in the local authorities in Botswana have been in existence for years without any review or revision. They were designed solely by the Ministry of Local Government for use by the district councils and to obviously transfer most of the risks to contractors. The above findings support this argument.
7. A majority of contractors (40.35%) perceive the client policy to use selected suppliers of building materials, e.g. face bricks as a slightly important source of risk whilst 48.15% of the consultants perceive this as not an important source. The researcher was unable to explain these findings in a logical way. For instance, there is only one manufacturing company that supplies face bricks to all government projects in Botswana via a government directive to all local authorities and other government bodies to specify their face bricks. Critical shortages have been experienced in the past. The only possible explanation the

researcher can deduce is the manufacturing plant's recent expansion of their production capacity, which can now possibly cope with the local demand of face bricks and possibly the slump in the Botswana construction industry in the past few years.

8. An overwhelming majority of both the contractors and the consultants (75.44% and 70.37%) perceive the client policy to award contracts based mainly on price, resulting in price undercutting as an extremely important source of risk during the tender stage. The most important criteria for award of contracts within the local authorities in Botswana is the price. Contractors whose bids are closest to the lower limit of the local authority's estimated range are considered first for award. This range is normally ten percent (10%) below the council estimate. The council estimate would normally be computed on the basis of existing market prices and rates. This would then be discounted by ten percent to arrive at the lower limit and increased by ten percent to arrive at the upper limit. The practical implication of this is that the contractor whose bid is accepted being closest to the lower limit would be awarded the project whose margin is ten percent lower than the existing market rates. Their profits are therefore very marginal and sometimes uncompetitive. Because of the shortage of construction work in Botswana in recent years, contractors keep their margins very low and sometimes to uncompetitive levels in order to secure construction work by the practice commonly referred to as undercutting. This theory is supported by the above findings.
9. A majority of both the contractors and the consultants (57.89% and 40.74%) perceive the abnormally long proposed payment period from date of work valuation as an extremely important source of risk during the tender stage. This can be explained by the fact that the payment clause in the conditions of contract



stipulate that the contractor will be paid within a period of thirty (30) calendar days from date of issue of a payment certificate. It is important to note that before the issue of the payment certificate, a substantial period of time will have elapsed between the time a work valuation is compiled and the time the certificate is issued. Add another thirty days and this period may run to one and a half months from date of valuation to date of actual payment. This prolonged period would obviously affect the contractor's cash flow. The above findings would seem to support this chronology of events as the norm rather than the exception as regards the payment periods within the local authorities.

10. A small majority of contractors (42.11%) perceive the abnormally long validity period of the submitted tender amount before contract award as an extremely important source of risk while 48.15% of the consultants perceive this as an important source of risk. The period of acceptance of tenders (tender validity period) is normally sixty days within the local authorities. Should the tender board (the board that awards tenders) not have been convened during this period for one reason or another, the tenderers would normally be requested to extend their validity periods. However, this is normally the exception as the tender boards are convened once every month and this would explain why the consultants' responses are evenly spread from important to extremely important.

Relative importance of the risks emanating from statutory requirements: -

1. The results showed that 29.82% and 55.56% of the contractors and consultants respectively perceive the restrictions on employment of foreign construction workers by the contractor as not an important risk while 57.89% and 37.04% of the contractors and consultants respectively perceive this as a

slightly important risk. This can be explained by the fact that the categories of contractors under consideration (categories A, B & C) are relatively small contractors in terms of value of projects they undertake. They therefore do not have a great need to employ foreign specialized technical staff, which is the category of construction workers whose shortage is critical in Botswana. They therefore do not perceive this as an important source of risk.

2. A majority of both the consultants and contractors perceive the contractor's liability to provide a safe working site as stipulated by the Factories Act Chapter 44 (Laws of Botswana) as being either important or very important source of risk. Apart from in cases of big construction projects, there are no strict inspections carried out to ensure conformance to the Factories Act. However, local authorities do insist on compliance with several conditions to ensure safe working site e.g. provision of safety helmets and boots to the workers, provision of first aid kits, proper hoarding etc). The researcher believes it is these provisions the respondents must have had in mind in their responses.
3. Majority of both categories of respondents perceive the contractor's liability to absorb any exchange rate and/or tax rate changes as being very important to extremely important source of risk (29.82% and 50.88% of the contractors and 25.93% and 48.15% of the consultants). Local authorities tenders in Botswana stipulate that the contract to be eventually entered into with the successful bidder shall be a fixed price contract. The only price fluctuations allowed are for wage rates for unskilled casual labourers in the eventuality that the government revises the minimum wage rates. All other price fluctuations and tax rate changes are to be absorbed by the contractor. This

risk is thus perceived to be important by both the contractors and consultants.

4. Majority of the contractors perceive the mandatory statutory requirement to use locally manufactured goods in lieu of importing cheaper materials as important to very important (42.11% and 38.60%) risk while the consultants perceive this risk as being very important to extremely important (40.74% and 37.04%). For the contractors, the price of locally manufactured goods do not compare favorably with their imported alternatives. However, it is important to note that most of the construction materials in Botswana are imported mostly from South Africa. Where some of the materials are produced locally, they are more expensive compared to the imported ones. Botswana is a small economy compared to, for instance South Africa, which is a huge economy, and therefore able to produce goods at very competitive prices due to the economies of scale. These statutory requirements are designed to encourage the development of the local manufacturing industry.
5. Both the contractors and consultants perceive the possibility that there will be increases in prices of materials, plant hire rates and wage rates as being important to very important (21.05% and 61.40% for contractors and 22.22% and 66.67% for consultants) risk. During the past few years, the Pula currency has being devalued several times. These devaluations are normally accompanied by price increases on almost all commodities and materials. The contractors have to take this risk into consideration when pricing their tenders as it is impossible to predict when the next devaluation will occur.
6. Majority of both the contractors and the consultants perceived the possibility of changes in the factors affecting the availability and cost of funds (interest

rate risk) as not important to slightly important risk (64.91% and 29.82% of the contractors and 74.07% and 25.93% of the consultants). This can be explained by the fact that citizen contractors in Botswana are normally provided with an advance payment equivalent to 15% of the contract amount on signing the contract as part of government incentives to develop capacity of these citizen contractors. This advance payment is subsequently recovered in six equal installments from the contractor's interim payments. This upfront financing of the project by the client cushions the contractors from the effects of interest payments on commercial bank loans were they to get these loans. Citizen contractors in the categories under consideration are also exempted from providing performance bond/guarantees which would normally attract premium payments to insurance companies for securing the same or security for the same from commercial banks. The government also insures the works and third party liabilities directly and deducts the premiums from contractor's payments. All these incentives therefore make the above risk not an important consideration during tender stage.

7. As for the possibility that consents required from other government departments will not be obtained or, if obtained, can only be implemented at a greater cost than budgeted, 15.79% and 57.89% of the contractors classified this risk as slightly important to important while 29.63% and 48.15% of the consultants classified the same as not important and slightly important. A possible explanation for this is that for the contractors, this normally provides a problem during the implementation phase when these consents cannot easily be obtained. It is not possible to predict the behaviour of other statutory bodies especially regarding how soon they can expedite the provision of certain consents. For the consultants, their attitude is premised on the fact

that it is the contractors' responsibility to apply and obtain these consents and do not therefore consider this as an important risk.

8. Regarding the possibility that utilities required (water, electricity etc) from statutory bodies may not be available or there will be delays due to relocation of utilities located on the project site, 54.39% and 28.07% of the contractors classified this risk as important to very important while 22.22% and 62.96% of the consultants classified the same as very important to extremely important. Both the contractors and consultants are in agreement that this is an important source of risk to be considered during tender stage. Water is a serious problem in Botswana. For the last two years, there have been restrictions imposed on the use of water especially for recreation and construction purposes. This was occasioned by the drought afflicting the country. Contractors especially around Gaborone area were restricted from using wholesome water for construction purposes. They have to look for alternative sources of water. Where these two services lines are to be relocated from a construction site, it takes some time for this to be done.

**Relative effectiveness of the risk management measures employed by the contractors: -**

1. The results showed that 54.39% and 40.35% of the contractors perceived clearly specified payment period from date of work valuation as effective to very effective risk management measure while 44.44% and 55.56% of the consultants classified the same as slightly effective to effective. Prompt payments to contractors improve their cash flow, which is the backbone of any construction company. The contractors therefore rate this risk

management measure as effective. The majority of the consultants are also in agreement that this is an effective risk management measure. It appears though that some consultants rate this risk management measure as slightly effective possibly because local authorities are by law required to pay on time as per the value certified.

2. The results show that 21.05% and 78.95% of the contractors perceived the signing up of long term supply contracts with approved suppliers for major materials as very effective to extremely effective risk management measure while 40.74% and 59.26% of the consultants classified the same as effective to very effective. Although this is not a common practice with the emerging building contractors in Botswana, they nevertheless perceive this as a very effective risk management measure. Signing up such contracts would cushion the contractors against the effects of material price increases during the currency of the contract. A majority of the consultants also seem to share this view.
3. As for the provision for timely issue of Architect's instruction/variation orders, the results show that 75.44% and 12.28% of the contractors classified this as very effective to extremely effective risk management measure while 77.78% and 22.22% of the consultants classified the same as very effective to extremely effective. The forms of contract used for local authorities building contracts do not specify at what stage and up to what limit the Architect may issue instructions. Most instructions are normally disruptive especially when issued towards the end of the project. Though there is a provision for extension of contract period and reimbursement for the resultant costs occasioned by the instructions, it would appear from these results that it is appreciated that a timely issue of the same would be very helpful as a way of

managing risks. The consultants who undertook the survey also share this view.

4. The results show that 31.58% and 43.86% of the contractors perceived signing up long-term contracts with sub-contractors to ensure availability of equipment and skilled labour as effective to very effective risk management measure while 33.33% and 66.67% of the consultants classified the same in a similar manner. The contractors in this survey were emerging building contractors. They normally do not sign up sub-contracts in their building projects because they are relatively small in money value. But it would appear that both the contractors and the consultants appreciate the effectiveness of this risk management measure.
5. The results show that 47.37% and 38.60% of the contractors classified clear contractor's company policy on quality and safety including effecting all necessary insurances as effective to very effective risk management measure while 55.56% and 44.44% of the consultants classified the same in a similar manner. Having a clear company policy on quality cushions the contractors against the effects of condemned work and/or re-works in a building site. Effecting the necessary insurances cushions the contractor from the effects of any accidents on site involving injury to life or destruction of property. It appears from the above results that this is clearly appreciated by the contractors and the consultants as an important risk management measure.
6. As regards the thorough investigation by the bidder of the project site conditions during tender period, the results show that 66.67% and 21.05% of the contractors classified this risk management measure as effective to very effective while 70.37% and 29.63% of the consultants classified the same in a

similar manner. A thorough investigation of the site by the bidder during the tender period would inform them of any difficult site conditions likely to be encountered during the construction stage. If any trial hole have been sunk, then it is possible to appreciate the sub-surface conditions in advance. The bidder would also establish of any possible restrictions as to, for instance, blasting of rock, restrictions on noisy site operations etc. The bidder would then plan for this accordingly and include any cost resulting there from in their tender. The above results confirm this view.

7. As regards the contractual provision for independent expert appointment to resolve disputes on expedited basis (adjudication), the results show that 26.32% and 57.89% of the contractors classified this risk management measure as slightly effective to effective while 62.96% and 18.52% of the consultants classified the same as effective to very effective. The form of contract used for local authority contracts does not contain a provision for adjudication process. The only dispute resolution provision contained in the contract is the arbitration process. Adjudication would normally help in the resolution of a dispute during the time of the contract amicably. From the above, it is apparent that both the contractors and the consultants appreciate the importance of having an adjudication clause in the contracts.
8. The results show that 36.84% and 52.63% of the contractors classified maintaining an updated historical database of prices of material, plant hire rates and wage rates as very effective to extremely effective risk management measure while 59.26% and 25.93% of the consultants classified the same in a similar manner. A historical data base on the prices of materials, plant hire rates and wage rates would help the contractor in keeping a record on the trends of these prices and rates. The contractor



would then be in a good position to predict any future fluctuations of the same. This would then be taken into account when pricing the tenders. This view seems to be shared by the contractors as well as the consultants.

9. With regard to having contractors' associations lobbying to have local authorities finalize designs before inviting tenders, the results show that 40.35% and 33.33% of the contractors classified this risk management measure as slightly effective to effective while 40.74% and 59.26% of the consultants classified the same in a similar manner. There are no strong contractor's associations in Botswana. Lobbying would therefore be difficult for the individual contractors. Also, it would appear local authorities have the discretion to invite tenders based on bills of quantities or schedule of rates and specifications when the designs are not complete. This is sometimes necessitated by the urgency of the work involved. Both contractors and consultants seem to share this view based on the above results.
10. With regard to having contractors' associations lobbying against the practice of selected suppliers of building materials, the results show that 26.32% and 43.86% of the contractors classified this risk management measure as not effective to slightly effective while 37.04% and 44.44% of the consultants classified the same as not effective and effective respectively. The practice of having selected suppliers for building materials for government projects in Botswana is informed by a lack of strong manufacturing capacity. In order to improve this capacity and protect the local manufacturing industry from strong competition from foreign imported materials, government has come up with this policy. It may therefore be difficult to have this policy set aside if the manufacturing capacity remains weak. The other reason could be as

explained above, that is, there is lack of a strong contractors' association to lobby for some of these policy changes.

11. The results show that 45.61% and 47.37% of the contractors classified maintaining an updated historical database of labour productivity as slightly effective and effective risk management measure respectively while 22.22% and 77.78% of the consultants classified the same as effective and very effective respectively. It would be difficult for these emerging contractors to measure labour productivity in a scientific manner. For the consultants, their view possibly is that it is possible to measure this productivity and build a database. Overall, a majority of both categories agree that this would be an effective risk management measure.
12. The provision for advance payment by the client for up-front financing of the project was perceived by 57.89% and 35.09% of the contractors as very effective and extremely effective risk management measure respectively while 77.78% and 22.22% of the consultants classified the same in a similar manner. The practice of advance payment to the citizen contractors is well established in Botswana as a way of building up the capacity of the local construction companies. Advance payments also cushion the contractors against the effects of interest payments on commercial bank loans. Both the contractors and the consultants are in agreement that this is a very effective risk management measure.

### **Summary, Conclusions And Recommendations**

The results from the data analysis showed that majority of the respondents perceived the client related risks being investigated to range from important, very important to extremely important. The overall perception of all the respondents regarding the relative

importance of all the risks emanating from the client during the tendering stage in terms of how they (the risks) influenced the contractor's pricing strategy was summarized as follows:

1. Extremely important - 34.29%
2. Very important - 25.36%
3. Important - 24.05%
4. Slightly important - 10.60%
5. Not important - 5.71%

Also, majority of the respondents perceived the statutory related risks being investigated to range from important to very important. The overall perception of all the respondents regarding the relative importance of all the risks emanating from statutory requirements during the tendering stage in terms of how they (the risks) influenced the contractor's pricing strategy was summarized as follows:

1. Important - 27.83%
2. Very important – 26.34%
3. Slightly important – 15.48%
4. Extremely important – 13.24%
5. Not important – 17.11%

Further, majority of the respondents perceived risk management measures being investigated to range from effective to extremely effective. The overall perception of all the respondents regarding the relative effectiveness of all the risk management measures employed by the emerging building contractors during the competitive tendering stage was summarized as follows:

1. Very effective – 34.52%
2. Effective – 34.43%
3. Extremely effective – 14.98%
4. Slightly effective – 12.00%
5. Not effective – 4.07%

## **Recommendations**

The following recommendations were suggested:

1. There is need for local authorities to always finalize designs before floating tenders.
2. Local authorities need to revisit their policy of awarding building contracts based on price criteria only.
3. Local authorities need to consider whether it would be advantageous to use fluctuating price contracts rather than the current fixed price contracts.
4. There is a need for the local authorities in Botswana to engage the contractors' organizations in formulating more equitable standard forms of contract.
5. There is need for the local authorities in Botswana to re-assess the current practice/policy of the use of selected suppliers of building materials.

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**AN INTEGRATED APPROACH TO RISK MANAGEMENT DURING  
COMPETITIVE TENDERING FOR LOCAL AUTHORITIES BY  
EMERGING BUILDING CONTRACTORS IN BOTSWANA**

By

Anthony M. Maina

Treatise Submitted in the Fulfillment of Part of the Requirements for the Degree  
of

**MASTER OF SCIENCE (PROJECT MANAGEMENT)**

In the Faculty of Engineering, Built Environment and Information Technology  
University of Pretoria

Study Leaders: Mr Gert Basson and Mr Danie Hoffman

December 2006

**DECLARATION**

I declare that this treatise is my own, unaided work, and any sources consulted are adequately acknowledged in the text and listed in the bibliography.

This treatise has not been submitted for any degree or examination at any other

University

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Anthony M. Maina

December 2006

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I thank my study leader, Mr. Gert Basson for his encouragement and invaluable professional guidance during the process of compiling this study and also during my years of study. I also would like to thank the co-study leader, Mr Danie Hoffman for his very constructive criticism of my initial draft.

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## **ABSTRACT**

Title of treatise: An Integrated Approach To Risk Management  
During Competitive Tendering For Local Authorities By Emerging  
Building Contractors In Botswana

Author: Anthony M. Maina

Study Leaders: Mr Gert Basson and Mr Danie Hoffman

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Information Technology, University of Pretoria.

Date: December 2006

The objective of this study is to investigate the relative importance of the risks experienced by the emerging building contractors emanating from both the client (local authorities) and the statutory requirements and to evaluate the relative effectiveness of the risk management strategies employed by these contractors during competitive tendering stage within the local authorities in Botswana.

The main problem is divided into three sub-problems, which form the basis of the questionnaire. The three sub-problems are to:-

1. To determine the relative importance of the sources of risk due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy.
2. To determine the relative importance of the sources of risk due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy.

3. To determine the relative effectiveness of the risk management strategies employed by the emerging building contractors within the local authorities in Botswana during competitive tendering stage.

Three hypotheses were also set to be tested by the survey data and the hypotheses were as follows:

1. The first hypothesis is that sources of risk due to the client during competitive tendering by emerging building contractors within the local authorities in Botswana are perceived by the contractors to have an influence in the contractor's pricing strategy.
2. The second hypothesis is that sources of risk due to statutory requirements during competitive tendering by emerging building contractors within the local authorities in Botswana are perceived by the contractors to have an influence in influencing the contractor's pricing strategy.
3. The third hypothesis is that the risk management strategies, which are employed by the emerging building contractors to minimize risks during competitive tendering within the local authorities in Botswana, are perceived by the contractors to be effective.

Chapter one of the study introduces the problem and its sub-problems, the delimitations of the study and the hypotheses to be tested.

Chapter two reviews the related literature.

The third chapter describes the research methodology used to investigate the problem and its sub-problems.

Chapter four is the data analysis and evaluation of the outcome of the questionnaire and the hypotheses are tested in this section.

Chapter five concludes this treatise with the summary, conclusions and recommendations of the study namely that:-

6. There is need for local authorities to always finalize designs before floating tenders.
7. Local authorities need to revisit their policy of awarding building contracts based on price criteria only.
8. Local authorities need to consider whether it would be advantageous to use fluctuating price contracts rather than the current fixed price contracts.
9. There is a need for the local authorities in Botswana to engage the contractors' organizations in formulating more equitable standard forms of contract.
10. There is need for the local authorities in Botswana to re-assess the current practice/policy of the use of selected suppliers of building materials.

11. There is need for an adjudication clause to be incorporated in the contract conditions used for local authorities building contracts.

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## **LIST OF ABBREVIATIONS**

GDP	Gross Domestic Product
PPADB	Public Procurement and Asset Disposal Board
PMI	Project Management Institute
PMBOK	Project Management Body of Knowledge
FIDIC	Federation Internationale des Ingenieurs-Conselis (International Federation of Consulting Engineers)
CSO	Central Statistics Office
BIDPA	Botswana Institute of Development Policy Analysis
DBES	Department of Building and Engineering Services
R & D	Research and Development
ISO	International Standards Organization
SWOT	Strengths Weaknesses Opportunities and Threats
CIOB	Chartered Institute Of Building
BOT	Build Operate Transfer
BOOT	Build Own Operate Transfer
PFI	Private Finance Initiative

PPP	Public Private Partnerships
NJCC	National Joint Consultative Council
RFI	Request For Information
RFQ	Request For Quotation
RFP	Request For Proposal
CDRL	Contract Data Requirement List
JBCC	Joint Building Contracts Committee
BIDP	Botswana Institute of Development Professionals
DOD	Department Of Defense



## **CHAPTER 1**

### **THE PROBLEM AND ITS SETTING**

#### **1.1 Introduction**

The construction industry is subject to substantial risk and uncertainty compared with other industries and often has suffered poor performance as a result. This is partly due to the nature of the construction industry. The industry is fragmented, being made up of many small and specialized firms. This characteristic of the construction industry as well as many of its other features have arisen largely in response to demands placed upon the industry such as non-standardization of the operations and the production processes being different between various projects.

Tendering (or bidding) is the usual means by which contractors in the construction industry solicit business. Bidding models have been devised to help contractors bid for projects but these tend to have limited applications because they generally treat uncertainties randomly. Contractors react to these uncertainties by rules of thumb. In recent years, risk management in the construction industry has become popular and has been accepted as a means to address some of the uncertainties inherent in construction works. The modeling of the perception of risk is one of the most crucial steps in the whole risk management process.

The ever-evolving business context seems to get increasingly populated by complex projects. The use of project-based organisation forms has exploded over the last couple of decades. Risk management in projects is, according to Raz & Michael (2001), a main topic of interest for researchers and practitioners working in the area of project management. The Project Management Institute (PMI), the largest professional organisation in the project management field, has emphasised risk management as one of nine areas covered in the Project Management Body of Knowledge (PMI, 2000).

According to Bystrom & Pierre (2003) risk can be defined as the possibility of something unexpected with negative consequences to happen. Businesses are constantly exposed to risks affecting fundamental decision-making. Doing business can actually be described as coping with risk. Risk is a natural part of business and must be successfully managed before one can make profit. Risk also needs to be controlled to eliminate or minimize negative impacts. The market conditions are constantly changing in all industries. One condition that has drastically changed and that affect businesses today is competition. Competition has increased both locally and globally due to increased availability of capital, better conditions for starting a business and due to the more recent electronic information revolution. For each business contract there are usually several potential sellers participating in a bidding process. Because of the increased competition the bidding process is gaining importance.

## **1.2 The milieu of the problem**

The construction industry in Botswana has in recent years been undergoing radical changes. New markets are opening up as traditional ones close. There is increased competition for a limited amount of construction work. Locally owned emerging construction companies are also facing increased competition from foreign owned companies that have set up base in Botswana. New technologies have also emerged making it difficult for local firms that have not adopted these technologies to compete.

The construction industry in Botswana plays a critical role in the country's economy. According to the Central Statistics Office (2005), construction related activities accounted for 5.4% of the Gross Domestic Product (GDP) in the 2003/2004 financial year.

Traditionally, the government is the major source of construction work in Botswana. Recent government cutbacks on funding for construction projects have left many emerging construction companies without work. In order to get work, many companies are tendering at very low and sometimes unrealistic prices aiming at just to keeping the company afloat and retain their experienced members of staff whilst keeping their equipment and plant occupied.

These changes have left many emerging construction companies without a choice but to move into markets in which they have little experience or entering into contracts, which allocates risks to them, which have previously been carried

by others. There is also the problem of lack of or insufficient information, both within and from outside the contractor's organization in so far as establishing what risks the company is expected to carry in a building project.

The tendering stage constitutes an important area where emerging building contractors could apply risk management strategies. This is the critical stage for tendering decision making. The tendering stage is the most important phase for applying risk management practices primarily through an effective bidding approach.

A fundamental condition that affects a project is that the knowledge about the project and its environment is very limited in the beginning but rises as the time goes on and the project continues. A second fact is that decisions taken in the initial stages of the project or even before the project started are usually the ones that affect the project the most. The importance of decisions and their effects on the project are less as the project continues (Bystrom & Pierre, 2003).

Bids represent potential or hypothetical projects that pose some probability of becoming a business contract (Artto & Hawk, 1999). The bidding phases of projects are very important to project success but also very uncertain. Decisions taken regarding the project scope, budget and schedule during the bidding phase seriously affect the forthcoming project's possibility to succeed. The structured management of uncertainties inherent in budgets and schedules should



consequently be emphasised during the bidding phase. Artto & Hawk (1999) emphasise risk management associated with bids and bidding as one of two important areas for future development in the risk management area.

The purpose of this treatise is to study the relative importance of the risks experienced by emerging building contractors during competitive tendering within the local government authorities in Botswana and to evaluate the relative effectiveness of the risk management strategies employed by these contractors.

