Estimating: A valid exercise or a false sense of security?

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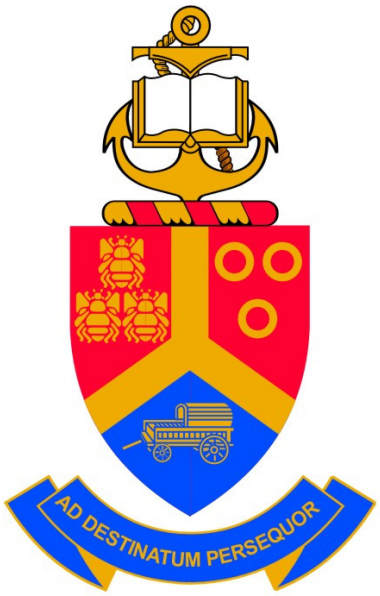

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October 2010

DECLARATION BY STUDENT

I, the undersigned, hereby confirm that the attached treatise is my own work and that any sources are adequately acknowledged in the text and listed in the bibliography.

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Signature of acceptance and confirmation by student

ABSTRACT

Title of treatise	:	Estimating: A valid exercise or a false sense of security?
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The uses of estimates vary from project to project. Essentially an estimate will show the required budget to complete the project.
Estimates will often be subject to adjustment in order to fit within the client's budget.

Estimating involves planning for future events. There will always be changes and unforeseen events. The quantity surveyor should not rely on the fact that an estimate is only an indication of costs, as he is liable for costs incurred by the client if he bases his decision to continue with the project on the estimate prepared by the quantity surveyor.

The aim of this treatise is to examine the importance of an accurate estimate to be used as a decision making tool by the parties involved, as well as the risks involved when tampering with rates and allowances to produce a favourable budget.

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Chapter 1: Introduction

1.1 Background

Estimating is an exercise where the cost of a project is determined. The appointed quantity surveyor will usually do the exercise. The quantity surveyor must use his knowledge and expertise to complete an estimate, as much of the design and specification is incomplete at this stage.

The uses of estimates vary from project to project. Essentially an estimate will show the required budget to complete the project.

Clients have their own budget or figure in mind from the beginning. Estimates will often be subject to adjustment in order to fit within the client's budget. This can be due to the quantity surveyor seeking appointment, or the client's belief that the project to be completed is within his budget.

The research aims to explore the validity and importance of an accurate estimate to be used as a decision making tool by the parties involved, as well as the risks involved when tampering with rates and allowances to produce a favourable result.

1.2 Statement of main problem

Estimating: A valid exercise or a false sense of security?

1.3 Statement of sub problems

1.3.1 What are the standard methods used for estimating?

1.3.2 Can the use of estimating software improve estimating?

1.3.3 What are the common sources of, and steps to avoid errors?

1.3.4 Which liabilities, responsibilities, and risks arise from an estimate?

1.4 Hypotheses

1.4.1 Hypothesis 1

An accurate estimate by a responsible quantity surveyor is very useful to measure the feasibility of, as well as to provide an initial budget for a project.

1.4.2 Hypothesis 2

Computer software like BIM is improving the accuracy of, and time needed to complete an estimate.

1.4.3 Hypothesis 3

Human error or errors in judgement are responsible for most mistakes during estimating.

1.4.4 Hypothesis 4

The quantity surveyor is liable for costs incurred by the client if he bases his decision to continue with the project on the estimate prepared by the quantity surveyor.

1.5 Delimitations

The research is limited to estimates for “normal” construction projects in the republic of South Africa.

The word “estimate” refers to an estimate of construction costs prepared by a quantity surveyor for the use by the employer, and not an estimate for tender purposes to be use by a contractor.

1.6 Importance of the study

In practice, the quantity surveyor may take the production of an estimate too lightly. This, coupled with high uncertainty, and personnel bias, may cause an estimate to be unrealistic. The quantity surveyor may be liable for costs incurred by the client if he bases his decision to continue with the project on the estimate prepared by the quantity surveyor. An unsuccessful project will have a negative effect on all stakeholders.

1.7 Research methodology

In investigating the abovementioned topic, various sources will be considered which will include, but not be limited to the following:

1) Electronic Media
2) Text books
3) Journals
4) Articles

Chapter 2: What are the standard methods used for estimating?

2.1 Introduction

The estimating method used for estimating construction costs differ from project to project as well as between the stages of projects. The degree of accuracy depends on the information available and the method used. The methods available are discussed below.

2.2 Cost –per-unit method of estimating

In the cost-per-unit method, the estimate of total building cost can be obtained by multiplying the use-factor of a project by an “all inclusive” monetary rate based on historical records. Examples of use factors include the number of keys/rooms in a hotel, the number of beds in a hospital, the number of people to be accommodated in a restaurant, etc.

The technique is based on the fact that there is usually some close relationship between the cost of a construction project and the number of functional units it accommodates. Functional units are those factors which express the intended use of the building better than any other. This method is extremely useful on occasions where the building’s client requires a preliminary estimate based on little more information than the basic units of accommodation.

The units adopted to facilitate this analysis depend on the type of project under consideration, site conditions, specification changes, market conditions, regional changes, and Inflation.
Using this estimating method can generate a rough estimate quickly, but the lack of accuracy will render it of little use in the cost planning procedure outlined earlier. However, this method is often used to determine the very

first notion of a price in early discussions of a project and as a crude means of comparing the known costs of different buildings.
(www.qskiru.blogspot.com Access: 2 October 2010)

For example, in “Davis Langdon Africa Region property and construction handbook 2010 23rd edition © 2010”, the following cost-per-unit rates are recommended:

Hotels:	Rate per no (excl VAT)
3-Star Budget	R 450 000 - R 650 000/key
5-Star Luxury	R 1 600 000 - R 2 200 000/key
Resort style	R 1 300 000 - R 1 500 000/key

Stadiums	Rate per no (excl VAT)
Stadium to PSL standards	R 21 000 - R 32 000/seat
Stadium to FIFA standards	R 47 000 - R 63 000/seat
Stadium pitch to FIFA standards	R 13 000 000 - R 16 000 000

Stadiums	Rate per no (excl VAT)
Stadium to PSL standards	R 21 000 - R 32 000/seat
Stadium to FIFA standards	R 47 000 - R 63 000/seat
Stadium pitch to FIFA standards	R 13 000 000 - R 16 000 000

Prisons	Rate per no (excl VAT)
New generation prison	R 170 000 - R 200 000/inmate

Carport (shaded)	Rate per no (excl VAT)
Single	R 2 700
Double	R 5 300

This method of estimating is not accurate as there are high number of uncertainties and variables, as well as a lack of comparable historical records. No two projects, or clients, are the same. One cannot compare a hotel in Johannesburg to a hotel in Knysna.