### **1.3 The Problem**

This study will investigate and attempt to identify the relative importance of the risks experienced by emerging building contractors emanating from both the client (local authorities) and the statutory requirements during competitive tendering within the local government authorities in Botswana and to evaluate the relative effectiveness of the risk management strategies employed by these contractors.

### **1.4 The Sub-Problems**

The sub-problems to the main problem are: -

- 1.4.1 To determine the relative importance of the sources of risk due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy. (What is the relative importance of the

- sources of risk due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy?).
- 1.4.2 To determine the relative importance of the sources of risk due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy. (What is the relative importance of the sources of risk due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy?).
- 1.4.3 To determine the relative effectiveness of the risk management strategies employed by the emerging building contractors within the local authorities in Botswana during competitive tendering stage. (What is the relative effectiveness of the risk management strategies employed by the emerging building contractors within the local authorities in Botswana during the competitive tendering stage?)

## **1.5 The Hypotheses**

- 1.5.1 Sources of risk due to the client during competitive tendering by emerging building contractors within the local authorities in Botswana are perceived by the contractors to have an influence in the contractor's pricing strategy.
  
- 1.5.2 Sources of risk due to statutory requirements during competitive tendering by emerging building contractors within the local authorities in Botswana are perceived by the contractors to have an influence in the contractor's pricing strategy.
  
- 1.5.3 The risk management strategies, which are employed by the emerging building contractors to minimize risks during competitive tendering within the local authorities in Botswana, are perceived by the contractors to be effective.

## **1.6 Delimitations**

The study will concentrate on the building projects tendered in the public sector within the local authorities only. This will further be narrowed down to specifically those projects tendered for the districts located at the southern region of Botswana, comprising of Central, Kgatleng, Kweneng and Southern District Councils, Gaborone City Council and Lobatse Town Council in Botswana in the last two (2) years. Central District Council is the largest district Council in Botswana comprising of five (5) sub-districts. Together with the other three

district Councils, Gaborone City Council and Lobatse town Council, they account for about 50% of volume of construction work within the local authorities in Botswana. With the exception of Central District Council, all the three district, city and town Councils are located within a radius of eighty (80) Kilometers from each other and are therefore easily accessible from Gaborone City.

These six local authorities will provide a wide enough sample of approximately one hundred emerging building contractors that is representative of the rest of the industry in Botswana.

The study will exclude civil engineering projects and projects that are overwhelmingly of specialized electrical or mechanical installation.

The study is also limited to building projects with estimated tender sums of between P 300 001 and P 4 500 000 tendered between 1<sup>st</sup> January 2004 and 31<sup>st</sup> December 2005.

(1 US Dollar = Botswana Pula 6.2 in 2006).

The study also excludes projects with a contract sum of P300 000 and below which are normally undertaken by category OC (Opportunity Class) contractors. These are very small start-up companies. Their registration is open to any citizen of Botswana without any pre-condition as to available finance, plant or past construction experience, which conditions would normally apply to other

categories of contractors. Many also do not have physical offices and it would therefore be difficult to contact them.

This study seeks to evaluate the relative importance of the risks emanating from the client (local authorities) and statutory requirements and the relative effectiveness of the risk management strategies employed by the emerging building contractors in Botswana. The extent and frequency of these risks and the quantifiable impacts of the risk management strategies does not form part of this study.

## **1.7 Definitions of terms**

### **1.7.1 Risk**

According to Kerzner (2003), risk is a measure of the probability and consequence of not achieving a defined project goal. Risk involves a measure of uncertainty. Risk is not always easy to assess, since the probability of occurrence and the consequence of occurrence are usually not directly measurable parameters and must be estimated by statistical or other procedures.

Risk has two primary components for a given event:

- (i) A probability (likelihood) of occurrence of that event.
- (ii) Impact of the event occurring (amount at stake)

In general, as either the likelihood or impact increases, so does the risk. Both the likelihood and impact must be considered in risk management.

Risk constitutes a lack of knowledge of future events. Typically, future events (or outcomes) that are favourable are called opportunities, whereas unfavorable events are called risks. Another element of risk is its cause. This source of danger is denoted as the hazard. Certain hazards can be overcome to a great extent by knowing them and taking action to overcome them. Risk increases with hazard but decreases with safeguard. The implication of this is that good project management should be structured to identify hazards and to allow safeguards to be developed to overcome them. If suitable safeguards are available, then the risk can be reduced to an acceptable level (Kerzner, 2003).

### **1.7.2 Risk Management**

Risk management is the act or practice of dealing with risk. It includes planning for risk, assessing (identifying and analyzing) risk issues, developing risk handling strategies and monitoring risks to determine how they have changed.

Risk management is not a separate project office activity assigned to a risk management department, but rather is one aspect of sound project management. Risk management should be closely coupled with key project processes, including but not limited to overall project management, systems engineering, cost, scope, quality and time. Proper risk management will attempt to reduce the likelihood of an event occurring and/or the magnitude of its impact (Kerzner, 2003).

## **1.8 Importance Of The Study**

The importance of this study emanates from the increased competition in the construction industry in Botswana. This competition has led to a serious shortage of construction work for emerging building contractors, which in turn has led to contractors tendering at very low prices in order to secure tenders. In so doing, they do not price for all the risks they are expected to carry under the contract. This has led to contractors submitting unrealistic low or high tender prices and later abandonment, time and cost over-runs and a multiplicity of claims during the construction stage.

The practice within the local authorities in Botswana, and indeed within the greater public sector construction procurement, has been to award contracts to the lowest bidders within a certain range approximately ten percent higher or lower than the local authority's estimated construction cost. The justification of this practice is that the economy and convenience of awarding to the very lowest tenderer is overridden by the fact that the lowest contractor will not necessarily be the most cost effective during the construction stage and may pose serious problems in financing the project due to the non-pricing of certain risks that the tenderer is expected to carry under the building contract.

## **1.9 Assumptions**

- 1.9.1 The sample of interviews will be representative of the majority of emerging building construction companies in Botswana.
- 1.9.2 Emerging building construction companies in Botswana have relatively similar information regarding the market.
- 1.9.3 There is lack of historical data on bidding systems in Botswana and therefore the research will be based on relevant literature review and empirical findings from a survey questionnaire.
- 1.9.4 Both the contractors and the consultants are aware of the weaknesses inherent in the current bidding system within the local authorities and would like to see changes effected in the system.

## **1.10 Research Methods**

The research will be carried out through a questionnaire survey and literature review. A comprehensive literature study will precede the empirical data analysis. The objective of this treatise is to study the relative importance of the risks emanating from the client (Botswana local authorities) and from statutory requirements in terms of how they influence the contractors' pricing strategy and to evaluate the relative effectiveness of the risk management strategies available to the emerging building contractors.



## **CHAPTER TWO**

### **THEORETICAL FRAMEWORK AND LITERATURE REVIEW**

#### **2.1 THE CONSTRUCTION PROCESS**

Construction has always been an essential part of a nation's economic growth and a reflection of the technical aspirations and demand of its people. The construction sector is one of the main engines of growth in an economy. In developing countries, the construction sector is even more important because of its link to the development of basic infrastructure for all other sectors, training of local personnel, technology transfer and improved access to information channels. In view of its close association with public works and hence the implementation of a country's development program, the construction sector plays an important role in creating employment opportunities for both skilled and unskilled labour (BIDPA, 2003).

The construction of a facility involves a variety of steps and participants, each generally from an independent organization and gathered together on a project – by – project basis with little or no provision for ensuring organizational compatibility or continuity of working relationships. Furthermore, each participant is generally brought into the project only when he is absolutely needed. This curtails feedback from participants and consideration of new alternatives in the later stages of the project and constrains participants to work within the bounds of decisions in which they had no part in formulating. Types of construction and trade specialization are also necessitated by many of the product characteristics

such as complexity, continuously changing technology, the custom – built nature and by the great variety of product types.

Three main sub-systems can be distinguished in the building process. These are the brief, the design and the control and construction stages. These sub-systems will have two key interfaces at the brief/design stage and the design and control/construction stage.

The interfaces, whilst clearly identifiable, do not occur sequentially or at a specific point in the process of time but overlap. It is at these interfaces that problems related to project implementation and performance manifest themselves.

The building process comprises of three main functions. These are design, construction and co-ordination or control.

### **2.1.1 Design**

This is the responsibility for preparing plans used by the client in taking decisions related to the building project. This responsibility includes calculations, designs, preparation of drawings, statutory planning approvals, preparation of specifications and preparation of other contract documents. Design also includes the measurement of activities of participants in order to make sure those organizational objectives and plans devised to attain them are being accomplished. The function of design therefore consists of verifying that everything occurs in conformity with the plan adopted, the instructions issued and

principles established. It has, therefore, the object to point out weaknesses and errors in order to rectify them and prevent recurrence. It operates on everything, things and people actions. This can be called the supervisory function of design.

### **2.1.2 Coordination**

This is the function of management, which integrates effort. Coordination is assisted by the right kind of organization with its built-in systems for ensuring that each operating factor is related to the other. The necessity for synchronizing individual action arises out of differences in opinion as to how group goals can be reached or how individual and group objectives can be harmonized. In the construction context the different participants need to know whether their basic goal is profit, quality, advanced techniques, fees or self-aggrandizement. To avoid such splintering efforts by the different participants in the building process, coordination comes into play (Donnelly, 1992).

### **2.1.3 Construction**

Construction is the building up of an object by putting or fitting together a structure. In project architecture and civil engineering, construction is the building or assembly of any infrastructure on a site or sites. Although this may be thought of as a single activity, in fact construction is a feat of multitasking. Normally the job is managed by the construction manager, supervised by the project manager, design engineer, or project architect. While these people work in offices, every construction project requires a large number of labourers,

carpenters, and other skilled tradesmen to complete the physical task of construction.

For the successful execution of a project effective planning is essential. Those involved with the design and execution of the infrastructure in question must consider the environmental impact of the job, the successful scheduling, budgeting, site safety, availability of materials, logistics, inconvenience to the public caused by construction delays, preparing tender documents, etc. (Wikipedia on-line encyclopedia, October 2006).

## **CONSTRUCTION INDUSTRY IN BOTSWANA**

Botswana is a landlocked country in Southern Africa. It is bordered by South Africa, Namibia and Zimbabwe. Botswana's economy is one of the healthiest in Africa and the country has one of the highest growth rates, largely attributed to abundant diamond resources coupled with sound macroeconomic policies. The construction industry in Botswana has been involved in the creation of physical infrastructure which has facilitated the country's economic development. Mining stimulated the growth of the construction industry in Botswana.

Botswana's economic growth and the expansion of the construction industry have been highly interrelated. The construction industry has played a critical role in promoting the economic growth through enhancing productivity, improving

competitiveness, reducing poverty, linking people and organizations and contributing to environmental sustainability.

According to a research by BIDPA (2003), the construction sector in Botswana has played a significant role in economic growth. Its share of Gross Domestic Product (GDP) ranged from 7.6% in 1990/91 to 6.1% in 1999/2000 (CSO, 2000). These figures compare favorably with industrialized countries whose share of construction in total GDP ranges between 5% and 7%. The share of the construction sector in total paid employment ranged from 12.5% in 1993 to 10.5% in 1999 (CSO, 1999). The share of employment in construction is higher than in most European countries that range between 5% and 7%. In 2003, the construction industry contributed 5.4% of GDP. Employment in the sector was recorded at 29,750 people (CSO, 2004).

The BIDPA research found that the construction sector in Botswana has largely been driven by the Government's investment in infrastructure and the mining sector. With regard to the latter, construction activities have been associated with direct development of mines and, indirectly, with infrastructure related to mining such as roads, utilities and residential houses. Growth in the construction industry has therefore been closely linked to and influenced by Government's investment in physical infrastructure. For example, the research found that in 1984 the construction sector grew steadily after facing a long and severe nationwide drought. The drought resulted in the suspension of various national

development projects including construction projects (Bank of Botswana, 1999). A construction boom was experienced in 1988-92. The boom was a result of an increase in Government's expenditure which rose by 40% from 1986/87 to 1989/90 (Bank of Botswana, 1999). The boom resulted in the emergence of several citizen owned construction firms as well as the entry of some international firms to the local market.

According to the BIDPA research, there are no market access restrictions in the construction sector in Botswana. However, both local and foreign construction firms have to register with the Registrar of Companies to operate. In case of foreign commercial presence, foreign firms are required to produce a certificate of registration when they apply for the use of tribal or state land. Acquisition of land is subject to approval by the Minister of Lands. In view of the growing land shortage in Gaborone, the capital city, delays in land allocation are experienced by both foreign and local firms. Both local and foreign firms are subject to planning and building requirements if they plan to erect physical developments. Some restrictions exist with regard to Government procurement. In order to register with the Public Procurement and Asset Disposal Board (PPADB), firms must be licensed or incorporated under relevant laws in Botswana, such as the Company's Act. Firms that are 100% foreign owned are restricted to register in the grade E category of the procurement authority. The contract value of this category differs between sub - sectors of the construction sector. For construction work for buildings, the grade E category is for projects over Pula (P)

9.0 million (1 US Dollar = Botswana Pula 6.2 in 2006.) With regard to civil engineering, grade E category is for projects whose contract value is over P40 million while it is for projects over P1 million for installation and assembly. Though 100% foreign owned firms can only register at grade E, entry of these firms is still possible for categories reserved for 100% citizen owned firms if citizen capacity is inadequate or not available. In addition, the Botswana government has resolved that projects over P50 million are open for international competitive bidding. All capable firms, be they local or foreign can tender for such projects whether or not they are registered with the procurement authority.

According to BIDPA research, despite a shortage of skilled workers in general in Botswana, there are restrictions in the movement of natural persons. All non-citizen employees and self-employed persons are required to have work and resident permits. Foreign investors who need to recruit non-citizen staff to fill the skills gap are required to apply for work permits. Work permits are granted on the basis of a labour market test and submission by the employer of a program to train citizen replacement for each position. Though not backed by any legal force, applicant's qualifications are also considered. Self-employed non-citizens are also subject to labour market tests but there is no training and localization condition. Work and residence permits are granted for 3 to 5 years and may be subject to renewal on the same conditions. Requirements for a work permit also affect local firms who wish to engage the skills of non-citizens. The delays

sometimes defeat the contractor's objectives of completing projects on schedule and within budget (BIDPA 2003).

### **2.2.1 Construction company ownership in Botswana**

Private and foreign ownership is permitted in the construction sector in Botswana. There are no equity requirements for foreign companies. According to the Registrar of Companies, both local and foreign applicants have to satisfy the following requirements:

- (i) Apply for a name for the company, this takes approximately 3 weeks and complete an application for registration and pay P3.00 as registration fee.
- (ii) Applicants have to wait for six weeks for approval after which a certificate of registration is issued. The certificate of registration permits the construction company to start operating.

Foreign firms wishing to set up commercial establishments need to apply for land. Approval for such applications is made by the Minister of Lands.

In terms of ownership, 71% of the installation and assembly firms registered with the PPADB are locally owned. It must be noted though that a majority of those firms (61%) are in the lower categories of OC, A and B.

### **2.2.2 Market Structure of Botswana Construction Sector**

Botswana's construction sector is comprised of small, medium and big as well as local and foreign construction companies. There were 1000 operating



construction firms by March 2000 (CSO, 2000). Out of these, 211 companies were not registered with the Registrar of Companies as operating establishments but may have registered with other authorities such as local authorities and the Registrar of Societies. According to CSO (2000) the figure may also include Government departments which are not, in a strict sense, private “limited” companies.

Most construction companies are registered with the PPADB. The PPADB has six categories of contractors. Categories are based on the company's track record, financial capability and the plant the companies possess. The categories include Opportunity Class (OC) and classes A, B, C, D and E. Each of the categories is defined by a financial ceiling on a single project which a firm may handle. Categories OC, A and B are for 100% citizen owned companies. Categories C and D are both for 100% citizen and citizen majority owned joint ventures (51% citizen owned and 49% or less foreign owned) and category E has no restrictions by nationality, as such 100% foreign owned companies can participate in this category. Tables 2.1.1, 2.1.2 and 2.1.3 below show the number of firms per category for the construction work for building, construction work for civil engineering and installation and assembly sub-sectors.

Table 2.1.1 : Financial Limits for Construction Work for Building

Class	Maximum Contract Value (P)	Number of Local Firms	Number of Foreign Firms	Total Number Of Firms
OC	300,000	782	0	782
A	900,000	114	0	114
B	1,800,000	88	0	88
C	4,500,000	51	Not available	Not available
D	9,000,000	27	Not available	Not available
E	Unlimited	7	Not available	Not available

Source: Department of Building and Engineering Services & PPADB (2000)

Table 2.1.2 : Financial Limits for Construction Work for Civil Engineering (Roads)

Class	Maximum Contract Value (P)	Number of Local Firms	Number of Foreign Firms	Total Number Of Firms
OC	600,000	224	0	224
A	2,000,000	57	Unknown	57
B	10,000,000	21	4	25
C	20,000,000	13	Unknown	13
D	40,000,000	11	8	19
E	Unlimited	2	6	8

Source: Department of Roads (2000)

Table 2.1.3 : Financial Limits for Installation and Assembly (Electrical and Mechanical)

Class	Maximum Contract Value (P)	Number of Local Firms	Number of Foreign Firms	Total Number Of Firms
OC	40,000	58	0	58
A	100,000	35	0	35
B	250,000	23	7	30
C	500,000	8	14	22
D	1,000,000	5	8	13
E	Unlimited	6	25	31

Source: Department of Building and Engineering Services (2000)

The above tables depict the following:

1. There is a high concentration of citizen owned firms in classes OC, A and B. This is logically so because others are not allowed into these categories. These are low contract value, small and simpler projects such as housing units. This could reflect that inadequate capacity (lack of capital and trained labour) is a constraint for local firms.
2. Higher categories (category E) are the domain of foreign firms. According to the BIDPA research, foreign firms are better resourced in terms of plant and equipment, finance and trained human resources compared to their citizen owned counterparts
3. For civil engineering and installation and assembly sub-sectors, participation of local firms is at even lower categories such as category B. BIDPA research has revealed that this is due to capacity constraints on local firms. Civil engineering construction in particular is capital and skills intensive. Plant, machinery and professional skills are expensive and therefore the prohibitive costs are a barrier to entry by local firms even at those levels.

A total of 58% of construction companies were registered in Gaborone, the capital city (CSO, 2000). A study conducted by Ngowi, Iwisi and Rwelamila in 1997 revealed that firms registered in the lower classes or categories (A, B and C) tended to concentrate their operations mainly in Gaborone. According to the study, logistical problems involved in moving personnel, equipment and materials

to various parts of the country make it difficult for smaller firms to spread out too widely.

The study also made the following conclusions: -

1. Lack of transport and building materials in some parts of the country also restrict small firms from spreading their operations widely. Bigger firms (categories D and E) generally do not have transport problems because they usually have large fleets of freight vehicles and often own warehouses from which they can mobilize and store large quantities of materials for projects located in distant places.
2. In general, foreign firms have accumulated experience over time; they can access skilled personnel, equipment and machinery outside the local market comparatively easier than domestic firms. As a result of this competitive advantage, foreign firms tended to participate more in complex projects than local firms.

### **2.2.3 The Public Procurement and Asset Disposal Board (PPADB)**

The PPADB is a statutory body set up in 2001 to replace the Central Tender Board. According to the Public Procurement and Asset Disposal Act of 2001, the main objective of the PPADB is to “provide for the procurement of works, supplies and services for the disposal of public assets and related matters”. The functions of the PPADB are to: -

1. Manage the public procurement system
2. Supervise procurement
3. Adjudication and award of tenders
4. Discipline of contractors
4. Advise on aspects of the PPADB Act and regulations

Locally established companies registering with the PPADB must fulfill the following requirements: -

1. The company must be incorporated or licensed in accordance with the laws of Botswana.
2. The firm must complete application forms. These are meant to determine financial standing, plant and equipment, previous capacity and capacity of permanent staff.
3. The contractor must also provide supporting information in the form of certified copies of curriculum vitae (CVs) for permanent staff, certificate of incorporation, share certificate, bank statements, and other relevant information.
4. Completed forms are sent for verification to the relevant department such as DBES and Roads Departments.
5. The relevant department conducts physical inspections of the contractor's premises and makes relevant recommendations to the board.

The entire registration process takes about three months.

For foreign firms to register with the PPADB, they must satisfy the following requirements : -

1. Provide financial profile
2. Provide a list of projects undertaken internationally
3. Provide references

In order to register with the PPADB, consulting firms must have been doing business in Botswana for a year prior to application. It must be noted that foreign companies do not have to register with the PPADB if the project for which they are tendering is valued at over P50 million. This is in accordance with a government policy that stipulates that projects of that magnitude must be subjected to international competitive bidding.

## **2.2 CERTAINTY, RISK AND UNCERTAINTY**

According to Kerzner (2003), decision making falls into three categories: certainty, risk and uncertainty. Decision making under certainty is the easiest case to work with. With certainty, it is assumed that all of the necessary information is available to assist in making the right decisions and that the outcome can be predicted with a high level of confidence.

In decision making under risk, there usually does not exist one dominant strategy for all states of nature. In a realistic situation, higher profits are usually accompanied by higher risks and therefore higher probable losses. When there

does not exist a dominant strategy, a probability must be assigned to the occurrence of each state of nature.

According to Kerzner (2003), the difference between risk and uncertainty is that under risk there are assigned probabilities, and under uncertainty meaningful assignments of probabilities are not possible. As with decision making under risk, uncertainty also implies that there may exist no single dominant strategy. The important implication to be drawn from decision making under uncertainty is the risk that the project manager wishes to incur. Any strategy can be chosen depending on how much resources one can afford to lose and what risks one is willing to take.

#### **2.4 RISK IN THE CONSTRUCTION INDUSTRY**

According to Jaafari (1996), construction as an industry is different from manufacturing due to the following:-

- (i) fragmented structure of the industry with the bulk of the construction business being generated by a large number of firms, often small in size and less inclined to formal methods of work study and management.
- (ii) diffused responsibility, that is, on normal construction projects, typically, many individual professionals and firms share the responsibility for the specification, design and construction of these projects.

- (iii) prototype nature, that is, projects typically resemble 'prototype' products in the manufacturing industry, often carrying unique design features, site characteristics and functions. Thus, the potential for errors to creep in is always present due to the once off nature of the relevant activities and production processes.
- (iv) influence of the public, the regulatory agencies and interest groups, which will ultimately affect the functions and configuration of projects, including construction methods and associated safeguards to the environment, third party issues and beneficiaries.
- (v) transient and itinerant labour force, who are not trained to operate under the quality assurance mode of construction, that is, the training in the skilled labour has generally been based on learning how to do the work, not necessarily being one's own inspector to produce at zero defect.
- (vi) virtual lack of research and development (R&D). Typically R&D work in construction is confined to that undertaken by the manufacturers of materials and components incorporated into projects; there is little R&D work on lines of projects, such as commercial buildings as a 'product line' or managerial processes in infrastructure works, etc.

The above points are the reasons for the rather slow pace of change in the construction industry with major innovations often getting established at a



creeping speed and over many years. Thus, application of risk management and workers' empowerment principles in construction can be different to those of manufacturing industries and the direct application of the body of knowledge available from the latter is not necessarily helpful.

#### **2.4.1 Probabilistic risk analysis**

According to Cho and Choi (2000) recent studies on probabilistic risk analysis have highlighted the importance of an effective risk assessment model for specified phases of construction projects. Therefore, there has been little effort to develop applicable systematic models throughout all construction phases. For those countries, where objective probabilistic data for risk assessment is extremely rare or unavailable, (like Botswana) the utilization of subjective judgmental data based on experts' experiences is inevitable. In such situations, fuzzy approaches for the probabilistic risk analysis may be very useful. Moreover, the practical, comprehensive and systematic models for some real risk-sensitive construction projects are relatively rare and new and thus it seems not available at present.

#### **2.4.2 Probabilistic risk analysis for construction projects**

Construction projects can be divided into four major phases, namely, pre-contract phase, planning and design phase, construction phase, and operation and maintenance phase. The probabilistic risk analysis of construction projects can be performed for each different phase, such as pre-contract phase, pre-construction phase, and construction phase. Prior-phase risk assessments of a

construction project can be updated and more accurately evaluated as the project proceeds and more information become available. However, probabilistic risk analysis of construction projects is usually performed at pre-contract phase or pre-construction phase, because most of contractors require risk analysis results that make it possible to predict cost caused by risks inherent in construction projects for successful bidding on a contract or to find strategies for reducing risks on the contracted projects. Therefore, it is necessary to predict risk events inherent in construction projects before construction and to reduce or prevent risks through effective risk management and response strategies during construction based on the analyzed data.

The objectives of probabilistic risk analysis for construction projects is to predict risks that are mainly associated with construction related events and which are the main causes of construction risks in the pre-construction phase, to perform the probabilistic risk analysis for those risk events and to suggest risk response strategies for reducing damage and mitigating risks during construction.