This type of estimate provides a very rough indication of building cost, and should not be used in viability/feasibility studies. It can be used for buildings and facilities, and for certain types of service installations.

2.3 Square-metre method of estimating

The estimate of construction cost is obtained by multiplying the total construction area by a monetary rate. The costs of general external works items are calculated separately. The rate is based on current or historical comparable buildings.

There are many buildings where the unit of accommodation method is impracticable; such as warehouse projects or open-plan offices. In these cases the superficial floor area method is found to be reliable with an accuracy of 10% to 15%.This method also works well with certain external works contracts such as concrete paving or macadam surfacing.

Sometimes contractors are asked to quote for building work using sketch drawings and a square metre price. It is unlikely that a contractor would risk signing a contract on this basis. First, a clear scope of works would be needed together with a site survey and soil investigation report. The price must accurately reflect the amount and specification of works. (www.qskiru.blogspot.com Access: 2 October 2010)

In an attempt to standardise the method of measurement of construction area, the construction Economics Committee of the Association of South African Quantity Surveyors has defined the term "construction area" in their "Guide to Elemental Cost Estimating and Analysis for Building Works, 1998" as follows:

*"*The Construction Area of a building is the total of all the areas of a building measured on plan at each covered floor level over the external walls of the outermost vertical enclosing planes or, where applicable, the centre line of walls between buildings."

The following items are specifically to be **included** in the calculation of Construction Area:

1. Internal stairwell and staircase areas
2. Lift shaft areas
3. Duct space areas
4. Mezzanine floor areas
5. Finished floor areas in attic spaces
6. Floor areas to penthouses, staff quarters, and lift motor rooms, etc.
7. All open but covered porches, balconies and balcony corridors within the enclosing planes of the main building
8. Floor areas to attached sheds, carports, etc., and all partially completed rooms, porches, balconies, etc., provided the relevant areas are covered and have at least two of their walls not less than two-thirds of the storey height on which they occur.

The following items are specifically to be **excluded** in the calculation of Construction Area:

1. External steps and paved areas
2. Areas of projecting roof overhangs, hoods, canopies and the like
3. Enclosed open areas (Light or ventilation wells and courtyards)

4. Areas of open covered ways and carports, etc.
5. Areas of unenclosed fire escapes
6. Areas on plan of small projections such as pilasters, attached piers, fins, chimney breasts, etc.

The areas of different types of buildings within the same overall building project, such as the office block of a factory project should, as far as possible, be kept separate from each other. (Pienaar: 2004)

This type of estimate provides a very rough indication of building cost, and should not be used in viability/feasibility studies. It is useful in setting a cost ceiling/limit for the project or providing a preliminary estimate.

2.3.1 Different rates that can be used for the cost/m² estimate:

1. Basic building rate

The rate based on other projects, excluding special items and site works and general.

2. Building rate

The basic rate, plus special items such as specialist work, mechanical work, etc, but excluding site works and general.

3. Project rate

This is the overall rate, including siteworks and general.

4. Use factor rate

This is the construction cost expressed per m² of usable or lettable area. (Pienaar: 2004)

2.3.2 Factors that could affect the rate used in a rate/m² method:

Geographical Location

The geographical location of the project will have a considerable impact on the availability of construction materials, plant, and skilled labour. The location may also present different ground conditions to other sites, calling for more, or less, expensive foundations. The position of the municipal sewer connection could result in excessive lengths of drains.

Design

The design of a building obviously has an impact on construction costs and will determine, amongst others; the construction materials and methods used, the size of the building, finishes, fullness of plan, the shape of the building, the number of specialist installations, floor to ceiling height, and the height of the building (number of storeys).

Professional team

The professional team will consist of project managers, architects, engineers, quantity surveyors, interior designers, etc. People have different views, skills, and methods. This may result in a completely different outcome than originally planned.

Size of building/project

Generally buying in bulk provides for lower prices.

Economic conditions

Economic conditions and the state of the market will have an impact on construction costs. This can cause two identical projects priced at different times to have a noticeable price difference.

Services

The more serviced rooms (Kitchens, bathrooms, laundries, etc) the higher the rate per m² of the building.

From the above one can conclude that both the cost-per-unit method and rate/m² method have many influencing factors that make it difficult to match comparable projects. Even if comparable projects are identified it is still difficult to adjust for varying conditions and factors between the projects.

2.4 Rough or inclusive-quantities method of estimating

This is a method whereby the important cost items are measured in much the same way as the items in a bill of quantities, except that items of identical or near identical measurement are grouped together. The areas of the earth filling under floors, surface bed, screed, floor finish, etc are not exactly the same but sufficiently similar to permit them to be grouped together. Sundry items of little value are not measured but are allowed for as a percentage addition. (Pienaar: 2004)

Detailed information such as working drawings are required by which time it would be possible to do an estimate using the elemental estimate method, or measure provisional bills of quantities. It can be difficult to decide which items can be ignored and which items are sufficiently costly as to require measurement. It is difficult to judge the percentage of cost to be allowed for sundry items and usually requires a bit of experience and skill.

Rough or approximate quantities can be successfully used in supplementing other systems of estimating.