According to Cho and Choi (2000) probabilistic risk analysis for construction projects may be useful only in case the historical data is available and the present conditions are ignored which can be assumed as not so changeable or special conditions. Probabilistic risk analysis can be used effectively and systematically for real construction projects in case all the data, which are largely divided into subjective and objective data, can be used incorporatively. Also, it can easily reflect present characteristics or conditions of site and the judgments

by assessors that may have great influence on the results of risk analysis.

Moreover, it is reasonable to use an uncertainty range in case a reliable expert's opinion could have error.

The risk analysis and evaluation process involves analyzing and evaluating the risk events identified before. However, uncertainties are considered as a major characteristic of risks inherent in construction projects, which are generally caused due to insufficient data, inadequate analysis techniques, subjective judgment based on experts' experiences, and so on. Therefore, the uncertainty range based on the concept of fuzzy set theory is used as a means to quantify uncertainties that give some numerical assessments of possibilities as well as potential consequences. It may be noted that the uncertainty range is suitable for more effectively and rationally incorporating uncertainty factors of construction projects. After each probability is calculated or assumed the uncertainty range is applied to the entire risk events.

Objective statistical data are explicitly computed by relative frequency analysis and statistics of extremes based on available objective data. In case of subjective data, this is taken to mean a subjective judgment of opinion or degree of belief that reflect present characteristics or conditions of the site where the risk event occurred. Such a belief is based upon all the relevant evidence, historical data, and experience that a field expert had with similar situations in the past. This allows the experts to use their logic, intuition, and experience to assess

probability values based upon any amount of data available to their state of information.

Event trees are usually designed through risk scenarios of subjective judgmental data. They are used as a tool to determine the probability of the occurrence of each failure path, and, hence, to evaluate the criticality of each path. The tree diagram shows each failure path based on risk scenarios and detail check items represent characteristics and site conditions, which actually have great influence on determining conditional probability of the occurrence of each risk event. The probability of the occurrence, which is evaluated by assessors or historical analyzed data, is determined based on subjective judgment or historical data considering detail check items checked by field supervisors. It may be easy to determine the probability value of each path in a risk scenario, if check-sheets are accumulated. The format of the sheets and checkpoints could be changed or added to according to project characteristics.

Cho and Choi (2000) conclude that the above procedure will be very useful for the systematic and rational risk assessment of real construction projects. The approach could effectively deal with all the related construction risks in terms of the assumed probability with conditional probability concept those systematically incorporate experts' experiences and subjective judgment. The probabilistic risk analysis modeling using fuzzy set theory may therefore be successfully applied to all the construction projects with only minor modifications in order to confirm specific projects characteristics. Also, it can easily reflect present characteristics

or site conditions and the judgments by assessors that have a great influence on the results of risk analysis. Moreover, it is reasonable to use the method of a fuzzy uncertainty range in case when reliable experts' opinions could invalidate some answers or contain some errors.

## **2.5 TYPES OF RISKS IN CONSTRUCTION**

According to Rwelamila (2001), risk and uncertainty are inherent in all major projects and the success or failure of such projects depends on how these risks are managed. Slight increases in capital costs, operational costs and finance charges, coupled with a slight decrease in demand, can turn an investment into a loss-making venture. Furthermore, the construction industry itself poses particular challenges in bringing projects to completion on time, to budget and with required quality and functionality.

Whatever forms of concessions, contracts, guarantees and regulatory frameworks are introduced to a project, all parties to the project will be susceptible to some degree of risk. The sooner this is recognized the sooner the parties may set about managing risk positively, in the knowledge that there is an optimum balance of risk and reward for all concerned.

The consequences of occurrence of risk are cumulative, sometimes by addition, but frequently by multiplication. Furthermore occurrence of one risk may render the project vulnerable to another risk, or may even cause the occurrence of such

risk, resulting in a cascade of effects, with a 'welling up' of consequences that may threaten the viability of the project and even its sponsors and lenders.

A structured and comprehensive approach to risk management is therefore required which will ensure that: -

1. Risk exposure is identified at the earliest possible time
2. The risk and its possible consequences are fully studied and analysed
3. The most effective risk-management measures are brought to bear promptly at the appropriate level and by the organization best able to do it.

The assessment of risk and reward is fundamental to any venture and, in any event, will be demanded by any specialized fund or institutional investor.

According to Rwelamila (2001), the major risks in construction can be simply stated and are interrelated thus:

1. Can the project be built to time, specification and within budget?
2. Is the project management adequate and experienced?
3. Is there sufficient market demand to give confidence in future revenue expectations?
4. Is there sufficient political will to help the project succeed?

Risk characteristics of projects differ on a project-by-project basis. Broad categories of risk can be distinguished, although the degree of importance

attached to these risks differ, depending on the country of operation and the project characteristics.

Rwelamila (2001) identifies the following construction project risks: -

### **2.5.1 Development risks**

Prior to commencement of construction, the main risks are associated with:

1. Planning issues - the obtaining of planning consents within the agreed programme may be hindered by delay on the part of the public sector.
2. Bidding risk – the costs of preparing tender submissions are extremely high, yet generally there is no recompense for unsuccessful tenderers.
3. Environmental issues – these are major aspects in the planning and design of major energy, water or transport infrastructure projects.
4. Different laws and conflicts between systems – these can add to pre-construction delays when projects are constructed across national boundaries. This is especially true when negotiations on a contract agreement affect more than one country.

### **2.5.2 Construction risks**

Construction risks can be of a performance, technical or physical nature and will often form the part of the financial assessment:

1. Completion risk – whether the project can be built on time, to specification and within budget (or tender price for contractors).

2. Technology risk – linked to the completion risk is the type of technology involved. Clear use of proven, tried and tested technology will mitigate this risk.
3. Physical risks – these include earthquake, flood, fire, landslip, pestilence and disease.
4. Management-related risks – competency of personnel to manage both the project and the co-ordination of labour.
5. Contracting risks – these include risks associated with the procurement strategy (reimbursable or fixed price), definition of force majeure and relief for strikes for the contract should be minimal, risks in ground conditions should be identified and priced and preferably the obligation should be accepted by the contractor.
6. Associated infrastructure risks – particularly important if connecting or approach roads have to be constructed by a specialized date by the public sector. This problem may be exacerbated in the case of cross-border projects in having to deal with two governments or government departments.

### **2.5.3 Operational Risks**

Operational risks can fall into further categories relating to both the physical operation of the facility and the economics of its operation:

1. Defects – plant falling into disrepair due to neglect or negligence or damage to equipment.



2. Latent defects – this risk is of particular importance, especially where the design is of a novel nature. Increased attention to monitoring of the design would help to minimize such defects.
3. Supply and purchase risk – this includes the impact of defaults and mismatches in or between the feedstock supply contract and offtake/sale contract.
4. Management – one of the main distinguishable features of infrastructure project finance is the lack of track record and experienced resources in the owning company.
5. Economy of operation – defective performance, including unavailability of spares and unscheduled interruptions can affect the economies.

#### **2.5.4 Financial risks**

Financial risks include those risks which increase the cost of finance and those associated with the mechanics of procuring finance, such as:

1. Foreign exchange – the availability and convertibility of revenues.
2. Debt service – this risk can arise when the facility is operating to specification but fails to generate sufficient revenue to cover operating costs and debt service.
3. Interest rate – risks relating to the type of, and changes in, the interest rate.
4. Loan period – the time over which repayment can be extended.
5. Cash flow – realistic milestones need to be assessed and set.

### **2.5.5 Revenue (or benefits) risks**

The risks associated with revenue generation are often considered on the basis of meeting demands:

1. Demand and growth data – level of accuracy and realism.
2. Increased demand – predictability and ability to meet increases.
3. Certainty – market-led revenues are far more uncertain than those based on predetermined sales contracts. Estimation of price elasticity in free-market conditions is essential.

### **2.5.6 Political risks**

Political risks can be associated with both local political powers, such as changes in policies or parties, and those risks generated by political entities beyond national jurisdiction:

1. Expropriation and repatriation of profits
2. Nationalisation
3. Force majeure
4. Changes in tariff structure
5. Fiscal and monetary policy changes

Cross-border projects become more complex since the fiscal and monetary policy changes can differ from country to country. In addition, the promoters may be faced with different regulations in relation to both the fiscal regimes and the safety and operating standards.

### **2.5.7 Legal risks**

Legal risks can be subdivided into those that can be associated with the host country and those that can be more particularly linked to the contract agreement.

Falling into the former category are:

1. The nature of the existing framework
2. Changes in laws and regulations during the contract period.
3. Company legislation and the liability of organizations as a major risk in projects, since the complex organizational structure often associated with projects involves numerous legal agreements between the organizations involved and must operate within the legal framework of the host country. In overseas projects the legal system of the host country may require the use of local companies and nominated suppliers to ensure compatibility with existing or proposed facilities.
4. Conflicting economic community (if applicable), national and regional laws.
5. Cross-borders regulations, e.g. import and export of materials, plant and labour.

Those linked to the contract agreement include:

1. The risk associated with the type of contract agreement.
2. Changes in the obligations under the legal framework.
3. Resolution of disputes.
4. The ability of the promoter to legally enforce the provisions of the contract, agreement and requirements of statutory undertakers.

### **2.5.8 Commercial risks**

Risks affecting the market and revenue streams and hence the commercial viability of a project can, broadly speaking, be classed as commercial risks.

Examples of these can include:

1. Changes in demand for the facility
2. Escalation of costs of raw materials
3. Consumer resistance to tolls
4. Convertibility of revenue currencies
5. Devaluation

### **2.5.9 Environmental risks**

Environmental issues are assuming an increasing importance on a global basis and related risks include:

1. Existing environmental constraints.
2. Risk of an environmental catastrophe on a new facility may lead to new environmental legislation, which in turn may increase the cost of the operation.
3. Perceived environmental risks in one country may have far-reaching effects in another country.

Environmental impact assessments are required by international funding institutions such as the World Bank and the European Union and, increasingly, by commercial lenders. Identification and management of these risks is therefore an essential element of successful project implementation.

Rwelamila (2001) further argues that risks on a project must be analysed quantitatively and qualitatively. Risk analysis will usually be carried out by the financial advisors in conjunction with engineering and legal advisors. It is necessary to identify the risk, determine the probability of it occurring, 'price' the risk and then ultimately decide where it should lie. As a general rule risk links with control, the risk will be allocated to the party best able to manage it. It is usual practice to develop some form of risk matrix for the project and determine this issue as a part of the overall risk-management strategy.

For major international projects, risks are generally allocated between the project promoter or sponsor and the contractor and the host country or local government (where appropriate). The promoter is best able to manage the risks associated with the operation and ongoing use of the project or facility. These will include factors such as project output, maintenance requirements, training, raw material supply and the like. The contractor is best able to manage the risk associated with the design and construction of the facility or project. These would include construction defects, delays in completion, quality of workmanship and materials, availability of resources and design life. The host government is best able to provide assurances about the legislative and regulatory environment in which the project is to be completed. Assurances could be provided to ensure that matters such as the country's fiscal structure or environmental compliance requirements are not changed so as to adversely affect the commercial viability of the project.

From the above, it is clear that risk management is inseparable from competent project planning, coordination, management and control.

## **2.6 SOURCES OF RISK TO CONTRACTORS**

Vastert & Gelder (2003) argues that for a contractor the (financial) result of a project is highly influenced by risk. To assure project profitability the price is based on a cost estimation. This estimation is based on cost accounts (fixed and variable) and a projection of a risk analysis. In past years efforts have been made to produce estimations that are statistically controlled. This means that for a great number of projects the cost realizations all fall within statistical boundaries of the cost estimation, with just a few exceptions. Risk control is concentrated in early project stages, though full implication is only known in later stages. The responsibility for design implies more risk allocated at the contractor's account.

At the start of a project a cost estimation sums up all fixed and variable cost items. A probabilistic cost estimation then starts with making an inventory of project risks throughout the project. This inventory has to be as complete as possible, identifying all relevant risk items. These risk items will be the inputs in the risk model, for which a Monte Carlo simulation is often used. For this purpose the risk items are modelled as either normal events or special events, characterised by their probability distribution. This distribution can be displayed in a density curve or in a cumulative distribution curve. Using a Monte Carlo simulation the individual risk items can be combined to a cost probability

distribution. When displayed in a density curve one can clearly show the distinction between fixed cost, variable costs and the reserve for risk. This reserve is set at an acceptable probability, determined in the distribution curve.

In a full probabilistic approach the project budget is fully determined by this cost estimation, its total budget following from the chosen acceptable probability.

When applied in a transparent manner each project calculated in this way can be evaluated and used to build a database to refine this method.

In practice, risk management is a continuous process. At several stages in the project the risk analysis provides a momentary value. The risk analysis thus delivers the information for the decision making in the process. To evaluate the effectivity of risk management, it is critical to consider the quality of risk analysis and its role in the decision-making.

In practice, it is not clear to determine for every risk that leads to cost overrun whether the client or contractor is responsible. In fact, it is not clear if these risks are process risks or perception risks. Most claim situations handle these disputes. Since cost overruns mostly occur when extra work is done these costs are initially accounted for by the contractor who will then claim these costs from the client.

The problem, therefore, occurs that during the different stages of construction, costs and possible income are separately accounted for in time. Even when

construction is finished the financial result is still very uncertain because claims are often exceeding construction time.

Common risk analysis for the contractor is based on process risk. The inventory contains risk items with uncertainty in occurrence and consequence. There are no risk items with uncertainty in allocation. The financial evaluation of the risk analysis is blurred because the financial consequences of claim risk and process risk are not separately accounted for.

The most important control measure available for the contractor for risk due to claim situations is two folded: -

1. Screen the contract on deficiencies and possible interpretation differences.
2. Appoint a contract manager to the work to concentrate on all legal matters.

It is not very suitable to control the risk from claim situations statistically in the risk analysis.

The key question that arises is how to evaluate the risk analysis at the start of the project to the financial result without the financial repercussions of claims. Only then will it be possible to acquire statistical material that can be used to refine the risk analysis for process risk. The solution to the problem of a clear evaluation of reserve for risk consists of the distinction of process risk, as identified in the risk analysis, and the exposure to risk due to claims. For a contractor, claim risk mainly consists of the uncertainty of compensation for costs



made with work supposedly outside the contract scope. If the contractor wants a full oversight during work to effectively manage the exposure, the risk analysis will also have to provide information on claim risk. The evaluation of process and claim risk for many projects will provide the contractor with a statistical tool.

This can be achieved with an adjustment to the risk analysis. Every monetary value presented in the risk analysis exposure on process risk and claim risk has to be separated. The exposure to the claim risk is separately displayed in a new budget function with the probability on compensation for the extra cost. If every claim risk is separately accounted for, it is possible, at any time, to calculate the most probable value of total profit or loss by combining the probability distribution of cost and budget.

This provides a probability function of the total budget. Together with the cost probability from the risk analysis it is possible to establish and calculate, at any time, the exposure. The financial outcome can be evaluated separately for cost and budget, and for process risk (risk analysis) and risk due to claims. This way, each project provides clear and useful information to answer the question whether the reserve for risk is sufficient. The outcome can be statistically useful when gathered in separate databases.

### **2.6.1 Notice requirements**

Richter (2002) states that the first step in good contractual risk management is to

understand the contract and its requirements. Particularly important is knowing the notice requirements contained in the contract. The easiest way to waive rights to compensation is to fail to provide timely notice as required by the contract for added work, delay, or differing site conditions. Notice requirements exist to allow the owner the opportunity to mitigate its damages resulting from an apparent problem. If notice requirements are not met, this opportunity has effectively been taken away from the owner. It is critical that field personnel know the notice requirement for changed conditions.

### **2.6.2 Differing site conditions**

Modern contracts, typically, require the contractor to investigate and satisfy itself as to general and local conditions, including patent site conditions, labour and utility availability, normal weather conditions and the character of equipment and facilities needed to perform the work. If a differing site condition is encountered and the contractor has not done its due diligence, the contractor may be barred from the recovery of additional costs associated with the differing site condition.

Richter (2002) avers that if the consultants have completed an adequate site investigation (complete with a written report of findings to the client), the reasonableness of the original estimate can more easily be shown. Reliance on information provided by the owner is often not a prudent approach. Exculpatory language in the contract documents may make recovery for differing site conditions even more difficult (e.g. "The soil report by the client is not a warranty

of subsurface conditions, nor is it a part of the contract documents," or the owner " ... disclaims any responsibility for the accuracy ... of soils investigations ..."). Exculpatory language may or may not be enforceable, depending on the type of contract and locality. Failure to take the time to make a detailed site investigation can prove fatal to profits.

### **2.6.3 Change clauses**

Early resolution of problems is ultimately the most cost-effective approach to contractual risk management. And, the best way to accomplish early resolution of issues is to maintain good site records (daily logs, time sheets, cost reports, schedules, etc.) and to keep the lines of communication open between the contracting parties and internal management. This is particularly important in change order management.

A contractor does not have to spend monies on more people and financial accounting systems to achieve expert change order management practices. It is mostly an exercise involving training the personnel who observe and collect data to track changes. And, it involves improving the communication between field personnel, the company controller, and the project scheduler.

### **2.6.4 Contract clauses**

There should be a standard, company-wide format for the site staff's daily log. In addition to a description of the work performed, the log should include identification of any added work and/or delay, with responsibility, start date,

resources impacted and resolution date documented. All site staff should be trained in the proper completion of the log and be sure they understand and appreciate the importance of the log to cost recovery. The log should be circulated daily. In construction, a company is better off running towards a problem than running away from it.

Richter (2002) further argues that, in recent years, the cost of claims resolution has often equaled or exceeded the cost of the entire project. Confrontations in court or arbitration have arisen from conditions occurring during the work, including differing site conditions, excessive change orders and severely adverse weather, among others. The time spent in litigation or arbitration often exceeds the time spent in constructing the project. Sizeable claims harm both the employer and the contractor. An employer may suffer loss of income, problems with funding and delayed occupancy; a contractor may face financial instability due to loss of payments.

## **2.7 RISK MANAGEMENT PROCESS**

It is important that a risk management strategy is established early in a project and that risk is continually addressed throughout the project life cycle. Risk management includes several related actions involving risk.

According to Basson (2004), response to risk is the choice between alternatives as well as the allocation of risks between parties involved. Both independent

risks and interrelated risks should be considered as a group although the latter would most probably be analyzed individually. The purpose is to establish the full impact of risks both quantitatively and qualitatively. This is used to determine the most and least favourable as well as the most probable final outcome of the project or undertaking analyzed as a whole. The route or plan with the minimum total risk is mostly chosen. Exceptions are when certain risks are unacceptable in terms of the organizational policies, other factors not related to risk *per se*, etc. The overriding rules are that the cost or impact of any action should be less than that (those) of the risk under consideration and the end result or objective should not be affected adversely.

Basson (2004) defines risk management as the systematic process of managing an organization's risk exposures to achieve its objectives in a manner consistent with public interest, human safety, environmental factors and the law. It consists of planning, organizing, leading, coordinating and controlling activities undertaken with the intent of providing an efficient pre-loss plan that minimizes the adverse impact of risk on the organization's resources, earnings and cash flows.

According to Bystrom & Pierre (2003) risk management refers to the structured handling of risks. They argue that since there are many types of risks there are many disciplines within the vast subject of risk management. Chapman & Ward (1997) defines the purpose of risk management as "to improve project

performance via systematic identification, appraisal and management of project-related risk". Managing risks requires a methodical approach and project risk management is a formalised process of decision-making (Baccarini, 2001).

### **2.7.1 Risk management methodology and tools**

According to Bystrom & Pierre (2003) project risk management methodologies exist in many forms. They point out that the most widely used is developed by the Project Management Institute (PMI) and is explained in the Guide to the Project Management Body of Knowledge (PMBOK Guide by PMI, 2000). It constitutes of six phases; Risk Management Planning, Risk Identification, Qualitative Risk Analysis, Quantitative Risk Analysis, Risk Response Planning and Risk Monitoring and Control. According to Artto (1997), the ISO Project Management Quality Guideline (ISO10006) also uses a similar definition of the content of risk management.

### **2.7.2 Risk management planning**

Risk management planning refers to the planning and structuring of risk management activities for a project. This phase involves planning meetings with all project members involved in risk management and key stakeholders. The purpose is to establish a risk management plan for the specific project. The risk management plan is based on the project charter, risk management policies and risk management plan developed and may specify methodology, roles, budget,

thresholds, reporting formats etc for risk management activities throughout the project.

### **2.7.3 Risk identification**

Risk identification consists of finding relevant risks to the specific project and to document them. Risk identification is “the process of determining what can happen, why and how” (Standards Australia according to Baccarini, 2001). Both internal and external risks are subject to identification. The project team can handle internal risks, while external risks are beyond the control of the team. Useful inputs to risk identification include product descriptions, historical information from previous project files or published information and other planning output such as cost and duration estimates, procurement plans, etc. Risk identification can be conducted in structured workshops through brainstorming, SWOT-analysis, interviews or by single individuals and through the use of simple checklists or more complex flowcharts. A common way to find risks is to identify causes and effects. Another method is the Delphi technique. Project risk experts participate anonymously in a risk questionnaire sent out by a facilitator. The responses are accumulated in risk categories by the facilitator and re-circulated to the experts for further comments. In this way, consensus can be reached without bias or undue influence on the outcome.

### **2.7.4 Qualitative risk analysis**

The qualitative risk analysis is the process of assessing the impact and probability of the identified risks and to prioritise them according to their effect on

the project if realized. The result serves as a guide for the choice of critical risk responses. The by far most common approach to qualitative risk analysis is the use of impact/probability matrixes. These are based on qualitative estimates of probabilities and impacts (expert judgement). While mathematical approaches to risk quantification are useful, expert judgement may be used in addition to other techniques. The impact/probability matrix can be extended so that each level of impact or probability is defined qualitatively or quantitatively. Quantitative definitions allow for the calculation of expected risk values (risk value = impact x probability). The output from the qualitative risk analysis should be a prioritized risk list and an overall risk ranking for the entire project. The overall risk ranking may indicate the level of risk inherent in the project in comparison to other projects and serve as a basis for the assignment of resources.

### **2.7.5 Quantitative risk analysis**

Quantitative risk analysis also involves evaluation of the risks identified to assess the potential outcomes. The objective is to define which risks need response based on quantitative calculations. One risk can cause multiple effects and different stakeholders may therefore perceive it differently. While an event can be an opportunity for one stakeholder, it may as well be a threat to another. Another important point regarding risk quantification is the danger of mathematical quantification techniques giving false impressions of precision and reliability. Except for the outputs from the risk identification and qualitative risk analysis phases, stakeholder risk tolerances may be needed in risk quantification. A number of risk quantification tools and techniques exist. The simplest technique



is to calculate expected monetary value. It is basically the product of the probability of an event occurring and the risk event value/impact. Intangible effects also need to be considered in this calculation to ensure a fair decision situation. Expected monetary value calculations are usually combined with further analysis such as decision trees, since risk events can occur individually or in groups, in parallel or in sequence. Statistical sums can be used to calculate a range of total project costs based on estimations of the cost for individual work items/tasks. Statistical sums are based on three-point estimations of costs (low, most likely, high) for each item. The mean value of the estimations can be calculated using different statistical distributions for each item. Different distributions can be used for each task. If the distributions are skewed, the sum of the mean values will always differ from the sum of the most likely estimates. Decision tree diagrams are used to illustrate decisions and outcomes. The branches of a decision tree depicts decisions (as boxes) or chance events (as circles). Decision makers can, by the use of decision tree diagrams, visualize a situation of uncertainty and the possible results of potential decisions.

## **2.8 RISK MANAGEMENT IN CONSTRUCTION**

Rwelamila (2001) argues that the risk management strategy for a project should be set in the context of overall project-management needs. For a complex project there should be a project management plan, embracing all aspects of the project and its component sub-projects, integrated with a quality management plan and a risk management plan. The risk management plan is integrated into

the overall project plan with formal risk reviews linked to the vital decision points in the project.

For each major risk area a study should indicate optional strategies for risk management. It should be possible then to estimate the residual level of risk that cannot be managed out, or transferred economically, and which has to be accepted and covered by contingent allowances of time and money and by equity funds of the risk taker.

According to Rwelamila (2001), the risk management plan should have the following essential features:

1. A statement of policy for managing risk and assignment of responsibility for risk management.
2. Procedures for formal risk assessments at, or prior to, each key project stage.
3. Procedures for monitoring of risks, particularly related to the management of design, development, contracts, variations within each stage of the project and procedures for updating the base-risk assessments.
4. Procedures to ensure that risks, particularly related to the management of design, development, contracts, variations within each stage of the project and procedures for updating the base-risk assessments.
5. Procedures to ensure that risk management is integrated into all project group activities.

6. Risk audits (technical and procedural).
7. Integration of the risk management system with the quality management system.