2.5 Storey-enclosure method of estimating

This method consists of measuring certain areas such as the floor area, the roof area, the vertical external wall area, etc. and multiplying each of these areas by a pre-determined factor for each item. Items such as plumbing and sanitary fittings, joinery fittings, etc. are separately measured and estimated. This method is an attempted compromise between the short-comings of the square- metre method of estimating and the time required for the more detailed estimating methods.
This method however, is seldom used in South Africa mainly because there are no comparable unit rates available. (Pienaar: 2004)

2.6 Cube method of estimating

The Cube method estimating is specific for building projects and aims to overcome the current criticism to the floor area method that does not take into account possible variations of the storey height. The building volume method became very popular in some European countries like in Germany and Switzerland, where building costs are often expressed in cubic meter prices. The total cost of the project will be given by:

Estimate = Volume X Unit Cost (Cost/m3)
External plan area X height X Cost (cost/ m3)

In order to use the method, the building volume must be first assessed and explicit rules exist in some countries for that purpose. Buildings with distinct types of occupation should have corresponding volumes assessed separately, for example, car park areas, shopping areas and office areas in a commercial building. Specific works like excavations, foundations and

external works ought to be assessed separately by using cost comparisons or approximate quantities, for example.
Costs per cubic meter may be difficult to find in countries where the method is not current. Actually, such costs depend on a number of variables, like building types, proportion of wall area per floor area, quality of finishes and so on. (www.qskiru.blogspot.com Access: 2 October 2010)

Calculation of volume is subject to rules of measurement:

- Measured from external faces of external walls
- Height of the building is taken from the top of foundation to:
    1. For pitched roof:
        a. A point midway between the ceiling and the apex of roof 2/3 where roof space is un-occupied.
        b. A point three quarters from the ceiling to the apex of the roof where roof space is occupied
    2. For Flat roof
        a. A point 610mm (2feet) above the roof structure

(www.qskiru.blogspot.com Access: 2 October 2010)

2.7 Elemental method of estimating

In this method the building is divided into elements such as foundations, structural frame, external envelope, internal divisions, floor finishes, etc. Each element is sub divided into components. A rate is calculated for the component by breaking the component up into its individual items to be priced per measurable unit of the component. Example: a slab can be broken up into concrete, reinforcement, formwork, and power floating.

In these estimates there is an element of over measure allowed for in either the pricing or by deducting a percentage. Flooring for instance is measured right across internal walls.

The Association of South African Quantity Surveyors (ASAQS) has prepared a Guide to Elemental Cost Estimating - Analysis for Building Works 1998 which provides a structured framework for compiling and presenting elemental cost estimates. The guide summarises the elements as follows:

Primary elements

- Foundations
- Ground Floor Construction
- Structural Frame
- Independent Structural Components
- External Envelope
- Roofs
- Internal Divisions
- Partitions
- Floor Finishes
- Internal Wall Finishes
- Ceilings and Soffits
- Fittings
- Electrical Installation
- Internal Plumbing
- Fire Services
- Balustrading, etc.
- Miscellaneous Items

Special installations

- Piling
- Sun Control Screens, Grilles, etc
- Raised Access Floors
- Special Fire Protection
- Lifts
- Escalators

- Air Conditioning
- Ventilation
- Heating
- Special Electrical Installations
- Other Services
- Compactors
- Access Control
- Gondolas
- Stoves
- Kitchen Equipment
- Specialised Equipment
- Security Systems
- Communication Systems
- Prefabricated Cold Rooms
- Signage
- Artwork
- Miscellaneous Items

Alterations

- Alterations

External works and services

- Soil Drainage
- Sub-surface Water Drainage
- Stormwater Drainage
- Water Supplies
- Fire Service
- External Electrical Installations
- Connection Fees, etc
- Demolitions
- Site Clearance

- Earthworks
- Boundary, Screen and Retaining Walls, etc
- Fencing and Gates
- Roads, Paving, etc
- Covered Parking, Walkways, etc
- Pergolas, Canopies, etc
- Minor Construction Work
- Pools, etc
- Sports Facilities
- Garden Works
- Miscellaneous Items

Training

- Training

Preliminaries

- Preliminaries

Contractor's Fee

- Contractor's Fee

Contingency allowances

- Price and Detail Development
- Building Contract Contingencies

Escalation

- Pre-tender escalation
- Contract escalation

Value Added Tax

- Value Added Tax

EXAMPLE A

TYPICAL EXAMPLE OF THE LAYOUT OF AN ELEMENTAL ESTIMATE

ELEMENT 104: EXTERNAL ENVELOPE

Element	Component	Description	Details of Element and Component				Element Rate	Cost
			Unit	Quantity	Cost per unit R	Cost R	R	%
104 External envelope			m^2	111	174,68	19 390,00	220,34	15,00
	104.10 Brick and block walls	230 mm Brick wall	m^2	94	130,00	12 220,00		
	104.50 External finishes	External cement plaster and PVA paint to walls	m^2	83	50,00	4 150,00		
		Facing bricks	m^2	11	60,00	660,00		
	104.60 Windows	Residential type windows	m^2	4	340,00	1 360,00		
	104.80 Doors	FLB door size 813 x 2032 mm	No	1	1 000,00	1 000,00		

Notes: Construction area = 88 m^2; Elemental area = 111 m^2.
Details included in descriptions will depend upon the extent of information available.