Rwelamila (2001), argues that the risk management strategy should:

1. Allow risk to be identified in sufficient time for a considered and effective response.
2. Ensure that risk is correctly allocated, in accordance with contracts or other agreements, to the body most able to manage it or, in the case of neutral risk, to those with greatest vested interest and capacity to bear it.
3. Engender the confidence of the investor community from the outset that risk is being managed proactively.
4. Enlist the cooperation of all parties in the belief that effective risk management is in the interest of all.

According to Rwelamila (2001), risk management embraces a whole range of measures available to avoid, defray, mitigate, transfer and absorb the full range of risks described above. As such, the risk management team has clear links to a range of other functions, departments and disciplines. These include:

1. Quality assurance
2. Project planning
3. Contracts
4. Insurance

## 5. Purchasing and supply

Tittes (2002) argues that construction professionals need to know how to balance the contingencies of risk with their specific contractual, financial, operational and organizational requirements. In order to achieve this balance, proper risk identification and risk analysis is required. The risk management process entails identifying construction risks and exposures and formulating an effective risk management strategy to mitigate the potential for loss.

Tittes (2002) argues that many construction professionals look at risks individually with a myopic lens and do not realize the potential impact that other associated risks may have on their business operations. Using a holistic risk management approach will enable a firm to identify all of the organization's business risks. This will increase the probability of risk mitigation, with the ultimate goal of total risk elimination.

### **2.8.1 Risk transfer and indemnification**

Tittes (2002) argues that the two most problematic areas for construction professionals to effectively manage are contractual risks and the insurability of projects. Contract reviews and insurance facilitation are critical components on an effective risk mitigation and management program. Insurance facilitation assumes the probability that accidents will occur and seeks an efficient way of distributing and/or transferring the risk.

In many instances the ultimate loss is transferred to the insurer, using conventional insurance as the risk transfer method. In other instances, the use of contractual risk transfer methods, utilizing indemnification provisions, are used. In most cases, the combination of insurance, risk financing and contract indemnification provisions are used.

According to Tittes (2002), indemnification can be viewed from the perspective of worker safety and avoidance of accidents, with an emphasis on the exculpatory aspects of indemnification. However, sometimes escaping liability and the associated consequences can create problems with the misuse of indemnification provisions. Particularly, with the broad form or intermediate form, which can exculpate the indemnitee from its own wrongdoing or negligence.

### **2.8.2 Contractor's view of risk**

Contractors treat risk differently from the clients because each views risk from a different perspective. The clients, in executing their risk management program, needs to understand the contractor viewpoint. Contractors typically divide risks into two basic types: business risks and program risks. Business risk, in the broadest sense, involves the inherent chance of making a profit or incurring a loss on any given contract. Program risk involves, among other things, technical, requirement and design uncertainties. A contractor's efforts to minimize business risks may conflict with a client's efforts to lower program risk. While the client and the contractors may have different views on specific cost, schedule, and

performance risk levels/ratings, they generally have (or should have) similar views of the risk management process. One exception may be the requirements placed by corporate management that could conflict with the client's view of program risk. The similarity, however, does not, necessarily, lead to the contractor having a competent internal risk management program.

As the Project Management Institute (PMI) handbook points out, "On most (construction) projects, responsibility for project risk is so pervasive that it is rarely given sufficient central attention." Often, the contractor is better equipped to understand the program's technical risks than the client's office is. Both the client and the contractor need to share information, understand the risks and develop and execute management efforts. The client must involve the contractor early in program development, so that effective risk assessment and reduction can occur. Risk management must be a key part of the contractor's management scheme. Although the client does not dictate how the contractor should manage risk, some characteristics of a good client/contractor relationship include:

1. Clear definition of risks and their assignment.
2. Flexibility for assignment of risks and risk management responsibilities among the teams.
3. Strong emphasis on best management and technical practices which, if followed, avoid unnecessary risks.

(Risk Management Guide For DOD Acquisition, 2003).

## **2.9 BIDDING AND PROCUREMENT**

Latham (1994) refers to 'a procurement system' as 'a procurement route'. He argues that a procurement route should precede the preparation of the outline (project) brief, since it necessarily affects who shall assist with the design brief as well. Hence a definition of 'a procurement route' could be formulated as:

“The organization structure adopted by the client within which the construction project is brought about, acquired or obtained (including preparation of project outline)”

The Chartered Institute of Building (CIOB) (1996) Project Management Manual defines procurement as:

“the process by which the necessary contributions of the various participants in the design and construction phases of the project are secured.”

A general definition of a project delivery/procurement system based on the above definitions can be summarized as:

“The organization structure adopted by the client to manage all stages of the project from inception to completion and in certain situations including post-completion phase(s)” (Rwelamila, 2001).

### **2.9.1 The cost of procurement/bidding**

According to Hillebrandt & Hughes (2003) the costs of procurement are transaction costs which are separate from the direct costs of a project.

Contractors devote considerable time and energy to determining the costs of

construction of a project and then in assessing the price they will quote to the client, that is, their costs plus mark-up. The client is interested in the price quoted by contractors. Price is the rate at which exchange may or does take place. Price to the contractor becomes a cost to the client. However, the actual cost of construction is not the only cost which must be considered. The cost of obtaining an invitation to bid, of estimating, of drawing up a contract, of administering the terms of the contract and of dealing with any deviations from the contract conditions are also important. In many cases these costs are a small proportion of the total cost of a contract. There are, however, two main reasons why they may be substantial. The first is the increase in the aspects of the construction project covered by the initial contract and the increase in the number of parties involved. The second is the danger that the contract conditions will not be fulfilled, either by the client or the suppliers of services and, hence, that the risks faced by all parties to the process will be high.

### **2.9.2 Types of cost**

The costs of arranging for a project to be constructed are known as transaction costs. These arise in construction because there are a number of parties to the process and the organizers of the total process have to identify potential participants, select those most appropriate, monitor that they are performing well and take action if they are not. If the person who wanted a building or civil works had in his employ designers, builders, tradesmen, labourers, material producers and so on, there would be no transaction costs. This state of affairs exists,



theoretically, in a centrally planned economy with no private property. In that case, there would be no transaction costs but there would instead be high administrative costs. Economists distinguish a number of different types of cost. Most of these apply both to direct costs of a construction project and to transaction costs. The most important, as identified by Hillebrandt & Hughes (2003) are listed below: -

1. Fixed costs are costs which do not vary with the amount of work undertaken by the firm or on a particular project. Variable costs are the opposite of fixed costs.
2. Short-term costs are those which have to be met in the near future. Long-term costs must eventually be met. Long and short-term are not fixed periods of time but vary according to the matter under consideration. Postponable costs are costs which must be met in the long run but of which payment may be delayed. They include, for example, a proper return on capital employed and remuneration for some staff as high as that they could command elsewhere.
3. Money costs are outgoings which have a clear monetary value. A cost which is not normally expressed in money terms is opportunity cost, sometimes referred to as the real cost. The real cost of employing a resource in one use is the lost opportunity of using it to produce an alternative good. Thus the real cost of using an architect to design building A is the lost opportunity which arises because he cannot design building B, which he might otherwise have done.

4. Social costs are costs to the community. Private costs are costs to the individual or a group of individuals. The community may have to bear the costs which arise from action by private individuals. A current example is the cost of pollution.

The important transaction costs of procuring a project are notably the selection of a contractor and determination of the price. In 1989 it was found, in discussions with contractors, that they expended of the order of 0.7 to 1.0 per cent of turnover in the handling of tender documentation (Flanagan and Norman, 1989). Costs of tendering are seen by the industry in the UK to be significant, typically quoted as 0.5 to 1.0 per cent of turnover for fairly traditional projects but 2.0 – 3.0 per cent where the projects are for a public client, but with private finance. For some elaborate procurement methods, such as prime contracting, the costs may be even higher.

### **2.9.3 Types of projects**

The variety of methods of procurement is great because there are differences in the services required by clients and in the selection of the organizations to carry out the needs of clients. Hillebrandt (2000) summarizes these in terms of:

1. The methods for the procurement of a building or other facility which encompasses project management, design and build, management contracting, construction management, prime contracting and build operate transfer (BOT). In all these cases the building is to be owned by the client's organisation or acting on behalf of another owner. The

contractor is not the owner. The services the contractor or manager is asked to provide vary. In particular, services may or may not include design. If they include design they may require different designs to be submitted as part of the competitive bidding process. One designer may be selected and commissioned or there may be a mixture of the two. The methods also vary in the role taken by the manager of the project and in his contractual position. This in turn determines the extent to which he is at risk.

2. The methods of procurement for the client who happens to require a building to provide a service include build own operate transfer (BOOT) and the private finance initiative (PFI) (Also known as public private partnerships (PPP)). In these cases the contractor and/or the contractor's collaborator is the owner. There is a great diversity in the services to be provided from running a hospital or a prison to managing a toll road. The bidding process normally involves the contractors in producing separate different competitive schemes for the services to be supplied.
3. The method of selection of the contractor or team involves open tendering, selective tendering in some form, negotiation or, in the case of large continuing clients, the prior selection of a number of contractors who are judged to be satisfactory, so that one is chosen for each project with competition being confined to price competition amongst the contractors already short-listed.

In considering the costs of tendering the factors which are specially important are the scope of the goods or services to be provided by each bidder and the number of bidders.

#### **2.9.4 Costs of the client**

The decision on how to procure a project is taken by the client. The choice will affect, not only the client's own costs, but also those of all the parties involved in bidding and may, in the long run, have consequences for the industry and society as a whole.

According to Hillebrandt & Hughes (2003) the client's costs are measured mainly in management time but his decisions will put more or less work on the client's external advisers. In both cases the real cost is the opportunity cost, that is, the value of the output they would be producing if they were not working on that particular project. Opportunity cost can be more or less than money cost. It would seem that the client's costs would rise with the complexity of the procurement process. It would seem that extra functions required by the contractor or manager would require more expensive management of the selection, especially if there is competition for each function. Such extra costs would be offset, to some extent, or even perhaps more than offset, by the saving on the costs of selecting those performing these functions separately. Many large continuing clients have moved to new methods of selection of which partnering is one. In this case selection of all the parties to the process is undertaken in advance of

requirements so that when a particular project is let no further selection should be necessary. The reasons for adopting these diverse methods of procurement do not rest on the costs of procurement but on a belief that efficiency in the total provision of the required project is, in the long run, enhanced, for example by lower costs or less risk of failure (Hughes et al, 1998).

Clients do not take into account, and probably do not realize, that the greater the costs imposed on contractors by their procurement methods, the greater, in the long run, will be the costs of construction.

Hillebrandt & Hughes (2003) argues that the client's costs of procurement are the client's private costs; they are under the client control and it may reasonably be assumed that the advantages the client buys in incurring these costs yield a financial benefit. Moreover they are directly related to the individual project and so are variable. An element of fixity is introduced with partnering where costs of getting to the stage of a partnering agreement are related to an unknown number of projects and cannot afterwards be altered.

### **2.9.5 Costs of the contractor**

According to Hillebrandt & Hughes (2003) the building or civil engineering contractor may become involved with the provision of services beyond those of construction, for example, of design, of finance for the construction of a project,

of management of the completed facility and the services it provides. This involves team work and the contractor may not be the leader of the team.

The contractor's costs of obtaining work are not under the contractor's control. If the contractor wishes to be in a particular business the contractor has to accept the procurement method ordained by the client. There are two aspects of costs of obtaining work to be considered; the cost of obtaining a contract for one project with various types of procurement methods and the cost to contractors of tendering for work where they failed to obtain the jobs.

The costs of being selected and of estimating will be lower the simpler the project for which the contractor is bidding and the greater his knowledge and experience of that type of work. If functions other than construction are added to the bid, notably design, provision of finance or management of the services provided by the project, the costs of bidding escalate. For partnering work the initial costs to the contractor of passing the selection process may be very high. This is especially so since the process will probably take the time and effort of a large number of senior staff for whom the opportunity cost may well be higher than their money cost. Once the contractor has passed the tests, the cost of estimating the price, which for multi-disciplinary projects may itself be high, is the only cost. Costs of being vetted for partnering agreements cannot be altered. They are the same whether the firm gets no work as a result or a lot of work. The manpower expended in the process of selection has no alternative use and so

has no opportunity cost and ought not to be considered in the decision-making process. This means that the firm should not tender for a project for which it has gained a position on the select list just because it has spent a lot of money and effort in getting to that position. The decision should be based on the current and future costs and benefits only. Costs which have been incurred in the past and have no current opportunity cost are known as sunk costs.

There will also be the problem that, if the contractor is inexperienced, the estimate may be too low so that the actual project makes a loss. The contractor is particularly vulnerable if relying on outside specialists with attendant risks of delays, escalating costs and non-fulfillment of contracts. These risks are not part of the cost of obtaining work but should rather be included in the contract price as part of the mark-up.

The cost of estimating and the costs of being asked to bid for an individual project are variable costs, that is, they are directly related to turnover, though the success rate determines the exact relationship. The cost of estimating for a particular project could be included in the cost estimate for that project. This is not, however, a normal practice. All costs of obtaining work are regarded as overheads and included in the mark-up for contracts as appropriate. The total cost of obtaining work is high. Taking the estimates of costs of tendering of 0.5 to 1.0 percent for traditional contracts and 2.0 to 3.0 percent for those involving finance, and assuming that for traditional contracts contractors obtain one in six

of contracts tendered for and one in four for complex projects, then the total costs of obtaining work become 3.0 to 6.0 percent for traditional work and 8.0 to 12.0 percent for complex work. The National Joint Consultative Council for the UK recommends five to eight contractors for selective tender (NJCC 1994). Thus the client, in determining what procurement method to use, is affecting contractors' overheads across the board and not simply for the one project he is currently concerned with.

Hillebrandt & Hughes (2003) poses the question that if the change to more complicated procurement methods increases the cost of obtaining work and hence overheads, can contractors simply add this extra amount to their overheads and hence charge more for contracts generally or will they, in so doing, become uncompetitive and lose their place in the market? They argue that there is no evidence of what happens in practice but theory goes some way to elucidating the position. Answers, according to them, depend, amongst other things, on the level of competition and the relative power of the players in the construction process.

If there is effective competition in the industry, then contractors, in general, will be making just enough profit to keep them in the industry. This level of profit is known as 'normal profit'. If they make more than that, others will enter the industry and their extra capacity will drive down prices to the level at which normal profit is made. If firms are making less than normal profit some firms will



leave the industry, thus reducing supply so that prices rise to allow normal profit. Individual firms may, in the short-run, make more or less than normal profit but in a truly competitive situation it will pay them to expand or to shrink so that they too are making normal profit. The economic system is in a constant state of adjustment towards an equilibrium situation (Hillebrandt, 2000).

With effective competition, if all contractors were in the same markets in the same proportions, they would all have the same increases in overheads and their costs would rise to the same extent. They would be able to increase their prices but as they did so the demand for construction would fall and some firms would shrink or go out of business. However, all contractors are not in the same markets. If those relatively few contractors who are in the complex procurement project market, as well as in other markets, try to add the extra overheads for the former onto all their projects, they will become uncompetitive in the traditional markets where they are competing against contractors who are operating only in these markets. Their tender success rate will diminish, their costs will rise and their profits will diminish. If they add the higher mark-up on to the complex projects they will be in the same position as other contractors, provided their competitors are doing the same thing. Logically they all have no choice but to separate the markets in applying overheads though it is probable that, in determining mark-ups, this argument is swamped by the other factors determining mark-ups, such as the overall state of the market and of the expected competitors. Nevertheless, a rise in price may choke off demand as in

the case where all contractors are in the same market (Hillebrandt & Hughes, 2003).

If competition in the industry is not strong, for example, if there are few contractors in the market or if one contractor has a monopoly, the profits being made will be higher than normal and the contractors will probably absorb part of the higher overheads so that the price rise is less than in a competitive situation, or even nil.

According to Hillebrandt & Hughes (2003), the construction industry is subject to fluctuations in demand so that the overall market demand and supply situation is constantly changing. This means that equilibrium is never reached and often, for long periods, not even approached. Thus, in the short run, the effect of higher costs will depend on the relative power of clients and contractors. If work is short, the contractors will have to bear extra costs and profits will fall below normal levels. In a period of boom, when clients are having difficulty in finding contractors to undertake work, the contractors can recoup all overheads and much more besides. Profits will be super-normal.

It is important to realize that high costs of obtaining work and of pricing projects, through their effect on contractors, affect other clients and the operation of the industry as a whole. Because a healthy industry is important to the economy, that is a matter of concern to society as a whole.

### **2.9.6 Costs to society**

There are two main ways in which the method of procurement adopted by clients impacts on society. The first is that the construction industry costs can rise, so that price of construction increases to the detriment of other clients and the economy. There may be advantages of a more elaborate procurement process if this leads to better buildings in terms of, for example, design, quality of construction or life cycle costs. Clients take account of the benefits and their own private costs but not of the increase of costs on the industry. Thus, the private costs and the social costs are not the same.

The other, probably more important, consequence of elaborate procurement processes is the use of scarce resources whose cost is not necessarily reflected in their price. For example, the resources used in design. In the traditional process for building, the client chooses an architect who is commissioned to prepare the designs for the project the client requires. Only one architect is involved. In a design-and-build competition, or simply in an architectural competition, several architects are producing designs for the same building of which only one will be used. In other types of procurement, such as PFI (PPP) or prime contracting, many designers are employed on different solutions for the same project. The money costs of this will be reflected in the costs of the individual contractor and the cost of the unsuccessful bids must be recouped as outlined above. The real cost however may be quite different. The total development cost of buildings will rise and this will result to higher rentals or

selling prices. If there is a shortage of good architects, while some of them are working on the one project, they are not working on other projects and, as a consequence, some projects may not get built, may be delayed or be designed by less competent persons. The opportunity cost of employing these architects would be high. In the long run economic forces would correct this situation. The price (fees) of architects would rise and more architects would emerge. The problem is that the training period for an architect is a minimum of five years and for an experienced architect much longer. The rise in the fees of architects would serve to increase the cost of projects without solving the supply problem. In this case, the social costs of elaborate procurement methods may be much higher than the private costs to the client.

It may be that there is a surplus of excellent architects. In that case the opportunity cost of the employment of several on one project is low and may be lower than the money cost. Their use would be beneficial to society in other ways, perhaps reducing unemployment, and certainly, by increasing their incomes, stimulating the economy as a whole. Thus, in this situation, the social cost of employing architects on the project with a complex procurement process may be less than the private cost. Similar arguments may be applied to the cost of arranging financial packages, assessing and minimizing full life costs, assessing the costs of providing a service linked to the building or other works and so on.

In summary, it is the client alone who takes the decision as to what method of procurement to adopt. Yet the above theoretical investigation of the costs of procurement has shown that the costs to the client of elaborate methods of procurement are only a small part of the potential costs to contractors, to the industry, to other clients and to society as a whole. Some of these costs may be offset by benefits of procurement methods which may produce buildings and civil works which are better than they otherwise would be. The matter is of concern because of the potentially high costs of elaborate methods of procurement to other clients and to society as a whole in a situation of high demand in the industry, when resources required to achieve inclusion in the list of contractors selected, to produce viable schemes and to assess their cost are scarce.

## **2.10 CONTRACTS AND PROCUREMENT**

Kerzner (2003) says that, in general, companies provide services or products based on the requirements of invitations for competitive bids issued by the client or the results of direct contract negotiations with the client. One of the most important factors in preparing a proposal and estimating the cost and profit of a project is the type of contract selected. The confidence by which a bid is prepared is usually dependent on how much of a risk the contractor will incur through the contract. Certain types of contracts provide relief for the contractor, since onerous risks exist. The cost must, therefore, consider how well the contract type covers certain high and low risk areas.

Prospective clients are always concerned when, during a competitive bidding process, one bid is much lower than the others. The client may question the validity of the bid and whether the contract can be achieved for the low bid. In cases such as this, the client imposes incentive and penalty clauses in the contract for self-protection.

Because of the risk factor, competitors negotiate not only for the target cost figures, but also for the type of contract involved, since risk protection is the predominant influential factor. The size and experience of the client's own staff, urgency of completion, availability of qualified contractors and other factors must be carefully evaluated. The advantages and disadvantages of all basic contractual arrangements must be recognized to select the optimum arrangement for a particular project.

### **2.10.1 Procurement**

According to Kerzner (2003), procurement can be defined as the acquisition of goods or services. Procurement (and contracting) is a process that involves two parties with different objectives who interact in a given market segment. Good procurement practices can increase corporate profitability by taking advantage of quality discounts, minimizing cash flow problems and seeking out quality suppliers. Because procurement contributes to profitability, procurement is often centralized, which results in standardized practices and lower paperwork costs.

All procurement strategies are frameworks by which an organization attains its objectives. According to Kerzner (2003), there are two basic procurement strategies:

1. Corporate procurement strategy: The relationship of specific procurement actions to the corporate strategy.
2. Project procurement strategy: The relationship of specific procurement actions to the operating environment of the project.

Project procurement strategies can differ from corporate procurement strategies because of constraints, availability of critical resources and specific customer requirements. Corporate strategies might promote purchasing small quantities from several qualified vendors, whereas project strategies may dictate sole source procurement.

Procurement planning usually involves the selection of one of the following as the primary objective:

1. Procure all goods/services from a single source
2. Procure all goods/services from multiple sources
3. Procure only a small portion of the goods/services
4. Procure none of the goods/services

Another critical factor is the environment in which procurement must take place. There are two environments: macro and micro. The macro environment includes

the general external variables that can influence how and when we do procurement. These include recessions, inflation, cost of borrowing money and unemployment. An example is where a foreign corporation has to undertake a large project that involves the hiring of several contractors. Because of the country's high unemployment rate, the decision is made to use only domestic suppliers/contractors and to give first preference to contractors in cities where unemployment is greatest, even though there are other more qualified suppliers/contractors.

According to Kerzner (2003), the microenvironment is the environment of the firm, especially the policies and procedures imposed by the firm, project or client in the way that procurement will take place. This includes the procurement/contracting system, which contains five cycles:

1. Requirement cycle : Definition of the boundaries of the project
2. Requisition cycle : Analysis of sources
3. Solicitation cycle : The bidding process
4. Award cycle : Contractor selection and contract award
5. Contract Administration cycle : Managing the subcontractor until completion of the contract.

There are several activities that are part of the procurement process and that overlap several of the cycles. These cycles can be conducted in parallel, especially requisition and solicitation.



### **2.10.2 Requirement cycle**

According to Kerzner (2003), the first step in procurement is the definition of the project, specifically the requirement. This is referred to as the requirement cycle and includes the following:

1. Defining the need for the project
2. Development of the statement of work, specifications and work breakdown structure
3. Performing a make-or-buy analysis
4. Laying out the major milestones and the timing/schedule
5. Cost estimating, including life-cycle costing
6. Obtaining authorization and approval to proceed.

Specifications are written, pictorial or graphic information that describe, define or specify the services or items to be procured. There are three types of specifications:

1. Design specifications: These detail what is to be done in terms of physical characteristics. The risk of performance is on the buyer.
2. Performance specifications: These specify measurable capabilities the end project must achieve in terms of operational characteristics. The risk of performance is on the contractor.
3. Functional specifications: This is when the seller describes the end use of the item to stimulate competition among commercial items, at a

lower overall cost. This is a subset of the performance specification, and the risk of performance is on the contractor.

### **2.10.3 Requisition cycle**

Once the requirements are identified, a requisition form is sent to procurement to commence with the requisition process. The requisition cycle includes:

1. Evaluating/confirming specifications
2. Confirming sources
3. Reviewing past performance of sources
4. Producing solicitation package(s)

The solicitation package is prepared during the requisition cycle but utilized during the solicitation cycle. In most situations, the same solicitation package must be sent to each possible supplier so that the playing field is level. A typical solicitation package would include:

1. Bid documents (usually standardized)
2. Listing of qualified vendors (expected to bid)
3. Proposal evaluation criteria
4. Bidder conferences
5. How change requests will be managed
6. Supplier payment plan

Quite often, one vendor will not bid on the project because it knows that it cannot submit a lower bid than one of the other vendors. The cost of bidding on a project is an expensive process. Bidder conferences are used so that no single bidder has more knowledge than others. If a potential bidder has a question concerning the solicitation package, then it must wait for the bidders' conference to ask the question so that all bidders will be privileged to the same information. This is particularly important in government contracting. There may be several bidder's conferences between solicitation and award.

#### **2.10.4 Solicitation cycle**

According to Kerzner (2003), selection of the acquisition method is the critical element in the solicitation cycle. There are three common method of acquisition:

1. Advertising
2. Negotiation
3. Small purchases

Advertising is when a company goes out for sealed bids. There are no negotiations. Competitive market forces determine the price and the award goes to the lowest bidder.