Figure 1: Typical layout of an elemental estimate. Association of South African Quantity Surveyors Guide to Elemental Cost Estimating & Analysis for Building Works, (ASAQS: Midrand)

EXAMPLE B

TYPICAL EXAMPLE OF AN ELEMENTAL ESTIMATE SUMMARY

ESTIMATE OF ESCALATED CONSTRUCTION COST AT CONTRACT COMPLETION DATE INCLUDING VALUE ADDED TAX (16/6/99)

SUMMARY OF CONSTRUCTION COST

	Construction Cost R	Rate per m^2 R	% of construction cost %
Primary elements	2 781 900	1 028,81	61,48
Special installations	450 050	166,44	9,95
Alterations	–	–	–
External works and services	715 030	264,43	15,80
Training	–	–	–
Preliminaries	278 020	102,82	6,14
Contractor's fee (spread over all elements)	–	–	–
Contingency allowances	300 000	110,95	6,63
ESTIMATE OF CURRENT CONSTRUCTION COST (EXCLUDING VAT) (1/04/97)	4 525 000	1 673,45	100,00
Pre-tender escalation	141 700	52,40	3,13
Contract escalation	351 100	129,84	7,76
Value added tax (VAT)	702 500	259,80	15,52
ESTIMATE OF ESCALATED CONSTRUCTION COST AT CONTRACT COMPLETION DATE INCLUDING VALUE ADDED TAX (16/06/99)	5 720 300	2 115,50	126,42

CONSTRUCTION AREA: 2 704 m^2

PROGRAMME ASSUMPTIONS:
- Date of estimate : 1 April 1997
- Contract tender date : 16 June 1997
- Contract completion date : 16 June 1999

ESCALATION:
- Pre-tender contract escalation : Based on latest published BER Building Cost Indices
  - Date of estimate index : 1092,5
  - Contract tender date index : 1126,7
- Contract escalation : Based on latest published JBCC Contract Price Adjustment Provisions indices (Work group 180) (PO151) adjusted for the Haylett formula
  - Contract tender date index : 158,4
  - Contract completion date index : 183,6

VALUE ADDED TAX (VAT): Value added tax calculated at 14,00%

EXCLUSIONS

This estimate of construction cost is based on ruling competitive tender market conditions and excludes the following:

Abnormal foundations Security system Loose furniture and fittings Fencing and gates Professional fees

Figure 2: Example of summary page of an elemental estimate. Association of South African Quantity Surveyors Guide to Elemental Cost Estimating & Analysis for Building Works, (ASAQS: Midrand)

The elemental method of estimating is the most accurate and commonly used method for estimating building work.

2.8 Conclusion

The estimating methods used for estimating construction costs differ from project to project as well as between the stages of projects. The degree of accuracy depends on the information available and the method used. Lack of experience of the estimator, coupled with the unsuitability of comparable information, is usually the factors that produce unreliable and inaccurate construction estimates. Therefore care must be taken provide for supervision of inexperienced staff, and to select the correct comparable projects (as well as adjusting the variances between them responsibly).

2.9 Hypotheses

An accurate estimate by a responsible quantity surveyor is very useful tool to measure the feasibility of, as well as to provide an initial budget for, a construction project. The original hypothesis is correct.

Chapter 3: Can the use of estimating software improve estimating?

3.1 Introduction

Staying competitive in the market is a daunting task. Over recent years computers have become essential to be competitive in all sectors of the economy.

With the advent of computers in business, contractors began using spreadsheet applications like VisiCalc, Lotus 1-2-3, and Microsoft Excel to duplicate the traditional tabular format, while automating redundant mathematical formulas. (www.wikipedia.org Access: 23 July 2010)

Microsoft excel is the most widely used application for construction cost estimating. This can be attributed to its simplicity to understand and the ability to be adapted to suite the users needs.

Like most other business, estimating programs typically run on Microsoft Windows-based computers, but some, such as Turtlesoft Goldenseal, will also run on Macintosh computers. (www.wikipedia.org Access: 23 July 2010)

Although Microsoft excel is very popular there are other estimating software available, such as Sage Timberline Office, MasterBuilder, Bid4Build, HCSS HeavyBid, and SharpeSoft Estimator. These mostly cater for construction companies who are tendering for a project. WinQS and QSplus are examples of software catering for quantity surveying, with an estimating module built in.

Estimating basically consists of two tasks, namely, taking off and pricing.

3.2 Taking off

Taking off is the measuring of items and materials required to complete the project off of a plan. This is mostly done by hand in South Africa, and if the project does not continue, the time and resources spent in the estimating process will be a loss. It is therefore imperative that the production of an estimate of construction costs is quick. It is also important for the estimate to be accurate as the project may continue based on this estimate, which may contain errors.

The use of software for taking off of quantities is becoming more common in South Africa. Examples of such software are: DimensionX, Takeoff Live and Quick measure on screen.

3.4.3 The advantages of such software are:

Complex areas and shapes can be measured easily. The fact that awkward areas can simply be “selected” and the area calculated means that taking off or measuring is much faster.
Reading off and retyping errors are avoided which lead to more accurate quantities and measurements.

Dimensions are automatically referenced. This makes review and adjustment of previous work much easier.
There is no need for a large print out of the drawing. This cuts on costs and also allows the quantity surveyor to measure on the computer instead of a large desk with cumbersome hangers of drawings.
Adjustments of linked items are simple due to the fact that only one item has to be changed and the linked items will change automatically.

The measurework can be imported into various other programs without having to capture the data manually.

3.2.1 Disadvantages:

Lack of training and unwillingness to change has caused a hesitation of the industry to implement these electronic measuring systems and software. These packages do come at quite an initial cost for the software, equipment and training. This may cause the option of measuring electronically to fall out of reach of some of the smaller quantity surveying firms.

3.3 Pricing

In order to get the estimated construction cost prices or rates most now be applied to the quantities. Traditionally this is done in Microsoft excel. WinQS and QSplus are examples of software that have an estimating module built into the software, which allows quantities to be read in or imported from a taking off application.

The rates used can be from a recent project, historical data that has been escalated, or built up from scratch. Some of the estimating software has frequently updated pricing data for standard items.