Negotiation is when the price is determined through a bargaining process. In such a situation, the customer may go out for a:

1. Request for information (RFI)

2. Request for quotation (RFQ)
3. Request for proposal (RFP)

The RFP is the most costly endeavor for the vendor. Large proposals contain separate volumes for cost, technical performance, management history, quality, facilities, subcontractor management, and others. The negotiation process can be competitive or non-competitive. Non-competitive processes are called sole-source procurement.

On large contracts, the negotiation process goes well beyond negotiation of the bottom line. Separate negotiations can be made on price, quality, quantity and timing. Vendor relations are critical during contract negotiations. The integrity of the relationship and previous history can shorten the negotiation process. The three major factors of negotiations are:

1. Compromise ability
2. Adaptability
3. Good faith

Negotiations should be planned for. A typical list of activities would include:

1. Develop objectives (i.e., minimum-maximum positions)
2. Evaluate your opponent
3. Define your strategy and tactics
4. Gather the facts

5. Perform a complete price/cost analysis
6. Arrange “hygiene” factor

There should be a post negotiation critique in order to review what was learned. The first type of post negotiation critique is internal to the firm. The second type of post negotiation critique is with all of the losing bidders to explain why they did not win the contract. Losing bidders may submit a “bid protest” where the customer may have to prepare a detailed report as to why this bidder did not win the contract. Bid protests are most common on government contracts.

#### **2.10.5 Award cycle**

The award cycle results in a signed contract. There are several types of contracts. The negotiation process also includes the selection of the type of contract.

The objective of the award cycle is to negotiate a contract type and price that will result in reasonable contractor risk and provide the contractor with the greatest incentive for efficient and economic performance.

According to Kerzner (2003), there are certain basic elements of most contracts:

1. Mutual agreement: There must be an offer and acceptance
2. Consideration: There must be a down payment

3. Contract capability: The contract is binding only if the contractor has the capability to perform the work
4. Legal Purpose: The contract must be for a legal purpose
5. Form provided by law: The contract must reflect the contractor's legal obligation, or lack of obligation, to deliver end products.

The two most common contract forms are completion contracts and term contracts.

1. Completion contract: The contractor is required to deliver a definitive end product. Upon delivery and formal acceptance by the customer, the contract is considered complete and final payment can be made.
2. Term contract: The contract is required to deliver a specific "level of effort," not an end product. The effort is expressed in person-days (months or years) over a specific period of time using specified personnel skill levels and facilities. When the contracted effort is performed, the contractor is under no further obligation. Final payment is made, irrespective of what is actually accomplished technically.

The final contract is usually referred to as a definitive contract, which follows normal contracting procedures such as the negotiation of all contractual terms, conditions, cost and schedule prior to initiation of performance. Negotiating the contract and preparing it for signatures may require months of preparation. If the customer needs the work to begin immediately or if long-lead procurement is necessary, then the customer may provide the contractor with a letter contract or

letter of intent. The letter contract is a preliminary written instrument authorizing the contractor to begin immediately the manufacture of supplies or the performance of services. The final contract price may be negotiated after performance begins, but the contractor may not exceed the “not to exceed” face value of the contract. The definitive contract must still be negotiated.

The type of contract selected is based upon the following:

1. Overall degree of cost and schedule risk
2. Type and complexity of requirement (technical risk)
3. Extent of price competition
4. Cost/price analysis
5. Urgency of the requirements
6. Performance period
7. Contractor’s responsibility (and risk)
8. Contractor’s accounting system (is it capable of earned value reporting?)
9. Concurrent contracts (will the contract take a back seat to existing work?)
10. Extent of subcontracting (how much work will the contractor outsource?)

#### **2.10.6 Contract administration cycle**

Kerzner (2003) says that the contract administrator is responsible for compliance by the contractor to the contract’s terms and conditions and for making sure that the final project is fit for use. According to Kerzner, the functions of the contract administrator include:

1. Change management
2. Specification interpretation
3. Adherence to quality
4. Warranties
5. Sub-contractor management
6. Production surveillance
7. Waivers
8. Contract breach
9. Resolution of disputes
10. Project termination
11. Payment schedules
12. Project closeout

The larger the contract, the greater the need for the contract administrator to resolve ambiguity in the contract. Sometimes, large contracts that are prepared by teams of attorneys contain an order of precedence clause. The order of precedence specifies that any inconsistency in the solicitation of the contract shall be resolved in a given order of procedure such as:

1. Specifications (first priority)
2. Other instructions (second priority)
3. Other documents, such as exhibits, attachments, appendices, statement of work, contract data requirements list (CDRL), etc (third priority)
4. Contract clauses (fourth priority)



5. The schedule (fifth priority)

According to Kerzner (2003), an ambiguous contract will be interpreted against the party who drafted the document. However, there is an offsetting rule called patent ambiguity. This includes the following:

1. The offeror in a “bid” situation is expected to be knowledgeable about ordinary and normal industrial or construction practices pertinent to its work
2. The presumption is made that the offeror has made reasonable and complete review of the contractual documents before preparing and submitting them.
3. Failure to notify of patent works against the offeror if the claim is later submitted based on ambiguity.

The majority of the contract administrator’s time is spent handling changes. According to Kerzner (2003), the following definitions describe the types of changes:

1. Administrative change: A unilateral contractual change, in writing, that does not affect the substantive rights of the parties (i.e. change in the paying office or the appropriation funding)
2. Change order: A written order, signed by the contracting officer, directing the contractor to make a change.
3. Contract modification: Any written change in the terms of the contract.

4. **Undefinitized contractual action:** Any contractual action that authorizes the commencement of work prior to the establishment of a final definitive price.
5. **Supplemental agreement:** A contract modification that is accompanied by the mutual action of both parties.
6. **Constructive change:** Any effective change to the contract caused by the actions or inaction of personnel in authority or by the circumstances that cause a contractor to perform work differently than required by written contract. The contractor may file a claim for equitable adjustment in the contract.

Kerzner (2003) has identified typical causes of constructive changes, which include:

1. Defective specification with impossibility of performance
2. Erroneous interpretation of the contract
3. Over-inspection of work
4. Failure to disclose superior knowledge
5. Acceleration of performance
6. Late or unsuitable owner or customer furnished property
7. Failure to cooperate
8. Improperly exercised options
9. Misusing proprietary data

Based on the type of contract, terms and conditions, the customer may have the right to terminate a contract for convenience at any time. However, the customer must compensate the contractor for his preparations and for any completed and accepted work relating to the terminated part of the contract.

Kerzner has identified the following reasons for termination for convenience of the customer:

1. Elimination of the requirement
2. Technological advanced in the state-of-the-art
3. Budgetary changes
4. Related requirements and/or procurements
5. Anticipating profits not allowed.

The following are reasons for termination for default due to contractor's actions:

1. Contractor fails to make delivery on scheduled date
2. Contractor fails to make progress so as to endanger performance of the contract and its terms
3. Contractor fails to perform any other provisions of the contract.

If a contract is terminated due to default, then the contractor may not be entitled to compensation of work in progress but not yet accepted by the customer. The customer may even be entitled to repayment from the contractor of any advances or progress payments applicable to such work. Also, the contractor may be liable

for any excess re-procurement costs. However, contractors can seek relief through negotiations, a Board of Contracts Appeals or Claims Court.

The contract administrator is responsible for performance control. This includes inspection, acceptance and breach of contract/default. If the goods/services do not comply with the contract, then the contract administrator has the right to:

1. Reject the entire shipment
2. Accept the entire shipment (barring latent defects)
3. Accept part of the shipment

In government contracts, the government has the right to have the goods repaired with the costs charged back to the supplier or fix the goods themselves and charge the cost of repairs to the supplier. If the goods are then acceptable to the government, the government may reduce the contract amount by an appropriate amount to reflect the reduced value of the contract.

### **2.10.7 Checklists**

According to Kerzner (2003), to assist a company in evaluating inquiries and preparing proposals and contracts, a checklist of contract considerations and provisions can be helpful in the evaluation of each proposal and form of contract to ensure that appropriate safeguards are incorporated. This checklist is also used for sales letters and brochures that may promise or represent a commercial commitment. Its primary purpose is to remind users of the legal and commercial

factors that should be considered in preparing proposals and contracts. A key word concept provides an excellent checklist of the key issues to be considered. It will be useful as a reminder in preparation for contractor-client agreement discussions.

According to Kerzner (2003), the following contract provisions will minimize risk and should be included in proposals and contracts:

1. Scope of services and description of project
2. Contract administration
3. Terms of payment
4. Client obligation and supplied items
5. Warranties and guarantees
6. Liability limitation and consequential damages
7. Indemnity
8. Taxes
9. Patent indemnification
10. Confidential information
11. Termination provisions
12. Changes and extras
13. Assignments
14. Delays, including force majeure
15. Insurance requirements
16. Arbitration

17. Escalation (lump sum)

18. Time of completion

In generic project management field, for situations where variations among proposals and contracts are envisaged, it is not feasible to prepare material specifically suited for each situation. It is also not practical to establish a standard form of contract or standard provisions to be included in a contract. To a large extent, contracts are standardized for the construction industry, both for public and private projects.

Kerzner (2003) argues that in the generic project management field, an increasing number of clients have certain set ideas as to the content of the proposal and contract. Therefore, it would be extremely helpful to develop a standard list and file of draft contract clauses that could be used with some modification for each bid. In addition, because clients occasionally ask for a “typical” contract, the draft clauses can be combined into a “typical” or “draft” contract that can be given to a client. Even though this “typical” contract agreement may not be sufficient for every situation, it can be a starting place. It would also be valuable to maintain a summary of commercially oriented company policies for reference in reviewing a client’s contract provisions. In actual sense, this is the more widely used practice in the construction industry where there is standardization of contract clauses.

In generic project management field, negotiating for the type of contract is a two-way process. The contractor desires a certain type of contract to reduce risk. The client desires a certain type of contract to reduce costs. Often the client and contractor disagree. It is not uncommon in industry for prospective projects to be cancelled because of lack of funds, disagreements in contract negotiations, or changing of priorities. In the construction industry, both the client and the contractor are generally aware of their duties and responsibilities under the contract even before entering into the actual contract. This is so because of the standardization of contract clauses in the construction industry.

#### **2.10.8 Proposal - Contractual interaction**

According to Kerzner (2003), it is critical during the proposal preparation stage that contract terms and conditions be reviewed and approved before submission of a proposal to the client. The contracts (legal) representative is responsible for the contract portion of the proposal. Generally, contracts with the legal department are handled through or in coordination with the proposal group. The contract representative determines or assists with the following:

1. Type of contract
2. Required terms and conditions
3. Any special requirements
4. Cash-flow requirements
5. Patent and proprietary data
6. Insurance and tax considerations

## 7. Finance and accounting

In the construction context, the above are standardized and no new wholesome contracts are drawn for each new project.

Kerzner (2003) argues that the sales department, through the proposal group, has the final responsibility for the content and outcome of all proposals and contracts that it handles. However, there are certain aspects that should be reviewed with others who can offer guidance, advice, and assistance to facilitate the effort. Kerzner (2003) says that the following departments should review contract agreements:

1. Proposal
2. Legal
3. Insurance
4. Tax
5. Project Management
6. Engineering
7. Estimating
8. Construction (standard contracts available)
9. Purchasing (standard contracts available)

In the construction industry, the above need not be the case as industry-wide standard contracts are readily available for use with minor or no modifications.



Responsibility for collecting and editing contract comments rests with the proposal manager. In preparing contract comments, consideration should be given to comments previously submitted to the client for the same form of agreement and previous agreements signed with the client.

Contract comments should be reviewed for their substance and ultimate risk to the company. Kerzner (2003) argues that it must be recognized that, in most instances, the client is not willing to make a large number of revisions to his proposed form of agreement. The burden of proof that a contract change is required rests with the company; therefore each comment submitted must have a good case behind it. In the construction industry, these comments may come in the form of an addendum to the contract agreement, prepared by the consultants for the client, and are generally kept to the barest minimum.

According to Kerzner (2003), when a company is confronted with a serious contract comment for which it is very difficult to express their position, it is better to flag the item for further discussion with the client at the conference table. A good example of this is taxes on cost-plus foreign projects. Normally, when submitting a proposal for such work, a company does not have sufficient definitive information to establish its position relative to how it would like to handle taxes; that is:

1. What is the client's position on taxes

2. Will one or two agreements be used for the work? Who will the contracting parties be?
3. Time will not permit nor is the cost justifiable for a complete tax assessment
4. Contract procedures have not been established. Would we buy in the name of the company or as agents without liability for the client?

The legal department should be advised of information pertinent to its functions as promptly as possible as negotiations develop. Proposal personnel should also be familiar with the standard contract forms the company uses, its contract terms and available conditions, including those developed jointly between sales and the legal department, as well as the functions, duties and responsibilities of the legal department. In addition, key areas that are normally negotiated should be discussed so that proposal personnel have a better understanding of the commercial risks and why the company has certain positions. In the construction industry, forms of contract have been developed that have international usage such as International Federation of Consulting Engineers (FIDIC) contract agreement form. Minor modifications are required in these forms as they are designed to be used in environments of differing legal systems.

By the time the client has reviewed the proposal, the company's legal position is fixed commercially if not legally. Therefore, sales and proposal personnel should

understand and be prepared to put forward the company's position on commercially significant legal considerations, both in general and on specific issues that arise in connection with a particular project. In this way, sales will be in a position to assert and sell the company's position at the appropriate time. In the construction industry, these issues are normally set out clearly in the standard contract agreement form and generally well understood by both the contracting parties.

Proposals should send all bid documents, including the client's form of contract or equivalent information, along with the proposal outline or instructions to the legal department upon receipt of documents from the client. The instructions or outline should indicate the assignment of responsibility and include background information on matters that are pertinent to sales strategy or specific problems such as guarantees, previous experience with client and so on. In the construction industry context, these matters are covered by the standard contract agreement.

Proposals should discuss briefly with the legal department what is planned by way of the project, the sales effort and commercial considerations. If there is a kickoff meeting, a representative of the legal department should attend if it is appropriate. The legal department should make a preliminary review of the documents before any such discussion or meeting. In the construction industry,

the consultants normally make any addendums to the standard contract based on the nature of the project and discuss with the client before inviting tenders.

The legal department reviews the documents and prepares a memorandum of comments and any required contract documents, obtaining input where necessary or advisable. If the client has included a contract agreement with the inquiry, the legal department reviews it to see if it has any flaws or is against some set policy of the company. Unless a lesser level of effort is agreed upon, this memorandum will cover legal issues. This does not necessarily mean that all such issues must be raised with the client.

The purpose of the memorandum is to alert the proposal department to the issues and suggest solutions, usually in the form of contract comments. The memo may make related appropriate commercial suggestions. If required, the legal department will submit a proposed form of contract, joint venture agreement and so on. Generally, the legal department follows standards that have been worked out by sales using standard forms and contract language that were found to be salable in the past and to offer sufficient protection. In the construction industry where standard documents are widely in use, this is not absolutely necessary, as the clauses in the standard forms would long have gone through legal scrutiny.

At the same time, proposals reviews the documents and advises the legal department of any pertinent issues known by or determined by proposals. This is essential, not only because proposals has the final responsibility, but also because proposals is responsible for providing information to, and getting comments from, others, such as purchasing, engineering, and estimating.

Proposals reviews and arrange for any other reviews of the legal department's comments and documents and suggest the final form of comments, contract documents and other relevant documents including the offer letter. Proposals reviews proposed final forms with the legal department as promptly as possible and prior to any commercial commitment.

According to Kerzner (2003), the normal practice is to validate proposals for a period of thirty to sixty days following date of submission. Validation of proposals for periods in excess of this period may be required by special circumstances and should be done only with management's concurrence. Occasionally, it is desirable to validate a bid for fewer than thirty days. The validity period is especially important on lump sum bids. On such bids, the validity period must be consistent with validity times of quotations received for major equipment items. If these are not consistent, additional escalation on equipment and materials may have to be included in the lump sum price and the company's competitive position could thereby be jeopardized.

Occasionally, it may be requested to submit, with the proposals, a schedule covering hourly rate ranges to reimbursable personnel. For this purpose, one should develop a standard schedule covering hourly rate ranges and average rates for all personnel in the reimbursable category. The hourly rate ranges are based on the lowest-paid person and the highest-paid person in any job classification. In this connection, if there are any oddball situations, the effect of such is not included. Average rates are based on the average of all personnel in any given job classification.

One area that is critical to the development of a good contract is the definition of the scope of work covered by the contract. This is of particular importance to the proposal manager, who is responsible for having the proper people prepared for the scope of work description. What is prepared during proposal production most likely governs the contract preparation and eventually becomes part of that contract. The degree to which the project scope of work must be described in a contract depends on the pricing mechanism and contract form used.

A contract priced on a straight per diem basis or on the basis of reimbursement of all costs plus a fee does not normally require a precise description of either the services to be performed or the work to be accomplished or the people to be used, but only the cost plus rates.

Usually, a general description is adequate. This, however, is not the case if the contract is priced by other methods, especially fixed price, cost sharing or guaranteed maximum. For these forms of contract, it is essential that considerable care be taken to set forth in the contract documents the precise nature of the work to be accomplished as well as the services to be performed.

In the absence of a detailed description of the work prepared by the client, one must be prepared to develop such a description for inclusion in the proposal. When preparing the description of the work for inclusion in the contract documents, the basic premise to be followed must be that the language in the contract will be strictly interpreted during various states of performance. The proper preparation of the description of the work as well as the evaluation of the requirements demands coordination among sales, administration, cost and technical personnel both inside and outside the organization. Technical personnel within the organization or technical consultants from outside must inform management whether there is an in-house capability to successfully complete the work. Determination must also be made of whether suitable subcontracts or purchase orders can be awarded. In the major areas, firms' commitments should be obtained. Technical projections must be effected relative to a host of problems, including delivery or scheduling requirements, the possibility of changes in the proposed scope of work, client control over the work, quality control and procedures.

Kerzner (2003) argues that while it is essential that companies obtain good contracts with a minimum of risk provisions, it is equally important that those contracts be effectively administered. The following guidelines can aid a company in preparing its proposals and contracts and administering operations:

1. Use of the checklist in the preparation of all proposals and contracts
2. Evaluation of risks by reference to the suggested contract provision wherever appropriate
3. Review by the legal department prior to submission to the client of all major proposals and contracts and of other contracts with questionable provisions
4. Appropriate pricing or insuring of risks under the contract
5. Improving contract administration at appropriate levels
6. Periodic review and updating of the entire contract procedure including basic risk areas, administration, and so on.

## **2.11 CONSTRUCTION INDUSTRY STANDARD FORMS OF CONTRACT**

It is important to note that the use of standardized forms of contract in the construction industry is wide spread. This has made the construction industry unique in a way. The standardization of these documents has made running of construction contracts much easier as both the contracting parties including the construction industry professionals understand the documents fairly well. One major advantage of the use of standard documents in the construction industry is



that it has resulted in efficiency in preparation of the bid documents as well as efficiency in bidding by the contractors.

Construction transactions can be business-to-business (commercial construction), government-to-business (public project construction), or business-to-consumer (residential construction). Construction contract documents are a hybrid of both standardized and negotiated narrative contract clauses.

The construction industry offer families of "standard" construction contract forms for use by the different parties involved in a construction project. These industry organizations in Botswana include the Botswana Institute of Development Professionals (BIDP) and the Joint Building Contracts Committee (JBCC) of South Africa whose contract forms are widely used in Botswana especially in the private sector. Central and local government authorities also have construction contract forms, which are used for public construction projects. Larger enterprises may create their own forms of agreement, which they use as templates or precedent contract documents in preparing construction contract documents used in specific construction projects.

Even when a "standard" form of construction contract, such as the JBCC contract document is used, the "standard" form serves as a starting point, but is customized and tailored as a result of negotiation between the contracting parties

in commercial construction. The customized wording may be incorporated in the contract document as an attachment ("supplementary conditions") or marked directly on the form document. The result is a hybrid contract document in which the contents consist of some "standard" construction contract clauses plus other tailored or customized clauses. Government construction contracts are less likely to be negotiated, although negotiated public construction contracts are being used with increasing frequency especially for major construction projects.

Construction contracts frequently include numerous schedules or attachments consisting of supplementary conditions, drawings, specifications, and similar items. These attachments are incorporated by reference in the primary contract document signed by the parties and physically attached to it.

After they are formed, all construction contracts (and construction contract documents), like other contracts and contract documents, can be amended or modified by the parties. Most construction industry "standard" form agreements provide for changes through a change order process described in the construction contract document.

Under the typical construction contract change order process, one party requests or claims the right to a change in the price, time for completion, or other terms of the contract upon the occurrence of an event described in the contract document. The request for a change order or notice of the claim for a change is given in

writing to the other contract party.

If a change is agreed upon, a separate change order document reflecting the modified terms of the construction contract is drafted by project representatives or project managers and is signed by the contracting parties to formalize the new terms. If the change order is not agreed upon, the party seeking the change usually must bring a claim for additional compensation or time as provided in the claims procedure and process set out in the construction contract document.

The documents produced by the BIDP and the JBCC are the most widely used standard form contracts in the construction industry in Botswana. They facilitate communication among all the parties involved in construction, which makes it easier to produce a high quality project in a timely and economical fashion.

Standardization of forms of contracts in the construction industry has resulted in the following advantages:

1. Standard contracts and forms are consensus documents that reflect advice from practicing architects, contractors, engineers as well as owners, surety bond producers, issuers and attorneys. Standard documents balance the interest of all the parties, so not one interest, including that of the architect, is unfairly presented.

2. Standard documents reflect changing construction practices and technology. Standard documents are revised regularly to accommodate changes in professional and industry practices, insurance and technology.
3. Standard documents reflect the law. Standard documents are revised and updated to incorporate changes resulting from court interpretations and rulings and legal precedents.
4. Standard documents are flexible. Standard documents can be easily modified to accommodate individual project demands. Such changes are easily distinguished from the original, printed language.
5. Standard documents are easy to interpret. Standard documents use the common meaning of words and phrases. Industry and legal jargon is avoided whenever possible.

(Sabo Warner, Legal Guide to American Institute of Architects Documents, 1992).

## **2.12 CONCLUSION**

There is a consensus that the construction industry is subject to a greater risk and uncertainty than many other industries. The use of risk management techniques in construction projects has developed significantly in the recent past. The recognition of the need to identify and manage risks successfully, while providing accurate out-turn cost estimates and construction programmes are now a key output in any construction project. By using risk management approaches

and techniques it is possible to better analyze the levels of uncertainty associated in the assessment of the final out-turn cost and completion date for the project. Risks can have a major effect on the cost and time of a project; understanding and managing these risks will help provide a greater certainty within projects and provide useful guidance to the decision-makers.

In quantitative analysis, risks can be partitioned into two sections, that is, risks and uncertainties. Risks cover those events for which probabilities can be assigned and, hence modeled statistically, i.e. those defined during the risk management process as an unplanned event that could occur during the project (Lowe & Whitworth, 1996). Uncertainties concerns unknown events that cannot be foreseen to the same extent and mathematical techniques used to estimate its effect is based on the “best” or “worst” possible scenario i.e. those issues where the existence and degree of impact on the project are uncertain (Lowe & Whitworth, 1996).

Uncertainties, but also the opportunities to affect project success, are extremely high during the bidding phase of the project. This chapter has demonstrated that the tendering stage constitutes an important area where contractors can apply risk management strategies. Construction companies perceive risks in their contracting process, and some situational factors affect the risk perception. Although risk analysis is relevant to the construction industry, rigorous analysis

techniques such as sensitivity analysis, probability analysis, decision tree analysis, simulation approach, etc. are not widely applied in the contracting process, instead the more traditional techniques are still favoured for risk analysis.

The tendering stage is the critical stages for contract decision-making. The tendering stage is the most important phase for applying risk management primarily through an effective bidding approach. The quantitative (tender bid records) and the qualitative (risk perception of contractors) information may be obtained to support decisions of contractors during competitive tendering. These tender bid records of contractors may be organized in a systematic way to provide invaluable strategic information to enhance the understanding of contractors with respect to their competitive bidding environments, their own bidding performance and the bidding behaviour of their competitors, thereby enabling contractors to manage risks more effectively and efficiently. However, the final success of a construction project depends on the contractor's ability to manage those risk factors that the contractor will inevitably have to carry to the implementation stage.

## **CHAPTER 3: RESEARCH METHODS**

### **3.1 The Research Approach**

This chapter aims at providing the necessary background information about the research approach for this treatise. The key research methodology considerations are pointed out and criticized. The research procedure employed and the quality of the results is evaluated.

When a researcher sets out to carry out a study, the research problem or question is the axis around which the whole research effort revolves. In general, research can be undertaken for two different purposes: basic or applied research (Leedy & Ormrod, 2005). Some research projects are intended to enhance basic knowledge about the physical, biological, psychological or social world or to shed light on historical, cultural or aesthetic phenomena. Such projects, which can advance human beings' theoretical conceptualizations about a particular topic, are known as basic research.