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Cost Analysis by Element
ADVCA-EXAMP: Advanced Cost Analysis Example
Element - Construction area [M2] 205.64
Using Price: Estimate Link Build-up Price
For ALL Locations

Code	Description	Cost R	Quantity	Unit	Cost per Unit R	Cost per M2 R	Cost %
1	**1 - PRIMARY ELEMENTS**	1 168 324	-			5 681.41	76.25%
1-1	100 - FOUNDATIONS	88 645	53.09	M2	1 669.71	431.07	5.79%
1.2	*600 x 300 mm Strip footings 500mm deep*	2 375		M			
1.4	*2000 x 2000 x 600mm Base 1000mm deep*	61 186		NO			
1.6	*CC Walls*	5 094		M2			
2.7	*Extra over for excavation in soft rock (10%*	3 330		M3			
2.8	*Extra over for excavation in hard rock (10%*	6 660		M3			
2.9	*Keeping excavations free of water*	10 000		ITEM			
1-2	101 - GROUND FLOOR CONSTRUCTION	26 897	53.09	M2	506.64	130.80	1.76%
3.3	*100mm R concrete surface beds on 250*	19 928		M2			
3.4	*600 x 150mm Thickening out of concrete*	6 126		M			
3.5	*Expansion joints*	844		M			
1-3	102 - STRUCTURAL FRAME	348 862	174.59	M2	1 998.18	1 696.47	22.77%
4.2	*255mm Slabs, including smooth formwork*	273 408		M2			
4.3	*Smth fwk sides: Edges, risers, ends and*	11 520		M			
4.5	*500 x 300mm Columns*	54 823		M			
4.6	*230 x 510mm Beams including rough formwork*	9 111		M			
1-4	103 - INDEPENDENT STRUCTURAL COMPONENTS	1	2s2.1r	M2	0.00	0.00	0.00%
5.2	***T B DESCRIBD** Staircases, including*	1		NO			
1-5	104 - EXTERNAL ENVELOPE	265 886	252.17	M2	1 054.39	1 292.97	17.35%
6.2	*One-brick walls*	85 620		M2			
6.3	*Walls*	32 684		M2			
6.4	*Plaster & pnt to ext walls*	35 280		M2			
7.5	*Window 597 x 706mm high (W1)*	3 745		NO			
7.6	*Window 1702 x 1274mm high (W3)*	29 125		NO			
7.8	*Shopfront*	-3 097		NO			
7.9	*40mm Framed batten door 813 x 2032mm*	54 255		NO			
7.10	*40mm Framed batten door 2400 x 2125mm*	28 274		NO			
1-6	105 - ROOFS	28 149	62.56	M2	450.02	136.88	1.84%
8.2	*Rafters & purlins*	102		M2			
8.3	*Roof coverings with pitches not exceeding 25*	19 260		M2			
8.4	*Hip*	8 181		M			
8.5	*Ridge*	606		M			
1-7	106 - INTERNAL DIVISIONS	34 136	45.44	M2	751.22	166.00	2.23%
10.2	*One-brick clay brick walls*	4 077		M2			
10.3	*Half -brick clay brick walls*	5 833		M2			
10.4	*Standard Solid core door comm venee 110*	23 245		NO			
10.6	*Door closer*	980		NO			
1-8	107 - PARTITIONS	20 444	40.59	M2	503.67	99.42	1.33%
11.2	*BPB 3,25 Drywall 1/30: Partitioning 3,30m high*	12 192		M			
11.3	*BPB 3,2 Drywall 1/30: Extra over partition*	280		NO			

Figure 3: An example of an estimate report generated by WinQS.

The Estimating module allows for the quick measure of an estimate with price build-up from bill of quantities items and a bill of quantities is automatically produced from the estimate measured. (www.winqs.co.za Access: 23 July 2010)

3.4.4 The advantages of such software are:

Many of the software applications will have multi-user database allowing collaboration by multiple users on all projects, on a client-server network. The entire office could be working on one project at the same time.
Adjustments of linked items are simple due to the fact that only one item has to be changed and the linked items will change automatically.
The measurework can be imported from various other programs without having to capture the data manually.
The software may have an estimating module which allows for the quick measure of an estimate with price build-up from bill of quantities items and, later, a bill of quantities is automatically produced from the estimate measured.
If there is uncertainty about the description or unit of measurement regarding an item, there are standard libraries of possible items conforming to the ASAQS standard system for measuring building work to reference. These items can also be copied to the current project, saving the time of doing a setup each time. All previous projects can be used as libraries for any new project including the ability to copy items and/or dimensions from previous projects.
The measurements can be entered into a multi level Location structure for the reporting of Costs at any level within a project i.e. Cost per building or per floor etc. Dimensions can be printed per user, per location or date range. This means that omissions or additions are easily accommodated and each can be printed, priced, or changed individually.

3.4 Standard features of most estimating software:

3.4.1 Item or Activity List:

All estimating software applications will include a main project window that outlines the various items or activities that will be required to complete the specified project. More advanced programs are capable of breaking an item up into subtasks, or sublevels. An outline view of all of the top-level and sub-level items provides a quick and easy way to view and navigate through the project.

3.4.2 Resource Costs:

Resources consist of labour, equipment, materials, subcontractors, trucking, and any other cost detail items. Labour and equipment costs are internal crew costs, whereas all other resource costs are received from vendors, such as material suppliers, subcontractors, and trucking companies. Labour costs are usually calculated from wages, benefits, burden, and workers compensation. Equipment costs are calculated from purchase price, taxes, fuel consumption, and other operating expenses.

3.4.3 Item or Activity Detail:

The detail to each item includes all of the resources required to complete each activity, as well as their associated costs. Production rates will automatically determine required crew costs.

3.4.4 Calculations:

Most estimating programs have built-in calculations ranging from simple length, area, and volume calculations to complex industry-specific calculations, such as electrical calculations, utility trench calculations, and earthworks cut and fill calculations.

3.4.5 Mark-ups:

Every program will allow for cost mark-ups ranging from flat overall mark-ups to resource-specific mark-ups, mark-ups for general administrative costs, and bonding costs.

3.4.6 Detailed Overhead:

Indirect costs, such as permits, fees, and any other overall project costs can be spread to project items.

3.4.7 Closeout Window:

Many estimating programs include a screen for manually adjusting bid prices from their calculated values.

3.4.8 Reporting:

Project reports typically include proposals, detail reports, cost breakdown reports, and various charts and graphs.

3.4.9 Exporting:

Most software programs can export project data to other applications, such as spreadsheets, accounting software, and project management software.

3.4.10 Job History:

Storing past projects is a standard feature in most estimating programs. (www.wikipedia.org Access: 23 July 2010)

3.5 Conclusion

If a company wishes to remain competitive, the use of computers is essential. Ordinary methods of measurement cannot compete with the accuracy, efficiency, and speed at which estimating can be done with the aid of estimating software. Estimating the construction cost of projects is more accurate and less time consuming as a result of the use of construction cost estimating software. It should be noted that the software is an aid and that it still requires a knowledgeable operator for the estimate to be realistic.

The initial cost could be recovered quickly by less time spent by qualified quantity surveyors preparing estimates for projects that in many instances do not materialise.

3.6 Hypotheses

Computer software like BIM is improving the accuracy of, and time needed to complete an estimate.
The original hypothesis is correct.

Chapter 4: What are the common sources of, and steps to avoid errors?

4.1 Introduction

During the production of an estimate, errors are inevitable. It is the size and regularity of the error that is a cause for concern. The estimator must strive to be as accurate as possible in order to produce a successful estimate.

One example is the trying to please the client.
Anyone who provides estimates of work knows that there can be pressure from your client to make the estimate as low as possible. Ultimately, the client wants to get what he needs for as little effort (and cost) as possible. In many cases, there is a tendency on the part of the estimator to get caught up in that mindset as well. The estimator ends up "wishing" the work ends up within the client expectations. (www.techrepublic.com Access: 16 August 2010)

There are certain types of errors that can be identified. The estimator should look out for, and try to prevent, these errors as they could have disastrous results for the estimate as well as for the project.

4.2 Common sources of errors

4.2.1 Errors in arithmetic

Estimates made on construction projects are arithmetical calculations of quantities and cost of materials and labour costs to install materials or perform various operations. In order to avoid errors in arithmetic, the estimator should use an electronic calculator with a recording tape, have the

calculations checked by another person, and attach the tape to the estimate sheet for backup. (www.masonryworktools.com Access: 14 August 2010)

Probably one of the most common construction cost estimating errors that occurs is a problem with the arithmetic. You may add, subtract, or multiply wrong, coming up with the wrong numbers. This can be a real problem if you are trying to do all the math yourself. Use the modern equipment available and double check to make sure you get the math right for your estimates. (www.construction-estimating.com Access: 13 August 2010)

With hundreds of calculations being made for a single estimate it is not difficult to see that simple arithmetic errors may occur. These mistakes could make a sizeable difference when it comes to the estimated construction costs. If for example you multiply the number of floors or number of rooms incorrectly, this will have an adverse effect on the estimated cost of the project.

4.2.2 Lack of visualisation and interpretation

Reading of construction drawing requires the estimator to visualise the building in three dimensions. The plans and sections must be understood and coordinated in order for the correct measurements to be taken off. The lack of visualisation and experience required may lead errors such as using the wrong heights in calculations and making the wrong assumptions about material and finishes to be used.

Misunderstanding of drawings, detailing shown in drawings, lack of understanding, lack of experience in construction works, lack of knowledge about IS codes or mode of measurements for deduction or additions to be made in calculation, lack of information about unit prices of materials, labour and equipments, and may be also the lack of communication between

clients, contractor or architects or consultants. (www.toostep.com: Access: 15 August 2010)

4.2.3 Knowledge and experience

The lack of knowledge and experience of the estimator may lead to serious errors while estimating. The drawings used during estimating are usually incomplete and the estimator will have to use his knowledge and experience to produce a realistic estimate. He may have to decide on structural elements, concrete strength, steel allowances, finishes, bulk earthwork allowances, etc.

He may have to add windows, doors, paving, lights, outbuildings and temporary structures that have not been included on the drawings, but that he believes will have to be constructed during the project.

The estimator will also have to consider costs of bulk services charges, taxes and cost of capital to produce e responsive estimate.

4.2.4 Time constraints

A quantity surveying firm is in the business of selling time. The quantity surveyor will not usually receive any remuneration for estimates of projects that do not continue, and therefore estimates must be completed as quickly as possible. The pressure of time bound completion can cause the estimator to make too many assumptions and increase the chances of other common mistakes occurring.

4.2.5 Lack of coordination/communication

Communication is vital for a successful estimate. The estimator must be sure of what the client and architect want. For example, the estimator may think that the passages will have a plastered ceiling while the architect and client want a suspended ceiling with many elaborate bulkheads. With many of the estimator's assumptions being above or below what the client wanted there will be deviation between estimated construction cost and actual construction cost.

4.2.6 Committing to best-case scenario

The client wants it done as quickly as possible. Your manager wants it done as quickly as possible. You think it can be done quickly. However, you get into trouble because you think about what it would take to complete the work if everything goes right. You might even think in terms of a range of effort for the work, but then too often you end up committing to an estimate at the lower, or optimistic, end of the range. (www.techrepublic.com Access: 16 August 2010)

Construction projects usually run for a long time in which many foreseen and unforeseen changes may occur. By committing to the best case scenario, for example, pricing the steel cost much lower than the current cost because the estimator believes the price will come down may have adverse consequences if the price remains the same, or increases.

The estimator may also not allow enough concrete or steel, or even the wrong type of foundation to be used because he assumes that the ground conditions are good.

4.2.7 Committing based on available budget

In this case, the client has a fixed amount for the budget. The project manager thinks there is a chance the project team can get it done within available budget, so he commits based on that budget number. Estimating work based on the available budget is so obviously wrong that it's almost a cliché. However, how many times have you fallen into this trap? (www.techrepublic.com Access: 16 August 2010)

This can also be described as starting with an amount and making the project cost fit it.