Other research projects are intended to address issues that have immediate relevance to current practices, procedures and policies. Such projects, which can inform human decision making about practical problems, are known as applied research.

Leedy & Ormrod (2005) however add that the line between basic research and applied research is, at best, a blurry one as answering questions about basic theoretical issues can often inform current practice in everyday world.

In this treatise, the research can be classified as applied research with the intended purpose of producing more knowledge about the main difficulties and risks experienced by emerging building contractors during competitive tendering for the local authorities in Botswana and the relative effectiveness of the risk management strategies employed by these contractors.

When a researcher is presented with a research problem, a number of questions to support methodological decisions have to be answered. These include:

1. What kind of result is desired and how will conclusions be drawn? (based on empirical investigation or theoretical reasoning).
2. Is information gathering necessary considering what information is accessible?
3. How will quality and trustworthiness of the result be guaranteed?

Based on the answers to above questions, appropriate methods for research and data acquisition can be chosen. This can also inform the researcher whether the research can, indeed, take place on site.

### **3.2 The Research Planning and Methodology**

Leedy & Ormrod (2005) argue that before the construction of a building, the architect develops a meticulous set of plans. These plans ensure success in construction of the building. Research should be no less detailed and precise in the planning of a research design. Research planning requires a



conceptualization of the overall organization of a project and a detailed specification of the steps to be carried out.

Research methodology entails extracting meaning from the data. Data and methodology are inextricably interdependent. For this reason, the methodology to be used for a particular research problem must always take into account the nature of the data that will be collected in the resolution of the problem.

In social science research, there are two main methodologies – the qualitative and quantitative.

In general quantitative research is used to answer questions about relationships among measurable variables with the purpose of explaining, predicting and controlling phenomena. This type of research involves either identifying the characteristics of an observed phenomenon or exploring possible correlations among two or more phenomena. This approach is sometimes called the traditional, experimental or positivist approach. Four kinds of quantitative studies are observation studies, correlational research, developmental designs and survey research (Leedy & Ormrod, 2005).

In contrast, qualitative research is typically used to answer questions about the complex nature of phenomena, often with the purpose of describing and understating the phenomena from the participant's point of view. The qualitative approach is also referred to as the interpretative, constructivist or post-positivist

approach. Five kind of qualitative studies are case studies, ethnographies, phenomenological studies, grounded theory studies and content analysis (Leedy & Ormrod, 2005).

Information and knowledge collected can be numeric or descriptive. Descriptive expressions in words collected are regarded as qualitative data and numeric data are considered quantitative (Cresswell, 1994). Descriptive study involves interview, exploratory or historical studies and is the method used for qualitative research. Findings are normally not arrived by statistical methods or other procedures of quantification. For quantitative research where the data is principally numeric, the studies to be considered are usually experimental, quasi-experimental, statistical, casual or descriptive in the form of a survey (Cresswell, 1994).

This study can be considered a quantitative study because it is based on quantitative data. This approach has been chosen because the researcher's ultimate goal is to learn about a large population of emerging building contractors by surveying a sample of these contractors. This will be done by way of posing a series of questions to willing participants and summarize their responses with percentages and frequency counts and then draw inferences about the whole population from the responses of the sample. The information required by the researcher can be caught with quantitative methods and expressed with quantitative data to achieve a proper understanding of the risks emanating from

both the client and statutory requirements during tender stage and the relative effectiveness of the risk management strategies employed by the contractors.

### **3.3 Inductive and deductive Methods**

Quantitative research is based on a method where the first step is to form one or several hypotheses. Out of these hypotheses, a conclusion is formed that serves as an explanation of a phenomenon. This choice of method is called deductive reasoning. This model is often used in quantitative studies and is extremely valuable for generating research hypotheses and testing theories. Another approach is induction, which implies that by observing a sample drawn from a population, conclusions about the population can be drawn from the sample (Leedy & Ormrod, 2005).

Leedy & Ormrod (2005) argue that the two approaches above represent different types of scientific research methods whereby insight into the unknown is sought by:

1. Identifying a problem that defines the goal of one's quest.
2. Positing a hypothesis that, if confirmed, resolves the problem.
3. Gathering data relevant to the hypothesis.
4. Analyzing and interpreting the data to see whether they support the hypothesis and resolve the question that initiated the research.

The two approaches above do not exclude each other. Application of the scientific research method often involves both deductive and inductive reasoning. A researcher may develop a hypothesis either from a theory (deductive logic) or from observations of specific events (inductive logic). Then, using deductive logic, a researcher makes predictions about the patterns likely to be seen in the data if the hypothesis is true. Alternatively, using inductive reasoning, a researcher generalizes from data taken from a sample to describe the characteristics of a larger population. A similar approach was used in this study. The researcher started by gathering information from relevant research literature to acquire the knowledge base in the theoretical field. The next step was to gather information from a small sample to acquire an understanding of the large population of contractors. The next action was to evaluate and interpret the collected data in order to test the hypotheses posited.

### **3.4 Data Acquisition**

Data used in this study was collected from both primary sources and secondary sources.

Primary sources supply data collected from the research environment while secondary sources supply data collected from presentations and interpretations based on other primary sources (Leedy & Ormrod, 2005).

The primary data is collected using a questionnaire administered to owners and/or managers of emerging construction companies with offices in Gaborone and the outlying districts.

A questionnaire was also administered to selected consultants within the local construction industry comprising of Project Managers, Architects, Quantity Surveyors, Civil and Structural Engineers. These were included in order to solicit their perception regarding the relative importance of the risks emanating from both the client and the statutory requirements and how, in their opinion, these risks influence the contractor's pricing strategies. Their perception regarding the relative effectiveness of the contractor's risk management strategies was also sought.

The secondary data was from a literature review, archival materials such as professional journals within the construction industry, articles from the internet and other related research dissertations in the same field. Related literature from relevant textbooks was also consulted.

### **3.5 The Sample**

The sample was selected by obtaining a list of those contractors registered with the Public Procurement and Asset Disposal Board (PPADB) of Botswana.

Contractors under categories A, B and C with offices in and around Gaborone were selected to be part of the sample. The above categories of contractors can

all be classified as emerging contractors. Registration of contractors in categories A and B by the Public Procurement and Assets Disposal Board (PPADB) is restricted to companies with one hundred percent shareholding by citizens of Botswana only. Registration in category C is restricted to citizen owned companies and joint ventures with majority citizen shareholding in the company. This sample contained one hundred and twenty names. A questionnaire was administered to this sample. A questionnaire was also administered to thirty selected consultants within the local construction industry in order to compare their perceptions with those of the contractors.

### **3.6 The Specific Treatment of the Data for Each Sub-Problem**

#### **Sub-problem 1**

To determine the relative importance of the sources of risk due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy. (What is the relative importance of the sources of risk due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy?).

The data for this sub-problem was obtained from data collected from the questionnaires administered to both the contractors and the consultants. The questionnaire was tabulated in such a way as to establish what the contractors

and the consultants perceived as the most important risks emanating from the client in terms of their influence on the contractor's pricing strategies.

### **Sub-problem 2**

To determine the relative importance of the sources of risk due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy. (What is the relative importance of the sources of risk due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy?).

The data for this sub-problem was obtained from data collected from the questionnaires administered to both the contractors and the consultants. The questionnaire was tabulated in such a way as to establish what the contractors and the consultants perceived as the most important risks emanating from the statutory requirements in terms of their influence on the contractor's pricing strategies.

### **Sub-problem 3**

To determine the relative effectiveness of the risk management strategies employed by the emerging building contractors within the local authorities in Botswana during competitive tendering stage. (What is the relative effectiveness of the risk management strategies employed by the emerging building

contractors within the local authorities in Botswana during the competitive tendering stage?)

The data for this sub-problem was obtained from data collected from the questionnaires administered to both the contractors and the consultants. The questionnaire was tabulated in such a way as to establish what the contractors and the consultants perceived as the most effective risk management strategies that can be adopted by the contractors.

### **3.7 Criticism of the Sources of Data and Treatment of Bias**

The demands on sources of data in academic research are many. According to Leedy & Ormrod (2005), no matter what research methodology chosen, the researcher must think about validity of the approach, that is, the accuracy, meaningfulness and credibility of the research project as a whole. The research effort will be worth the time and effort only to the extent that it allows the researcher to draw meaningful and defensible conclusions from the data.

The internal validity of a research study guarantees that the study has sufficient controls to ensure that the conclusions drawn are truly warranted by the data. It is the extent to which accurate conclusions about the cause-and-effect and other relationships within the data can be drawn. Secondly, the external validity of a research study guarantees that what was observed in the research situation can be used to make generalizations about the world beyond that specific situation. It



is the extent to which the conclusions drawn can be generalized to other contexts.

The main criticism of the research's primary sources is that they could lack objectivity. The researcher is aware of this danger. The questionnaire is administered to contractors who may have participated in several tenders without being successful in any and could therefore be biased in their response. The researcher has endeavored to guard against this, and therefore ensure internal validity, by collecting data from multiple sources within the industry with the hope that they will all converge to support a particular hypothesis. These sources include the various construction industry consultants involved in tendering in Botswana local authorities in order to solicit their perception on the relative importance of the risks passed on to the contractors including their perception of the relative effectiveness of the risk management strategies employed by these contractors. This information is used for comparison purposes in order to enhance objectivity and thus ensure internal validity. This is what Leedy & Ormrod (2005) have called triangulation.

The external validity of this study is enhanced by way of selecting a representative sample. This has been achieved by employing a sampling design appropriate to the situation. The researcher has used stratified random sampling. This has been necessitated by the fact that the researcher is dealing with three

categories of emerging building contractors, that is, categories “A”, “B” and “C”.

The researcher endeavored to sample equally from each of the three categories.

As for the secondary sources, the researcher has endeavored to use, where possible, research literature and articles primarily collected from books and other research material published during the last ten years. The researcher has also quoted widely from “A guide to the project management body of knowledge” (PMI, 2000), Risk Management Guide for DOD Acquisition (2003) and the Project Management Handbook by Harold Kerzner (2003). In the researcher’s judgment, these sources are considered a reference work in the field by other researchers and the differences from other theories in the field are therefore marginal.

In research, bias can be defined as any influence, condition or set of conditions that singly or together distort the data (Leedy & Ormrod, 2005). Bias attacks the integrity of the facts. In contrast with primary sources, secondary sources are the works of others who have interpreted and written about primary sources.

Secondary sources inevitably reflect the assumptions and biases of the people who wrote them. Some may also be suspect as personal interpretations of interested parties participating in the particular event. These problems were, however, not insurmountable so long as the researcher was aware of them and interpreted the source of information in terms of its contemporary concept. This is

the attitude the researcher adopted especially with regard to information obtained from the internet.

The above measures should, therefore, together result in a high level of internal and external validity and appropriate treatment of bias.

### **3.8 Data Analysis And Presentation**

The analysis of the data was by calculating the percentages of responders who selected each alternative for each question in the questionnaire. The data was then analyzed by statistical methods. The presentation of the collected and analyzed data was by use of tables and pie charts.

## **CHAPTER 4: DATA ANALYSIS AND EVALUATION**

### **4.1 Introduction**

The objective of the questionnaire was to collect sufficient and qualitative data from the field. The questionnaire was analyzed to answer the questions raised by the sub-problems. Answers to these sub-problems would be found by testing the hypotheses. Conclusions are then made on whether the hypotheses are answered in the affirmative or not.

One hundred and fifty questionnaires were distributed, one hundred and twenty to contractors and another thirty to building consultants such as architects, quantity surveyors, project managers and civil/structural engineers. The questionnaires were hand delivered or e-mailed to contractors and consultants with their offices in Gaborone and the outlying towns. Out of the one hundred and fifty questionnaires issued out, eighty four were returned. Fifty seven of the respondents were contractors and twenty seven were consultants. The eighty four returned questionnaires represented 56% response rate and this is considered adequate for the analysis process.

The questionnaire was divided into four sections.

Section A of the questionnaire was to establish the characteristics of the respondents in terms of their occupation/professional background, their

experience in the industry and the tender sums of the projects under consideration.

Section B of the questionnaire was to establish the respondent's views on the relative importance of the risks emanating from the client during the tendering stage in terms of how they influence the contractor's pricing strategy. This section of the questionnaire contained ten questions. These ten questions would be analyzed to answer the first sub-problem, which is to determine the relative importance of the sources of risks due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy.

Section C of the questionnaire was to establish the respondent's views on the relative importance of the risks due to statutory requirements during the tendering stage in terms of how they influence the contractor's pricing strategy. This section of the questionnaire contained eight questions. These eight questions would be analysed to answer the second sub-problem, which is to determine the relative importance of the sources of risks due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy.

Section D of the questionnaire was to establish the respondent's views on the relative effectiveness of risk management strategies available to some of the problems highlighted in sections B and C. This section of the questionnaire contained twelve questions. These twelve questions would be analyzed to answer the third sub-problem, which is to determine the relative effectiveness of the risk management strategies employed by the emerging building contractors within the local authorities in Botswana.

The questionnaire was arranged in simple terms so that the respondents do not have difficulties in answering the questions.

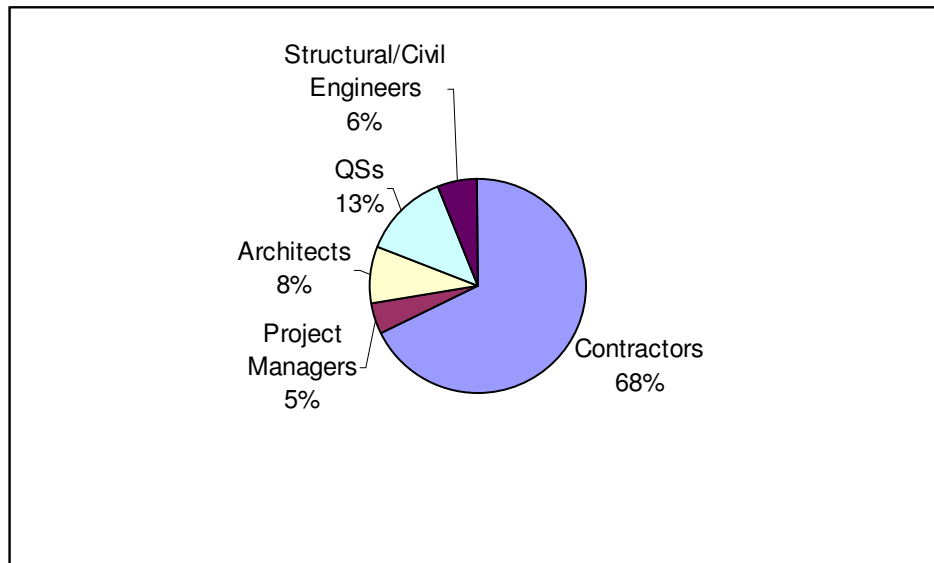
## **4.2 Section A: General Information**

### **4.2.1 (Questions A1)**

The respondents were required to indicate their occupation/professional background. A list of occupations/professional backgrounds was provided and the respondents were required to tick an appropriate box. The question was phrased as follows: *What is your occupation/professional background?* The results are represented in the pie chart (Figure 4.2.1)

Contractors	-	57
Project Managers	-	4
Architects	-	7
Quantity Surveyors	-	11
Structural/Civil Engineers	-	5

**Figure 4.2.1: Occupation/professional background of the respondents**



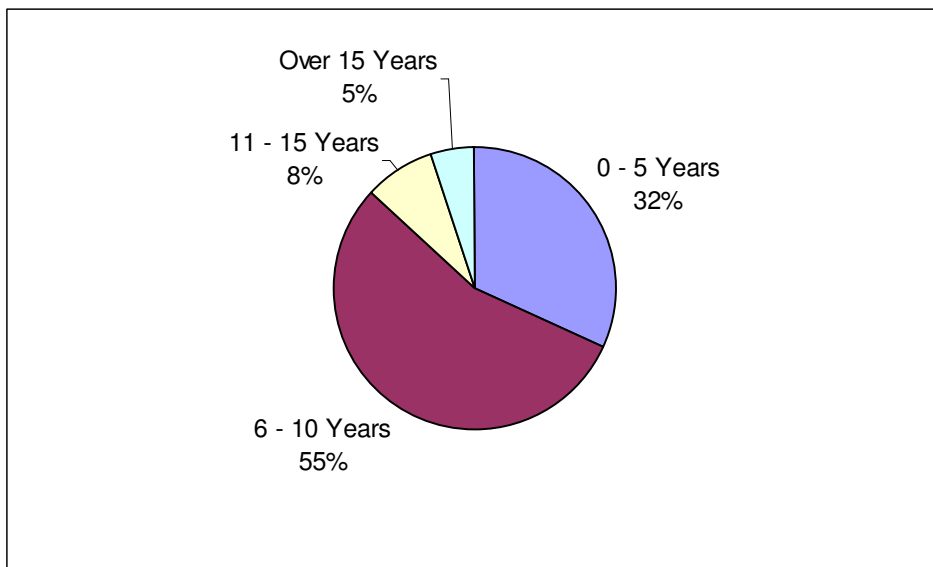
This question sought to establish the occupational background of the respondents. The researcher deliberately included consultants in the survey in order to compare the veracity of the contractor responses. The contractors included in the survey are from categories A, B and C which can all be regarded as emerging building contractors in Botswana.

#### **4.2.2 (Questions A2)**

The respondents were required to indicate their experience in the industry/profession. A range of experience in years was provided and the respondents were required to tick an appropriate box suitable to them. The question was phrased as follows: *What is your experience in the industry/profession?* The results are represented in the pie chart (Figure 4.2.2)

0 – 5 Years	-	32%
6 – 10 Years	-	55%
11 – 15 Years	-	8%
Over 15 Years	-	5%

**Figure 4.2.2: Experience of the respondents in the industry**



The question sought to establish the experience of the respondents in the industry in year terms. This would provide the caliber of people contained in the survey. As shown above, over half (68%) of the respondents had over five years experience in the industry with the greater majority having 6 – 10 years experience (55%). This cluster of the respondents was expected as the research deals with emerging building contractors who have not been in the industry for long.

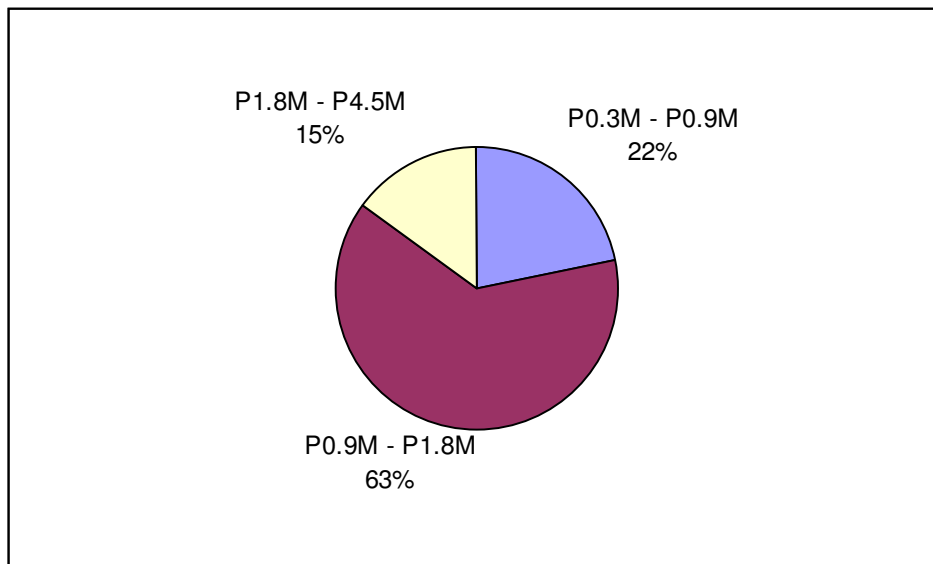


### 4.2.3 (Questions A3)

The respondents were required to give an indication of the estimated tender sum of the project under consideration. A range of estimated tender sums was provided for the respondents to choose from. The question was phrased as follows: *What was the project's estimated tender sum?* The results are represented in the pie chart (Figure 4.2.3)

Pula (P) 300 000 - P 900 000	-	22%
Pula (P) 900 000 - P 1 800 000	-	63%
Pula (P) 1 800 000 - P 4 500 000	-	15%

**Figure 4.2.3: Project's estimated tender sums**



As shown above, most of the respondents (63%) had dealt with a medium sized project of between 0.9 million to 1.8 million Pula. Of all the respondents, 15% had

dealt with a project of up to 4.5 million Pula while a small number of respondents (22%) had had an experience with a small project of between 0.3 to 0.9 million Pula. This is to be expected as most of the respondents had indicated to have had 6 – 10 years experience in the industry and would therefore have graduated from the low contract sums projects (0.3 – 0.9 million Pula) to the next level of 0.9 - 1.8 million Pula projects.

### **4.3 Sections B, C and D of the questionnaire**

#### **Introduction**

In these sections, the respondents were asked to tick or insert any other mark inside the box (provided) regarding their view on the relative importance of the risks emanating from the client (section B), risks emanating from the statutory requirements (section C) during the tendering stage in terms of how they (the risks) influence their (contractors') pricing strategy. In section D, the respondents were asked to tick or insert any other mark inside the box (provided) regarding their view on the relative effectiveness of the risk management strategies employed by the contractors.

A five point Likert scale on a continuum ranging from “extremely important/effective” to “not important/effective” was used to gather the data from the survey. The data was based on a 5-point scale as shown in table 4.3.1 below. This scale with the attitudes assigned has been used to assess the relative importance of risks emanating from the client and from statutory

requirements and the relative effectiveness of risk management strategies employed by the contractors. The Likert scale was chosen as it's the most common format of obtaining respondents' opinion on a subject (Leedy & Ormond, 2005).

Table 4.3.1 - Interpretation of the scale in the survey

Attitudes	Scale				
	1	2	3	4	5
Importance	Not Important	Slightly Important	Important	Very Important	Extremely Important
Effectiveness	Not Effective	Slightly Effective	Effective	Very Effective	Extremely Effective

In this study, each of the point 1 to 5 on the 5-point Likert scale corresponds to the attitudes of the respondents to the variables in the survey. The weight of 5 is assigned to indicate the highest agreement to the variable while the weight of 1 is assigned to indicate the lowest agreement to the variable. These indicate the degree of relative importance or relative effectiveness of a certain variable as perceived and ranked by a respondent on a 5-point scale. The frequency of all the respondents who chose a particular variable per question is then summed up and expressed as a percentage of the sum total of the respondents. The percentages are then used to compare which variable was chosen by a majority of the respondents. This is divided into two categories, one for contractors and the other for the consultants. A combined mean percentage is then computed to compare which variable was chosen by a majority of the combined category of the respondents. The combined mean percentages of the variables for each

question are then aggregated and a weighted average computed to compare the overall mean value of the number of respondents who chose a particular variable. If the majority of the weighted averages of the perceived risks fall between important/effective to extremely important/effective, this is regarded as agreement with the statement. Therefore for each of the hypothesis, it will be accepted or rejected depending on whether a majority of the respondents fall in the category of those who chose the option important/effective to extremely important/effective.

#### 4.4 Sections B – Relative importance of risks emanating from the client

##### 4.4.1 Question B1

The risk being investigated was put to the respondents as follows: *Tendering on bills of quantities in lieu of schedule of rates and specifications*. The results are represented in the frequency table 4.4.1)

Table 4.4.1

Client factor B1 - Tendering on bills of quantities in lieu of schedule of rates and specifications.

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	-	0.00%	-	0.00%	0.00%
Slightly Important	-	0.00%	-	0.00%	0.00%
Important	9	15.79%	3	11.11%	14.29%
Very Important	17	29.82%	6	22.22%	27.38%
Extremely Important	31	54.39%	18	66.67%	58.33%
<b>Total</b>	<b>57</b>	<b>100.00%</b>	<b>27</b>	<b>100.00%</b>	<b>100.00%</b>

The results show that a majority of consultants and contractors (66.67% and 54.39% respectively) consider tendering on schedule of rates and specifications in lieu of bills of quantities to be an extremely important factor affecting the contractors' pricing strategy. This can be explained by the fact that both contractors and consultants dislike tenders based on schedule of rates and specifications albeit for different reasons; for contractors, this kind of tender means the contractor carries most of the risk as to the sufficiency and accuracy of their tender price while for the consultants, it means having to deal with a multiplicity of claims from contractors during the project implementation stage intended to mitigate the effects of any insufficiency or inaccuracy in their tender price.