4.2.8 Taking wrong measurements from plans and specifications

When measuring off of plans there will always be mistakes. The estimator may put in the wrong measurement, for example 32 meters taken off as 23 meters. If too many of these mistakes occur an estimate could become inaccurate.

Errors in measurements and dimensions taken from plans, drawings, and specifications result in corresponding mistakes in the cost of construction items based on those measurements. (www.masonryworktools.com Access: 14 August 2010)

The wrong measurements can also be a problem that causes errors when you are making a construction cost estimate. Whether you get the wrong measurements from plans or you use the wrong unit of measurement, this can definitely cause a big difference in the estimates. Make sure you get the right measurements and get the right unit of measurement being used as well. (www.toostep.com: Access: 15 August 2010)

4.2.9 Failure to visit the project site

This source of error might well be number one on the list because of its importance in the early stages of cost estimating. Visiting the proposed site of the project enables the cost estimator to inspect topography, check the soil by boring if necessary, determine if protection of adjacent properties will be needed, and check distances to railroad sidings, supply centres, and the proximity to sources of labour. If existing structures have to be demolished or removed from the premises, the estimator is able to properly determine the probable cost. (www.builderspace.com Access: 14 August 2010)

Never actually visiting the construction site can also be a huge error that can lead to problems with the construction cost estimating. Taking time to visit the site is going to be important when you are estimating the cost of the project. You'll have to determine whether current structures must be removed, whether you'll have to protect bordering properties, and more. If you don't visit the site yourself, you can't get the big picture in order to come up with an accurate measurement. (www.toostep.com: Access: 15 August 2010)

Due to time constraint and not wanting to spend too many resources on the estimate most quantity surveyors will not visit a site before the estimate is started.
The site may also be in another city or country which could deter the quantity surveyor from visiting the site. For example, the estimator will not want to fly out to Dubai for a site visit if he is not sure that the project will continue and that he will be appointed.

4.2.10 Failure to consider quality of workmanship required

A contractor who is accustomed to working on projects that require high quality workmanship may not be set up to bid or estimate projects of

mediocre, low grade workmanship. Conversely, a contractor who usually works on cheap structures is frequently at a disadvantage when it comes to bidding on the construction of upscale residences or commercial buildings where only the finest quality of workmanship is acceptable. Failure to give proper consideration to the quality of workmanship a project warrants can lead to overestimating or underestimating. (www.builderspace.com Access: 14 August 2010)

The rates used for different types of construction will differ considerably. The estimator may use a rate for plaster of a recent tender for a private dwelling on the estimate of a new luxury hotel. If many of the rates used are not fit for the proposed project the variance in cost may make the estimate unresponsive.

4.2.11 Duplicating the work of subcontractors

During the estimate specialist installations will be priced by subcontractors. Such installations may include the plumbing installation, roof, electrical installation, HVAC installation, ceiling installation, aluminium doors and windows, etc.

With so many installations being subcontract work it is easy for work to overlap. For example the ceiling contractor will price for the structure of the ceiling. He may include additional structure to carry the HVAC ducts. The HVAC subcontractor may also include for the same item.

Subcontractors often prepare their cost estimates from the plans and specifications without the guidance or supervision of the general contractor. They take off details and include all of the items they assume to fall within their particular trade. As a result there frequently is overlapping with the work of the general contractor or other

subcontractors. (www.contractorexam.blogspot.com Access: 16 August 2010)

4.2.12 Failure to review the amounts of subcontractors

The owner looks to the general contractor for the completion of the work in compliance with the plans and specifications. The owner does not look to the subcontractors. It is very important that the estimates of subcontractors are carefully reviewed to be sure they comply with the plans and specifications. (www.contractorexam.blogspot.com Access: 16 August 2010)

During the estimate specialist installations will be priced by subcontractors. Such installations may include the plumbing installation, roof, electrical installation, HVAC installation, ceiling installation, aluminium doors and windows, etc.

The estimator may take the amount given to him and plug it straight into the estimate without checking it. The subcontractor may have over- or under-specified the installation, or may have made simple arithmetic mistakes, or may have included for items which he believes will be necessary but will not be required.

4.2.13 Not taking all the work into account

This is perhaps the most common problem, especially with earlier, high-level estimates. You may just miss some major work that you didn't understand to be a part of the project, such as documentation or training. Typically, however, you underestimate the size of deliverables that need to be completed or you do not include all of the activities required to complete the deliverable. (www.zdnetasia.com Access: 16 August 2010)

Whole sections of work can easily be left out such as an existing boundary wall which the estimator assumes still needs to be constructed.

4.2.14 Taking shortcuts

A very common error is taking short cuts; we generally take shortcuts when making an estimate which can be risky. Often there is a temptation to take shortcuts when under pressure because of time-limit in which to complete the cost estimate or because of a heavy backlog of work. Shortcuts take the form of guess estimating, using square feet or cubic foot costs in place of details, and using lump sum figures picked out of the air, all of which have inherent risks. (www.toostep.com: Access: 15 August 2010)

This happens all too often during estimating. At the end of the estimate while all figures are being put into the estimate template, most of the information or rates still outstanding will simply be guessed or pro rated from another project. For example working out a metre square rate for the roof of another project and multiplying that rate by the area of the proposed project. This can have serious adverse effects on the accuracy of the estimate.

4.2.15 Approximation of the measurements and rates

The pressure of the little time available to complete the estimate may cause the estimator to approximate rates and measurements. For example, the estimator may take the overall floor area of building to price the screed, floor finish and ceilings. The walls make up about 10% of the floor area and could cause a serious price deviation if the floor finish and ceiling are expensive.

4.2.16 Computer skill and precision

This is where many errors creep in. For example, when estimating using Microsoft Excel, by not checking that all the cells are included in the formula a total section of work, such as external works, can be omitted.