#### 4.4.2 Question B2

The risk being investigated was put to the respondents as follows: *Ambiguous specifications and descriptions*. The results are represented in the frequency table 4.4.2)

Table 4.4.2

Client risk factor B2 - Ambiguous specifications and descriptions

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	0	0.00%	0.00%
Slightly Important	2	3.51%	0	0.00%	2.38%
Important	20	35.09%	8	29.63%	33.33%
Very Important	29	50.88%	7	25.93%	42.86%
Extremely Important	6	10.53%	12	44.44%	21.43%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that a majority of the contractors (50.88%) perceive ambiguous specifications and descriptions as affecting their pricing strategy with some inherent risks while 44.44% of the consultants perceive this as an extremely important source of risk and therefore affecting the contractors pricing strategy. The consultants view can be explained by the fact that this is an avenue for claims by contractors and every consultant would endeavor to have clear specifications and descriptions and thus their perception

#### 4.4.3 Question B3

The risk being investigated was put to the respondents as follows: *Errors, omissions and discrepancies within the tender documents issued by client.* The results are represented in the frequency table 4.4.3)

Table 4.4.3

Client risk factor B3 - Errors, omissions and discrepancies within the tender documents issued by client

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	5	8.77%	2	7.41%	8.33%
Slightly Important	14	24.56%	1	3.70%	17.86%
Important	22	38.60%	3	11.11%	29.76%
Very Important	12	21.05%	7	25.93%	22.62%
Extremely Important	4	7.02%	14	51.85%	21.43%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

It is interesting to note that the results show an even spread of contractors who perceive this source of risk as slightly important to important. On the other hand, 51.85% of the consultants perceive this source of risk as extremely important.

This can be explained by the fact that, contractors have nothing to lose, so to speak, through errors, omissions and discrepancies in the tender documents as they can always use this to claim during the currency of the contract. Consultants would however perceive this as an important source of risk since it would play havoc with their budgets during implementation through claims by the contractors and thus the above results.

#### 4.4.4 Question B4

The risk being investigated was put to the respondents as follows: *Too short or inadequate tendering period*. The results are represented in the frequency table

4.4.4)

Table 4.4.4

Client risk factor B4 - Too short or inadequate tendering period

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	5	18.52%	5.95%
Slightly Important	13	22.81%	3	11.11%	19.05%
Important	23	40.35%	15	55.56%	45.24%
Very Important	11	19.30%	4	14.81%	17.86%
Extremely Important	10	17.54%	0	0.00%	11.90%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that a slight majority of both the contractors and the consultants indicated that this is an important source of risk during tendering with the rest being evenly spread on both ends of the continuum. This result can be explained by the fact that there is a twenty eight (28) days minimum statutory requirement for tendering period for all local authority projects. This period can only be

extended but cannot be reduced. This may explain why very few of the respondents chose the 'very important' and 'extremely important' options. They nevertheless consider this as an important source of risk during the tendering stage.

#### 4.4.5 Question B5

The risk being investigated was put to the respondents as follows: *High quantum of proposed liquidated damages for delays to completion*. The results are represented in the frequency table 4.4.5)

Table 4.4.5

Client risk factor B5 - High quantum of proposed liquidated damages for delays to completion

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	2	7.41%	2.38%
Slightly Important	8	14.04%	4	14.81%	14.29%
Important	20	35.09%	9	33.33%	34.52%
Very Important	19	33.33%	7	25.93%	30.95%
Extremely Important	10	17.54%	5	18.52%	17.86%
<b>Total</b>	<b>57</b>	<b>100.00%</b>	<b>27</b>	<b>100.00%</b>	<b>100.00%</b>

The results show that a majority of the contractors perceive this as an important to very important source of risk (35.09% and 33.33%) with the same trend shown by the consultants (33.33% and 25.93%). This can be explained by the fact that because of a multiplicity of factors in the Botswana construction industry (e.g. poor labour productivity, monopoly of some essential material suppliers etc), many contractors rarely complete projects on time. Without a good basis for an



extension of contract period, liquidated damages are levied at the rate of 0.5% of the contract amount per week's delay or part thereof. Both the contractors and consultants perceive this as an important source of risk and this would therefore support the above findings.

#### 4.4.6 Question B6

The risk being investigated was put to the respondents as follows: *Inequitable contract terms*. The results are represented in the frequency table 4.4.6)

Table 4.4.6

Client risk factor B6 - Inequitable contract terms

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	0	0.00%	0.00%
Slightly Important	3	5.26%	0	0.00%	3.57%
Important	10	17.54%	8	29.63%	21.43%
Very Important	15	26.32%	8	29.63%	27.38%
Extremely Important	29	50.88%	11	40.74%	47.62%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that a majority of the contractors and consultants perceive this as an extremely important source of risk to the contractors during tender stage.

The possible explanation for this is that the current conditions of contract used in the local authorities in Botswana have been in existence for years without any review or revision. They were designed solely by the Ministry of Local Government for use by the district councils and to obviously transfer most of the risks to contractors. The above findings support this argument.

#### 4.4.7 Question B7

The risk being investigated was put to the respondents as follows: *Client policy to use selected suppliers of building materials, e.g. face bricks*. The results are represented in the frequency table 4.4.7)

Table 4.4.7

Client risk factor B7 - Client policy to use selected suppliers of building materials, e.g. face bricks

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	15	26.32%	13	48.15%	33.33%
Slightly Important	23	40.35%	8	29.63%	36.90%
Important	12	21.05%	4	14.81%	19.05%
Very Important	3	5.26%	2	7.41%	5.95%
Extremely Important	4	7.02%	0	0.00%	4.76%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that a majority of contractors (40.35%) perceive this is a slightly important source of risk whilst 48.15% of the consultants perceive this as not an important source. The researcher was unable to explain these findings in a logical way. For instance, there is only one manufacturing company that supplies face bricks to all government projects in Botswana via a government directive to all local authorities and other government bodies to specify their face bricks. Critical shortages have been experienced in the past. The only possible explanation the researcher can deduce is the manufacturing plant's recent expansion of their production capacity which can now possibly cope with the local demand of face bricks and possibly the slump in the Botswana construction industry in the past few years.

#### 4.4.8 Question B8

The risk being investigated was put to the respondents as follows: *Client policy to award contracts based mainly on price, resulting in price undercutting*. The results are represented in the frequency table 4.4.8)

Table 4.4.8

Client risk factor B8 - Client policy to award contracts based mainly on price, resulting in price undercutting

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	0	0.00%	0.00%
Slightly Important	1	1.75%	0	0.00%	1.19%
Important	4	7.02%	2	7.41%	7.14%
Very Important	9	15.79%	6	22.22%	17.86%
Extremely Important	43	75.44%	19	70.37%	73.81%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that an overwhelming majority of both the contractors and the consultants (75.44% and 70.37%) perceive this as an extremely important source of risk during the tender stage. The most important criteria for award of contracts within the local authorities in Botswana is the price. Contractors whose bids are closest to the lower limit of the local authority's estimated range are considered first for award. This range is normally ten percent (10%) below the council estimate. The council estimate would normally be computed on the basis of existing market prices and rates. This would then be discounted by ten percent to arrive at the lower limit and increased by ten percent to arrive at the upper limit. The practical implication of this is that the contractor whose bid is accepted being closest to the lower limit would be awarded the project whose margin is ten

percent lower than the existing market rates. Their profits are therefore very marginal and sometimes uncompetitive. Because of the shortage of construction work in Botswana in recent years, contractors keep their margins very low and sometimes to uncompetitive levels in order to secure construction work by the practice commonly referred to as undercutting. This theory is supported by the above findings.

#### 4.4.9 Question B9

The risk being investigated was put to the respondents as follows: *Abnormally long proposed payment period from date of work valuation*. The results are represented in the frequency table 4.4.9)

Table 4.4.9

Client risk factor B9 - Abnormally long proposed payment period from date of work valuation

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	0	0.00%	0.00%
Slightly Important	0	0.00%	2	7.41%	2.38%
Important	6	10.53%	5	18.52%	13.10%
Very Important	18	31.58%	9	33.33%	32.14%
Extremely Important	33	57.89%	11	40.74%	52.38%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that a majority of both the contractors and the consultants (57.89% and 40.74%) perceive this as an extremely important source of risk during the tender stage. This can be explained by the fact that the payment clause in the conditions of contract stipulate that the contractor will be paid within

a period of thirty (30) calendar days from date of issue of a payment certificate. It is important to note that before the issue of the payment certificate, a substantial period of time will have elapsed between the time a work valuation is compiled and the time the certificate is issued. Add another thirty days and this period may run to one and a half months from date of valuation to date of actual payment. This prolonged period would obviously affect the contractor's cash flow. The above findings would seem to support this chronology of events as the norm rather than the exception as regards the payment periods within the local authorities.

#### 4.4.10 Question B10

The risk being investigated was put to the respondents as follows: *Abnormally long validity period of the submitted tender amount before contract award.* The results are represented in the frequency table 4.4.10)

Table 4.4.10

Client risk factor B10 - Abnormally long validity period of the submitted tender amount before contract award

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	3	5.26%	3	11.11%	7.14%
Slightly Important	5	8.77%	2	7.41%	8.33%
Important	6	10.53%	13	48.15%	22.62%
Very Important	19	33.33%	5	18.52%	28.57%
Extremely Important	24	42.11%	4	14.81%	33.33%
<b>Total</b>	<b>57</b>	<b>100.00%</b>	<b>27</b>	<b>100.00%</b>	<b>100.00%</b>

The results indicate that a small majority of contractors (42.11%) perceive this as an extremely important source of risk while 48.15% of the consultants perceive this as an important source of risk. The period of acceptance of tenders (tender validity period) is normally sixty days within the local authorities. Should the tender board (the board that awards tenders) not have been convened during this period for one reason or another, the tenderers would normally be requested to extend their validity periods. However, this is normally the exception as the tender boards are convened once every month and this would explain why the consultants' responses are evenly spread from important to extremely important.

**Summary of Section B of the questionnaire (risks emanating from the client) : Consolidated weighted average percentage of the relative importance of all the risks emanating from the client**

The results are represented in the weighted average percentage frequency table

4.4.11

Table 4.4.11

Weighted average percentage of the relative importance of all the risks emanating from the client

<b>Client risk factor</b>	<b>Extremely Important (1)</b>	<b>Very Important (2)</b>	<b>Important (3)</b>	<b>Slightly Important (4)</b>	<b>Not Important (5)</b>	<b>Totals</b>
<b>B1</b>	<b>58.33%</b>	27.38%	14.29%	0.00%	0.00%	100.00%
<b>B2</b>	21.43%	<b>42.86%</b>	33.33%	2.38%	0.00%	100.00%
<b>B3</b>	21.43%	22.62%	<b>29.76%</b>	17.86%	8.33%	100.00%
<b>B4</b>	11.90%	17.86%	<b>45.24%</b>	19.05%	5.95%	100.00%
<b>B5</b>	17.86%	30.95%	<b>34.52%</b>	14.29%	2.38%	100.00%
<b>B6</b>	<b>47.62%</b>	27.38%	21.43%	3.57%	0.00%	100.00%
<b>B7</b>	4.76%	5.96%	19.05%	<b>36.90%</b>	33.33%	100.00%
<b>B8</b>	<b>73.81%</b>	17.86%	7.14%	1.19%	0.00%	100.00%
<b>B9</b>	<b>52.38%</b>	32.14%	13.10%	2.38%	0.00%	100.00%
<b>B10</b>	<b>33.33%</b>	28.58%	22.62%	8.33%	7.14%	100.00%
<b>Weighted Average</b>	34.29%	25.36%	24.05%	10.60%	5.71%	100.00%

The above table represents the weighted average percentage of the relative importance of all the risks emanating from the client (risk B1 to B10 as in above analysis) arranged in order of the variable with the highest weighted average percentage to the variable with the lowest weighted average percentage. The findings indicate that majority of the respondents perceived the risks to range from important (risk B3, B4 and B5), very important (risk B2) to extremely

important (risk B1, B6, B8, B9 and B10). A majority of the respondents (36.90%) indicated risk B7 as being slightly important.

The overall perception of all the respondents regarding the relative importance of all the risks emanating from the client during the tendering stage in terms of how they (the risks) influence the contractor's pricing strategy can be summarized as follows: -

6. Extremely important - 34.29%
7. Very important - 25.36%
8. Important - 24.05%
9. Slightly important - 10.60%
10. Not important - 5.71%



## 4.5 Sections C – Relative importance of risks due to statutory requirements

### 4.5.1 Question C1

The risk being investigated was put to the respondents as follows: *Restrictions on the employment of foreign construction workers by the contractor*. The results are represented in the frequency table 4.5.1)

Table 4.5.1

Statutory risk factor C1 - Restrictions on employment of foreign construction workers by the contractor

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	17	29.82%	15	55.56%	38.10%
Slightly Important	33	57.89%	10	37.04%	51.19%
Important	5	8.77%	2	7.41%	8.33%
Very Important	2	3.51%	0	0.00%	2.38%
Extremely Important	0	0.00%	0	0.00%	0.00%
<b>Total</b>	<b>57</b>	<b>100.00%</b>	<b>27</b>	<b>100.00%</b>	<b>100.00%</b>

The results indicate that 29.82% and 55.56% of the contractors and consultants respectively perceive this as not an important risk while 57.89% and 37.04% of the contractors and consultants respectively perceive this as a slightly important risk. This can be explained by the fact that the categories of contractors under consideration (categories A, B & C) are relatively small contractors in terms of value of projects they undertake. They therefore do not have a great need to employ foreign specialized technical staff, which is the category of construction workers whose shortage is critical in Botswana. They therefore do not perceive this as an important source of risk.

#### 4.5.2 Question C2

The risk being investigated was put to the respondents as follows: *Contractor's liability to provide a safe working site as stipulated by the Factories Act Chapter 44 (Laws of Botswana)*. The results are represented in the frequency table 4.5.2)

Table 4.5.2

Statutory risk factor C2 - Contractor's liability to provide a safe working site as stipulated by the Factories Act Chapter 44 (Laws of Botswana)

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	0	0.00%	0.00%
Slightly Important	2	3.51%	0	0.00%	2.38%
Important	34	59.65%	7	25.93%	48.81%
Very Important	21	36.84%	14	51.85%	41.67%
Extremely Important	0	0.00%	6	22.22%	7.14%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results indicate that a majority of both the consultants and contractors perceive this source of risk as being either important or very important. Apart from in cases of big construction projects, there are no strict inspections carried out to ensure conformance to the Factories Act. However, local authorities do insist on compliance with several conditions to ensure safe working site e.g. provision of safety helmets and boots to the workers, provision of first aid kits, proper hoarding etc). The researcher believes it is these provisions the respondents must have had in mind in their responses.

### 4.5.3 Question C3

The risk being investigated was put to the respondents as follows: *Contractor's liability to absorb any exchange rate and/or tax rate changes*. The results are represented in the frequency table 4.5.3)

Table 4.5.3

Statutory risk factor C3 - Contractor's liability to absorb any exchange rate and/or tax rate changes

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	0	0.00%	0	0.00%	0.00%
Slightly Important	0	0.00%	0	0.00%	0.00%
Important	11	19.30%	7	25.93%	21.43%
Very Important	17	29.82%	7	25.93%	28.57%
Extremely Important	29	50.88%	13	48.15%	50.00%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results indicate that the majority of both categories of respondents perceive this risk as being very important to extremely important (29.82% and 50.88% of the contractors and 25.93% and 48.15% of the consultants). Local authorities tenders in Botswana stipulate that the contract to be eventually entered into with the successful bidder shall be a fixed price contract. The only price fluctuations allowed are for wage rates for unskilled casual labourers in the eventuality that the government revises the minimum wage rates. All other price fluctuations and tax rate changes are to be absorbed by the contractor. This risk is thus perceived to be important by both the contractors and consultants.

#### 4.5.4 Question C4

The risk being investigated was put to the respondents as follows: *Mandatory statutory requirement to use locally manufactured goods in lieu of importing cheaper materials.*

The results are represented in the frequency table 4.5.4)

Table 4.5.4

Statutory risk factor C4 - Mandatory statutory requirement to use locally manufactured goods in lieu of importing cheaper materials.

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	8	14.04%	2	7.41%	11.90%
Slightly Important	3	5.26%	2	7.41%	5.95%
Important	24	42.11%	2	7.41%	30.95%
Very Important	22	38.60%	11	40.74%	39.29%
Extremely Important	0	0.00%	10	37.04%	11.90%
<b>Total</b>	<b>57</b>	<b>100.00%</b>	<b>27</b>	<b>100.00%</b>	<b>100.00%</b>

The results show that majority of the contractors perceive this risk as important to very important (42.11% and 38.60%) while the consultants perceive this risk as being very important to extremely important (40.74% and 37.04%). For the contractors, the price of locally manufactured goods do not compare favorably with their imported alternatives. However, it is important to note that most of the construction materials in Botswana are imported mostly from South Africa. Where some of the materials are produced locally, they are more expensive compared to the imported ones. Botswana is a small economy compared to, for instance South Africa, which is a huge economy, and therefore able to produce goods at very competitive prices due to the economies of scale. These statutory

requirements are designed to encourage the development of the local manufacturing industry.

#### 4.5.5 Question C5

The risk being investigated was put to the respondents as follows: *Possibility that there will be increases in prices of materials, plant hire rates and wage rates.*

The results are represented in the frequency table 4.5.5)

Table 4.5.5

Statutory risk factor C5 - Possibility that there will be increases in prices of materials, plant hire rates and wage rates

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	2	3.51%	0	0.00%	2.38%
Slightly Important	4	7.02%	0	0.00%	4.76%
Important	12	21.05%	6	22.22%	21.43%
Very Important	35	61.40%	18	66.67%	63.10%
Extremely Important	4	7.02%	3	11.11%	8.33%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that both the contractors and consultants perceive this risk as being important to very important (21.05% and 61.40% for contractors and 22.22% and 66.67% for consultants). During the past few years, the Pula currency has being devalued several times. These devaluations are normally accompanied by price increases on almost all commodities and materials. The contractors have to take this risk into consideration when pricing their tenders as it is impossible to predict when the next devaluation will occur.

#### 4.5.6 Question C6

The risk being investigated was put to the respondents as follows: *Possibility of changes in the factors affecting the availability and cost of funds (interest rate risk).*

The results are represented in the frequency table 4.5.6)

Table 4.5.6

Statutory risk factor C6 - Possibility of changes in the factors affecting the availability and cost of funds (interest rate risk)

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	37	64.91%	20	74.07%	67.86%
Slightly Important	17	29.82%	7	25.93%	28.57%
Important	3	5.26%	0	0.00%	3.57%
Very Important	0	0.00%	0	0.00%	0.00%
Extremely Important	0	0.00%	0	0.00%	0.00%
<b>Total</b>	<b>57</b>	<b>100.00%</b>	<b>27</b>	<b>100.00%</b>	<b>100.00%</b>

The results show that majority of both the contractors and the consultants perceived this risk as not important to slightly important (64.91% and 29.82% of the contractors and 74.07% and 25.93% of the consultants). This can be explained by the fact that citizen contractors in Botswana are normally provided with an advance payment equivalent to 15% of the contract amount on signing the contract as part of government incentives to develop capacity of these citizen contractors. This advance payment is subsequently recovered in six equal installments from the contractor's interim payments. This upfront financing of the project by the client cushions the contractors from the effects of interest payments on commercial bank loans were they to get these loans. Citizen

contractors in the categories under consideration are also exempted from providing performance bond/guarantees which would normally attract premium payments to insurance companies for securing the same or security for the same from commercial banks. The government also insures the works and third party liabilities directly and deducts the premiums from contractor's payments. All these incentives therefore make the above risk not an important consideration during tender stage.

#### 4.5.7 Question C7

The risk being investigated was put to the respondents as follows: *Possibility that consents required from other government departments will not be obtained or, if obtained, can only be implemented at a greater cost than budgeted.* The results are represented in the frequency table 4.5.7)

Table 4.5.7

Statutory risk factor C7 - Possibility that consents required from other government departments will not be obtained or, if obtained, can only be implemented at a greater cost than budgeted

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	4	7.02%	8	29.63%	14.29%
Slightly Important	9	15.79%	13	48.15%	26.19%
Important	33	57.89%	6	22.22%	46.43%
Very Important	8	14.04%	0	0.00%	9.52%
Extremely Important	3	5.26%	0	0.00%	3.57%
<b>Total</b>	<b>57</b>	<b>100.00%</b>	<b>27</b>	<b>100.00%</b>	<b>100.00%</b>

The results show that 15.79% and 57.89% of the contractors classified this risk as slightly important to important while 29.63% and 48.15% of the consultants classified the same as not important and slightly important. A possible explanation for this is that for the contractors, this normally provides a problem during the implementation phase when these consents cannot easily be obtained. It is not possible to predict the behaviour of other statutory bodies especially regarding how soon they can expedite the provision of certain consents. For the consultants, their attitude is premised on the fact that it is the contractors' responsibility to apply and obtain these consents and do not therefore consider this as an important risk.

#### **4.5.8 Question C8**

The risk being investigated was put to the respondents as follows: *Possibility that utilities required (water, electricity etc) from statutory bodies may not be available or there will be delays due to relocation of utilities located on the project site.* The results are represented in the frequency table 4.5.8)



Table 4.5.8

Statutory risk factor C8 - Possibility that utilities required (water, electricity etc) from statutory bodies may not be available or there will be delays due to relocation of utilities located on the project site.

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Important	2	3.51%	0	0.00%	2.38%
Slightly Important	4	7.02%	0	0.00%	4.76%
Important	31	54.39%	4	14.81%	41.67%
Very Important	16	28.07%	6	22.22%	26.19%
Extremely Important	4	7.02%	17	62.96%	25.00%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 54.39% and 28.07% of the contractors classified this risk as important to very important while 22.22% and 62.96% of the consultants classified the same as very important to extremely important. Both the contractors and consultants are in agreement that this is an important source of risk to be considered during tender stage. Water is a serious problem in Botswana. For the last two years, there have been restrictions imposed on the use of water especially for recreation and construction purposes. This was occasioned by the drought afflicting the country. Contractors especially around Gaborone area were restricted from using wholesome water for construction purposes. They have to look for alternative sources of water. Where these two services lines are to be relocated from a construction site, it takes some time for this to be done.

**Summary of Section C of the questionnaire (risks emanating from statutory requirements) : Consolidated weighted average percentage of the relative importance of all the risks emanating from statutory requirements**

The results are represented in the overall weighted average percentage frequency table 4.5.9

Table 4.5.9

Weighted average percentage of the relative importance of all the risks emanating from statutory requirements

<b>Statutory risk factor</b>	Important	Very Important	Slightly Important	Extremely Important	Not Important	<b>Totals</b>
<b>C1</b>	8.33%	2.38%	<b>51.19%</b>	0.00%	38.10%	100.00%
<b>C2</b>	<b>48.81%</b>	41.67%	2.38%	7.14%	0.00%	100.00%
<b>C3</b>	21.43%	28.57%	0.00%	<b>50.00%</b>	0.00%	100.00%
<b>C4</b>	30.95%	<b>39.29%</b>	5.95%	11.90%	11.90%	99.99%
<b>C5</b>	21.43%	<b>63.10%</b>	4.76%	8.33%	2.38%	100.00%
<b>C6</b>	3.57%	0.00%	28.57%	0.00%	<b>67.86%</b>	100.00%
<b>C7</b>	<b>46.43%</b>	9.52%	26.19%	3.57%	14.29%	100.00%
<b>C8</b>	<b>41.67%</b>	26.19%	4.76%	25.00%	2.38%	100.00%
<b>Weighted Average</b>	27.83%	26.34%	15.48%	13.24%	17.11%	100.00%

The above table represents the weighted average percentage of the relative importance of all the risks emanating from the statutory requirements (risk C1 to C8 as in above analysis) arranged in order of the variable with the highest weighted average percentage to the variable with the lowest weighted average percentage. The findings indicate that majority of the respondents perceived the risks C2, C7 and C8 to be important, risk C4 and C5 to be very important, risk C1 to be slightly important, risk C3 to be extremely important and risk C6 to be not important.

The overall perception of all the respondents regarding the relative importance of all the risks emanating from statutory requirements during the tendering stage in terms of how they (the risks) influence the contractor's pricing strategy can be summarized as follows:

- 12. Important - 27.83%
- 13. Very important – 26.34%
- 14. Slightly important – 15.48%
- 15. Extremely important – 13.24%
- 16. Not important – 17.11%

**4.6 Sections D – Relative effectiveness of the risk management measures employed by the contractors.**

**4.6.1 Question D1**

The risk management measure being investigated was put to the respondents as follows: *Clearly specified payment period from date of work valuation.* The results are represented in the frequency table 4.6.1)

Table 4.6.1

Risk management measure D1 - Clearly specified payment period from date of work valuation

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	2	3.51%	0	0.00%	2.38%
Slightly Effective	1	1.75%	12	44.44%	15.48%
Effective	31	54.39%	15	55.56%	54.76%
Very Effective	23	40.35%	0	0.00%	27.38%
Extremely Effective	0	0.00%	0	0.00%	0.00%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 54.39% and 40.35% of the contractors classified this risk management measure as effective to very effective while 44.44% and 55.56% of the consultants classified the same as slightly effective to effective. Prompt payments to contractors improve their cash flow, which is the backbone of any construction company. The contractors therefore rate this risk management measure as effective The majority of the consultants are also in agreement that this is an effective risk management measure. It appears though that some consultants rate this risk management measure as slightly effective possibly

because local authorities are by law required to pay on time as per the value certified.

#### 4.6.2 Question D2

The risk management measure being investigated was put to the respondents as follows: *Signing up long term supply contracts with approved suppliers for major materials*. The results are represented in the frequency table 4.6.2)

Table 4.6.2

Risk management measure D2 - Signing up long term supply contracts with approved suppliers for major materials

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	0	0.00%	0	0.00%	0.00%
Effective	0	0.00%	11	40.74%	13.10%
Very Effective	12	21.05%	16	59.26%	33.33%
Extremely Effective	45	78.95%	0	0.00%	53.57%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 21.05% and 78.95% of the contractors classified this risk management measure as very effective to extremely effective while 40.74% and 59.26% of the consultants classified the same as effective to very effective.

Although this is not a common practice with the emerging building contractors in Botswana, they nevertheless perceive this as a very effective risk management measure. Signing up such contracts would cushion the contractors against the effects of material price increases during the currency of the contract. A majority of the consultants also seem to share this view.

### 4.6.3 Question D3

The risk management measure being investigated was put to the respondents as follows: *Provision for timely issue of Architect's instruction/variation orders*. The results are represented in the frequency table 4.6.3)

Table 4.6.3

Risk management measure D3 - Provision for timely issue of Architect's instruction/variation orders

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	0	0.00%	0	0.00%	0.00%
Effective	7	12.28%	0	0.00%	8.33%
Very Effective	43	75.44%	21	77.78%	76.19%
Extremely Effective	7	12.28%	6	22.22%	15.48%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 75.44% and 12.28% of the contractors classified this risk management measure as very effective to extremely effective while 77.78% and 22.22% of the consultants classified the same as very effective to extremely effective. The forms of contract used for local authorities building contracts do not specify at what stage and up to what limit the Architect may issue instructions. Most instructions are normally disruptive especially when issued towards the end of the project. Though there is a provision for extension of contract period and reimbursement for the resultant costs occasioned by the instructions, it would appear from these results that it is appreciated that a timely issue of the same would be very helpful as a way of managing risks. The consultants who undertook the survey also share this view.

#### 4.6.4 Question D4

The risk management measure being investigated was put to the respondents as follows: Signing up long-term contracts with sub-contractors to ensure availability of equipment and skilled labour. The results are represented in the frequency table 4.6.4)

Table 4.6.4

Risk management measure D4 - Signing up long-term contracts with sub-contractors to ensure availability of equipment and skilled labour.

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	0	0.00%	0	0.00%	0.00%
Effective	18	31.58%	9	33.33%	32.14%
Very Effective	25	43.86%	18	66.67%	51.19%
Extremely Effective	14	24.56%	0	0.00%	16.67%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 31.58% and 43.86% of the contractors classified this risk management measure as effective to very effective while 33.33% and 66.67% of the consultants classified the same in a similar manner. The contractors in this survey were emerging building contractors. They normally do not sign up sub-contracts in their building projects because they are relatively small in money value. But it would appear that both the contractors and the consultants appreciate the effectiveness of this risk management measure.

#### 4.6.5 Question D5

The risk management measure being investigated was put to the respondents as follows: *Clear contractor's company policy on quality and safety including effecting all necessary insurances.* The results are represented in the frequency table 4.6.5)

Table 4.6.5

Risk management measure D5 - Clear contractor's company policy on quality and safety including effecting all necessary insurances

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	0	0.00%	0	0.00%	0.00%
Effective	27	47.37%	15	55.56%	50.00%
Very Effective	22	38.60%	12	44.44%	40.48%
Extremely Effective	8	14.04%	0	0.00%	9.52%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 47.37% and 38.60% of the contractors classified this risk management measure as effective to very effective while 55.56% and 44.44% of the consultants classified the same in a similar manner. Having a clear company policy on quality cushions the contractors against the effects of condemned work and/or re-works in a building site. Effecting the necessary insurances cushions the contractor from the effects of any accidents on site involving injury to life or destruction of property. It appears from the above results that this is clearly appreciated by the contractors and the consultants as an important risk management measure.



#### 4.6.6 Question D6

The risk management measure being investigated was put to the respondents as follows: *Thorough investigation by the bidder of the project site conditions during tender period*. The results are represented in the frequency table 4.6.6)

Table 4.6.6

Risk management measure D6 - Thorough investigation by the bidder of the project site conditions during tender period

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	3	5.26%	0	0.00%	3.57%
Effective	38	66.67%	19	70.37%	67.86%
Very Effective	12	21.05%	8	29.63%	23.81%
Extremely Effective	4	7.02%	0	0.00%	4.76%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 66.67% and 21.05% of the contractors classified this risk management measure as effective to very effective while 70.37% and 29.63% of the consultants classified the same in a similar manner. A thorough investigation of the site by the bidder during the tender period would inform them of any difficult site conditions likely to be encountered during the construction stage. If any trial hole have been sunk, then it is possible to appreciate the sub-surface conditions in advance. The bidder would also establish of any possible restrictions as to, for instance, blasting of rock, restrictions on noisy site operations etc. The bidder would then plan for this accordingly and include any cost resulting there from in their tender. The above results confirm this view.

#### 4.6.7 Question D7

The risk management measure being investigated was put to the respondents as follows: *Contractual provision for independent expert appointment to resolve disputes on expedited basis (adjudication)*. The results are represented in the frequency table 4.6.7)

Table 4.6.7

Risk management measure D7 - Contractual provision for independent expert appointment to resolve disputes on expedited basis (adjudication)

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	5	8.77%	0	0.00%	5.95%
Slightly Effective	15	26.32%	2	7.41%	20.24%
Effective	33	57.89%	17	62.96%	59.52%
Very Effective	4	7.02%	5	18.52%	10.71%
Extremely Effective	0	0.00%	3	11.11%	3.57%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 26.32% and 57.89% of the contractors classified this risk management measure as slightly effective to effective while 62.96% and 18.52% of the consultants classified the same as effective to very effective. The form of contract used for local authority contracts does not contain a provision for adjudication process. The only dispute resolution provision contained in the contract is the arbitration process. Adjudication would normally help in the resolution of a dispute during the time of the contract amicably. From the above, it is apparent that both the contractors and the consultants appreciate the importance of having an adjudication clause in the contracts.

#### 4.6.8 Question D8

The risk management measure being investigated was put to the respondents as follows: *Maintaining an updated historical database of prices of material, plant hire rates and wage rates*. The results are represented in the frequency table 4.6.8)

Table 4.6.8

Risk management measure D8 - Maintaining an updated historical database of prices of material, plant hire rates and wage rates

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	0	0.00%	0	0.00%	0.00%
Effective	6	10.53%	4	14.81%	11.90%
Very Effective	21	36.84%	16	59.26%	44.05%
Extremely Effective	30	52.63%	7	25.93%	44.05%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 36.84% and 52.63% of the contractors classified this risk management measure as very effective to extremely effective while 59.26% and 25.93% of the consultants classified the same in a similar manner. A historical data base on the prices of materials, plant hire rates and wage rates would help the contractor in keeping a record on the trends of these prices and rates. The contractor would then be in a good position to predict any future fluctuations of the same. This would then be taken into account when pricing the tenders. This view seems to be shared by the contractors as well as the consultants.

#### 4.6.9 Question D9

The risk management measure being investigated was put to the respondents as follows: *Contractors' associations to lobby to have local authorities finalise designs before inviting tenders.* The results are represented in the frequency table 4.6.9)

Table 4.6.9

Risk management measure D9 - Contractors' associations to lobby to have local authorities finalize designs before inviting tenders

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	9	15.79%	0	0.00%	10.71%
Slightly Effective	23	40.35%	11	40.74%	40.48%
Effective	19	33.33%	16	59.26%	41.67%
Very Effective	6	10.53%	0	0.00%	7.14%
Extremely Effective	0	0.00%	0	0.00%	0.00%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 40.35% and 33.33% of the contractors classified this risk management measure as slightly effective to effective while 40.74% and 59.26% of the consultants classified the same in a similar manner. There are no strong contractor's associations in Botswana. Lobbying would therefore be difficult for the individual contractors. Also, it would appear local authorities have the discretion to invite tenders based on bills of quantities or schedule of rates and specifications when the designs are not complete. This is sometimes necessitated by the urgency of the work involved. Both contractors and consultants seem to share this view based on the above results.

#### 4.6.10 Question D10

The risk management measure being investigated was put to the respondents as follows: *Contractors' associations to lobby against the practice of selected suppliers of building materials*. The results are represented in the frequency table 4.6.10)

Table 4.6.10

Risk management measure D10 - Contractors' associations to lobby against the practice of selected suppliers of building materials

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	15	26.32%	10	37.04%	29.76%
Slightly Effective	25	43.86%	3	11.11%	33.33%
Effective	13	22.81%	12	44.44%	29.76%
Very Effective	3	5.26%	2	7.41%	5.95%
Extremely Effective	1	1.75%	0	0.00%	1.19%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 26.32% and 43.86% of the contractors classified this risk management measure as not effective to slightly effective while 37.04% and 44.44% of the consultants classified the same as not effective and effective respectively. The practice of having selected suppliers for building materials for government projects in Botswana is informed by a lack of strong manufacturing capacity. In order to improve this capacity and protect the local manufacturing industry from strong competition from foreign imported materials, government has come up with this policy. It may therefore be difficult to have this policy set aside if the manufacturing capacity remains weak. The other reason could be as

explained above, that is, there is lack of a strong contractors' association to lobby for some of these policy changes

#### 4.6.11 Question D11

The risk management measure being investigated was put to the respondents as follows: *Maintaining an updated historical database of labour productivity.*

The results are represented in the frequency table 4.6.11)

Table 4.6.11

Risk management measure D11 - Maintaining an updated historical database of labour productivity

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	26	45.61%	0	0.00%	30.95%
Effective	27	47.37%	6	22.22%	39.29%
Very Effective	4	7.02%	21	77.78%	29.76%
Extremely Effective	0	0.00%	0	0.00%	0.00%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 45.61% and 47.37% of the contractors classified this risk management measure as slightly effective and effective respectively while 22.22% and 77.78% of the consultants classified the same as effective and very effective respectively. It would be difficult for these emerging contractors to measure labour productivity in a scientific manner. For the consultants, their view possibly is that it is possible to measure this productivity and build a database. Overall, a majority of both categories agree that this would be an effective risk management measure.

#### 4.6.12 Question D12

The risk management measure being investigated was put to the respondents as follows: *Provision for advance payment by the client for up-front financing of the project.*

The results are represented in the frequency table 4.6.12)

Table 4.6.12

Risk management measure D12 - Provision for advance payment by the client for up-front financing of the project

Attitude	Contractors		Consultants		Combined Mean Percentage
	Frequency	Percentage	Frequency	Percentage	
Not Effective	0	0.00%	0	0.00%	0.00%
Slightly Effective	0	0.00%	0	0.00%	0.00%
Effective	4	7.02%	0	0.00%	4.76%
Very Effective	33	57.89%	21	77.78%	64.29%
Extremely Effective	20	35.09%	6	22.22%	30.95%
<b>Total</b>	57	100.00%	27	100.00%	100.00%

The results show that 57.89% and 35.09% of the contractors classified this risk management measure as very effective and extremely effective respectively while 77.78% and 22.22% of the consultants classified the same in a similar manner. The practice of advance payment to the citizen contractors is well established in Botswana as a way of building up the capacity of the local construction companies. Advance payments also cushion the contractors against the effects of interest payments on commercial bank loans. Both the contractors and the consultants are in agreement that this is a very effective risk management measure.

**Summary of Section D of the questionnaire (risk management measures used by the contractors) : Consolidated weighted average percentage of the relative effectiveness of the risk management measures employed by the contractors.**

The results are represented in the frequency table 4.6.13)

Table 4.6.13

Weighted average percentage of the relative effectiveness of the risk management measures employed by the contractors

<b>Risk management measure</b>	Very Effective	Effective	Extremely Effective	Slightly Effective	Not Effective	<b>Totals</b>
<b>D1</b>	27.38%	<b>54.76%</b>	0.00%	15.48%	2.38%	100.00%
<b>D2</b>	33.33%	13.10%	<b>53.57%</b>	0.00%	0.00%	100.00%
<b>D3</b>	<b>76.19%</b>	8.33%	15.48%	0.00%	0.00%	100.00%
<b>D4</b>	<b>51.19%</b>	32.14%	16.67%	0.00%	0.00%	100.00%
<b>D5</b>	40.48%	<b>50.00%</b>	9.52%	0.00%	0.00%	100.00%
<b>D6</b>	23.81%	<b>67.86%</b>	4.76%	3.57%	0.00%	100.00%
<b>D7</b>	10.71%	<b>59.53%</b>	3.57%	20.24%	5.95%	100.00%
<b>D8</b>	<b>44.05%</b>	11.90%	<b>44.05%</b>	0.00%	0.00%	100.00%
<b>D9</b>	7.14%	<b>41.67%</b>	0.00%	40.48%	10.71%	100.00%
<b>D10</b>	5.95%	29.76%	1.19%	<b>33.33%</b>	29.76%	99.99%
<b>D11</b>	29.76%	<b>39.29%</b>	0.00%	30.95%	0.00%	100.00%
<b>D12</b>	<b>64.29%</b>	4.76%	30.95%	0.00%	0.00%	100.00%
<b>Weighted Average</b>	34.52%	34.43%	14.98%	12.00%	4.07%	100.00%

The above table represents the weighted average percentage of the relative effectiveness of all the risk management measures employed by the contractors (risk management measures D1 to D12 as in above analysis) arranged in order of the variable with the highest weighted average percentage to the variable with the lowest weighted average percentage. The findings indicate that majority of the respondents perceived risk management measures D3, D4, D8 and D12 to



be very effective, risk management measures D1, D5, D6, D7, D9 and D11 to be effective, risk management measures D2 and D8 to be extremely effective and risk management measure D10 to be slightly effective.

The overall perception of all the respondents regarding the relative effectiveness of all the risk management measures employed by the contractors during the tendering stage can be summarized as follows: -

6. Very effective – 34.52%
7. Effective – 34.43%
8. Extremely effective – 14.98%
9. Slightly effective – 12.00%
10. Not effective – 4.07%

## **4.7 SUMMARY**

The summary of this chapter entails establishing whether the hypotheses as stated are affirmed or not by the questionnaire data collected and the findings from the literature review.

### **4.7.1 The First Hypothesis Findings**

The first hypothesis to be tested is that sources of risk emanating from the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana influence the contractor's pricing strategy. The first hypothesis will be tested based on the results of the data analysis of questions B1 to B12 of the questionnaire. From the results above, it is found that only risk B7 (client policy of preferred material suppliers) was not considered as important in influencing the contractor's pricing strategy during the tendering stage. All the other risks were considered as important, very important or extremely important by 83.70% of the respondents (24.05% + 25.36% + 34.29%) in influencing the contractor's pricing strategy during the tendering stage.

From the combined weighted average percentage of the relative importance of all the risks, the researcher concludes that the findings shown above provide strong support for the first hypothesis.

#### **4.7.2 The Second Hypothesis Findings**

The second hypothesis to be tested is that sources of risk emanating from statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana influence the contractor's pricing strategy. The second hypothesis will be tested based on the results of the data analysis of questions C1 to C8 of the questionnaire. From the results above, it is found that only risk C1 (restrictions on employment of foreign workers) and risk C6 (possibility of changes in interest rates) were considered as slightly important or not important in influencing the contractor's pricing strategy during the tendering stage. All the other risks were considered as important, very important or extremely important in influencing the contractor's pricing strategy during the tendering stage.

From the combined weighted average percentages of the relative importance of all the risks, 67.41% (27.83% + 26.34% + 13.24%) of all the respondents perceive the risks under consideration to be important, very important or extremely important. The researcher therefore concludes that the findings shown above provide strong support for the second hypothesis.

#### **4.7.3 The Third Hypothesis Findings**

The third hypothesis to be tested is that the risk management tools, which are employed by emerging building contractors to minimize risks during competitive

tendering within the local authorities in Botswana, are perceived by the contractors to be effective. The third hypothesis will be tested based on the results of the data analysis of questions D1 to D12 of the questionnaire. From the results above, it is found that only risk D10 (contractors' associations to lobby against the practice of selected suppliers of building materials) was considered as slightly effective in minimizing risks during the tendering stage. All the other risks were considered as effective, very effective and extremely effective in minimizing risks during the tendering stage.

From the combined weighted average percentages of the relative importance of all the risks, 83.93% (34.43% + 34.52% + 14.98%) of all the respondents indicated that they perceived the risk management measures under consideration to be effective, very effective or extremely effective. The researcher therefore concludes that the findings shown above provide strong support for the third hypothesis.

## **CHAPTER 5: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

### **5.1 Introduction**

Construction projects involve numerous stakeholders, and their satisfaction could directly influence the performance of subsequent projects. Driven by a desire to improve project success, the critical satisfaction factors pertinent to the construction management process should be identified. Risk is inherently present in all construction projects. Quite often, construction projects fail to achieve their time, quality, and budget goals. Depending on their uncertainties and the consequences, they are accepted routinely, and measures are taken to minimize their consequences.

### **5.2 Summary**

Chapter one of the study was introducing the study and setting out the problem to be investigated. This chapter set out the main objective of the study, that is, what the study should and should not achieve. The problem statement stated in chapter one was to investigate and attempt to identify the relative importance of the risks experienced by emerging building contractors during competitive tendering stage within the local government authorities in Botswana and to evaluate the relative effectiveness of the risk management strategies employed by these contractors. The problem was subdivided into three sub-problems and the sub-problems each had a hypothesis to be tested.

Chapter two of the study was a review of related literature to the problem and sub-problems under investigation. The chapter investigated sources of construction risk, the risk management process and the strategies that could be used to minimize risks. The literature review set the tone of discussions and gave direction to important research areas in the area of construction risk. The review initially discussed broader construction risk related topics and was progressively narrowed down to more specific areas relevant to the main problem and the respective sub-problems. Since little empirical research has been carried out on this topic in Botswana, the literature was obtained from journals, books and related research papers written and published internationally.

Chapter three discusses the research methods stating research techniques that were used to investigate the problem set out in chapter one. The investigation of the problem was by a combination of a questionnaire and literature review. This chapter aimed at providing the necessary background information about the research approach for this treatise. The key research methodology considerations were pointed out and criticized. The research procedure employed and the quality of the results were evaluated.

Chapter four is an analysis and evaluation of the data collected from the questionnaire survey and testing the hypotheses in terms of the results of the data analysis. Interpretation of the data collected is also carried out. A summary of findings is made in this chapter and this states the extent to which each

hypothesis was affirmed or not affirmed and this is backed by the data in the summary tables.

This summary chapter or chapter five will include a summary of the main findings, conclusions and recommendations for further study.

### **5.3 Conclusions of each of the sub-problems and hypotheses**

#### **5.3.1 The First Sub-problem**

To determine the relative importance of the sources of risk due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy. (What is the relative importance of the sources of risk due to the client during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy?).

The results from the data analysis showed that majority of the respondents perceived the risks to range from important (risk B3, B4 and B5), very important (risk B2) to extremely important (risk B1, B6, B8, B9 and B10). A majority of the respondents (36.90%) indicated risk B7 as being slightly important. The overall perception of all the respondents regarding the relative importance of all the risks emanating from the client during the tendering stage in terms of how they (the risks) influence the contractor's pricing strategy was summarized as follows:

1. Extremely important - 34.29%
2. Very important - 25.36%
3. Important - 24.05%
4. Slightly important - 10.60%
5. Not important - 5.71%

### **5.3.2. The First Hypothesis**

The first hypothesis is that sources of risk due to the client during competitive tendering by emerging building contractors within the local authorities in Botswana influence the contractor's pricing strategy. 83.70% of the respondents perceived the risks being investigated as ranging from important, very important to extremely important.

The data and the literature review have confirmed this hypothesis.

### **5.3.3. The Second Sub-problem**

To determine the relative importance of the sources of risk due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy. (What is the relative importance of the sources of risk due to statutory requirements during competitive tendering stage by emerging building contractors within the local authorities in Botswana in terms of how they influence the contractor's pricing strategy?).



The results from the data analysis showed that majority of the respondents perceived the risks C2, C7 and C8 to be important, risk C4 and C5 to be very important, risk C1 to be slightly important, risk C3 to be extremely important and risk C6 to be not important. The overall perception of all the respondents regarding the relative importance of all the risks emanating from statutory requirements during the tendering stage in terms of how they (the risks) influence the contractor's pricing strategy can be summarized as follows:

1. Important - 27.83%
2. Very important – 26.34%
3. Slightly important – 15.48%
4. Extremely important – 13.24%
5. Not important – 17.11%

#### **5.3.4. The Second Hypothesis**

The second hypothesis is that sources of risk due to statutory requirements during competitive tendering by emerging building contractors within the local authorities in Botswana influence the contractor's pricing strategy. 67.41% of the respondents perceived the risks being investigated as ranging from important, very important to extremely important.

The data and the literature review have confirmed this hypothesis.

### **5.3.5. The Third Sub-problem**

To determine the relative effectiveness of the risk management measures that are employed by emerging building contractors within the local authorities in Botswana during competitive tendering stage. (What is the relative effectiveness of the risk management measures that are employed by emerging building contractors within the local authorities in Botswana during the competitive tendering stage?)

The results from the data analysis showed that majority of the respondents perceived risk management measures D3, D4, D8 and D12 to be very effective, risk management measures D1, D5, D6, D7, D9 and D11 to be effective, risk management measures D2 and D8 to be extremely effective and risk management measure D10 to be slightly effective. The overall perception of all the respondents regarding the relative effectiveness of all the risk management measures employed by the emerging building contractors during the competitive tendering stage can be summarized as follows:

1. Very effective – 34.52%
2. Effective – 34.43%
3. Extremely effective – 14.98%
4. Slightly effective – 12.00%
5. Not effective – 4.07%

### **5.3.6 The Third Hypothesis**

The third hypothesis is that the risk management strategies, which are employed by emerging building contractors to minimize risks during competitive tendering within the local authorities in Botswana, are perceived by the contractors to be effective. 83.93% of the respondents perceived the risks being investigated as ranging from important, very important to extremely important.

The data obtained from the survey has confirmed this hypothesis to be true.

## **5.4 Recommendations**

The following recommendations are suggested:-

- 5.4.1 There is need for local authorities to always finalize designs before floating tenders.
- 5.4.2 Local authorities need to revisit their policy of awarding building contracts based on price criteria only.
- 5.4.3 Local authorities need to consider whether it would be advantageous to use fluctuating price contracts rather than the current fixed price contracts.
- 5.4.4 There is a need for the local authorities in Botswana to engage the contractors' organizations in formulating more equitable standard forms of contract.
- 5.4.5 There is need for the local authorities in Botswana to re-assess the current practice/policy of the use of selected suppliers of building materials.

## **6.5 Further Research.**

- 6.5.1 This study sought to evaluate the relative importance of the risks emanating from the client (local authorities) and from the statutory requirements and the relative effectiveness of the risk management strategies employed by the emerging building contractors within the local authorities in Botswana.

6.5.2 Further research is needed on the following areas: -

- 6.5.2.1 The extent and frequency of these risks and the quantifiable impacts of the risk management strategies in the Botswana's construction industry.
- 6.5.2.2 To investigate the management of uncertainty and risk in project management specifically in Botswana, to investigate the interface between risk and value management and to develop new frameworks and strategies for managing risk and value in the project management practice in Botswana.
- 6.5.2.3 The literature review in chapter two revealed that there are different standard forms of contracts in use in the Botswana construction industry. A detailed study needs to be undertaken into the risk allocation between these different standard forms of contracts.
- 6.5.2.4 A study to consider those risks associated with the various elements of construction activities and environment. The main elements to be considered are the duration and cost of the activities of a project. The main emphasis should be placed upon the contribution that can be made to the avoidance of cost overruns. A risk management model need to be developed that can predict construction cost rapidly, and enable the consequences of

alternative construction methods or management strategies to be evaluated quickly and realistically before tendering and other decisions such as the procurement of materials and equipment are made.

6.5.2.5 A detailed study to examine the management of risks in competitive bidding using the various procurement routes available in the construction industry in Botswana, that is, using lump sum contracts, cost reimbursable contracts, design and build contracts etc. The literature review in chapter two revealed that there are different procurement routes and a study needs to be undertaken zeroing in on any one of these specific routes.

6.5.2.6 This research examined risk management in a competitive tendering environment. A study needs to be undertaken on the risk management practices in a non-competitive bidding environment, e.g. in a selective tendering environment or in a negotiated type contract.

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