4.2.17 Not allowing for realistic contingencies

Some construction projects may have inherent and unusual problems that should be recognized when the cost estimate is being prepared. Failure to make the allowances or contingencies may result in not getting the contract or losing money if awarded the contract. These contingencies include severe winter weather conditions, or extremely hot and humid climates. The project may be located in an area of the country subject to heavy rainfall. Justifications for a realistic contingency include anticipated labour troubles, material shortages, or political problems. (www.builderspace.com Access: 14 August 2010)

4.2.18 Including contingency items without reason

An estimator may include contingencies on many of the specialist installations, and again on the total estimated construction amount. These amounts may add up and contribute to an estimate being inaccurate.

Opposed to making allowances for realistic contingencies, it is poor policy to make flat allowances for contingencies without good reasons, particularly when competition is strong. (www.builderspace.com Access: 14 August 2010)

4.3 Conclusion

Arithmetic errors, lack of visualisation, lack of knowledge and experience, lack of coordination between team members, taking off the wrong measurements, failure to visit the site, not considering the quality required, failure to review subcontractors amounts, failure to take all work into consideration, taking shortcuts, and allowing the unrealistic contingencies are all errors that pertain to the attitude and skill of the estimator as a person. It is because of the estimator, that errors are inevitable.

The onus lies on the estimator to strive for accuracy in order to produce a successful estimate. Some errors can be avoided by using sound estimating practices, checklists and estimating software, but without an experienced estimator errors will hinder the chances of the estimate of construction costs to be accurate.

4.4 Hypotheses

Human error or errors in judgement are responsible for most mistakes during estimating.
The original hypothesis is correct.

Chapter 5: Which liabilities, responsibilities, and risks arise from an estimate?

5.1 Introduction

Estimating is sometimes described as an art. This suggests that estimating requires some form of creativity and that it is a skill or ability that can be developed by practice.

Estimating may require a great deal of creativity as at the time of the estimate there may be almost no information to base it on. The information provided may be as little as a hand drawn sketch with the length, breadth and height of the building indicated. In this case the quantity surveyor will decide on finishes, materials, structure, etc. This will require technical knowledge and experience, as well as some time.

Most estimates are like quotes, if the project does not continue, the quantity surveyor will not be compensated for his effort. This leads to many estimates being completed by less costly students and inexperienced quantity surveyors, or to the use of inaccurate methods and shortcuts.

Provisional amounts have to be included in the estimate. Specialist installations are usually priced by the asking for an estimate or quote from a potential subcontractor. He too prices the installation with very little information and time available.

A client will also have a figure in mind when asking for an estimate. If the estimate is over this amount the client may instruct the quantity surveyor to lower the estimate by fiddling with the rates, quantities, or specifications in the estimate.

With many factors such as these, an estimate can be inaccurate. The quantity surveyor, who is not an architect, engineer or the employer, may carry the blame for budget overruns and undesirable return on investment should the client continue with the project on the basis of his estimate.

As in the case of an Architect or Engineer, a quantity surveyor providing an estimate must assume, in the absence of any express instruction to the contrary, that the Employer is looking for a forecast of the likely final cost of the project, and not an estimate based on current prices. An estimate must make an allowance for, or give warning about, likely inflation and contingencies. The quantity surveyor must clearly indicate the extent to which his estimate is subject to any variation or possible change. The estimates of the building costs themselves must be reasonably accurate and capable of being justified in detail. (www.fenwickelliott.co.uk Access: 3 September 2010)

The quantity surveyor should exercise some caution when producing estimates as he may be liable for damages the estimate is not accurate.

5.2 The quantity surveyor's liability

The quantity surveyor must carry out his duties with due care, failing which he may be liable for damages for negligence.

The quantity surveyor is the client's mandatory and acts as his consultant, but is not his agent in the sense he has no power to create contractual obligations that bind his client. Like the architect, he may be liable to his client for any damages occasioned by his negligence in the course of his professional duties. (Finsen: 2005)

These duties include the production of an estimate of the project costs.

"*The private quantity surveyor shall at all times accept responsibility for the accuracy of his estimates. The decision whether to proceed or cancel a project depends directly on the estimates."* (www.info.gov.za Access 10 September 2010)

Further, when appointed on a project for the department of public works, the following applies:

"Directors, members, partners of the company with limited liability/close corporation/enterprise with limited liability have to accept herewith jointly and severally, in his/our personal capacity, full liability for the due fulfilment of all obligations in respect of the applicable appointment as indicated in the letter of appointment." (www.info.gov.za Access 10 September 2010)

In the case of Moneypenny v Hartland, the judge said:

"A man should not estimate a work at a price at which he would not contract for it; for if he does, he deceives his employer… If a surveyor delivers an estimate greatly below the sum at which a work can be done, and thereby induces a private person to undertake what he would not otherwise do, then I think he is not entitled to recover; and this doctrine is precisely applicable to public works. There are many in this metropolis which would never have been undertaken at all, had it not been for the absurd estimates of surveyors". (www.fenwickelliott.co.uk Access: 3 September 2010)

The quantity surveyor will be held liable.
For example X (the consultant) under estimate a project for one or more of the following reasons:
(i) To improve the feasibility of the project
(ii) Because he did not get the promotions that he expected
(iii) Because the inherent laziness of man, did the project leader not check the estimate thoroughly.

The project fails as a combined result of (i), (ii) and (iii) and it now becomes negligence, or the non-practice of the reasonable knowledge and care that the client could have expected in terms of the contractual relationship with the professional firm.
The law force X to pay compensation to all parties who suffered.
(Potgieter 2009)

The following information serves as background of the legal aspects which accountability can establish on a practicing quantity surveyor.

5.3 Juristic accountability

Juristic accountability stems from the following:

- Delict; And/or
- Breach of contract

In many cases the actions against a quantity surveyor could be both delictual and contractual because of loss suffered due to negligence.

Delictual actions follows if there was, from a juristic point of view, an obligation to act or not to act in a certain way, and such obligation was ignored (unlawful action with intent)

Contractual action follows as a result of a breach of contract, where such a breach caused damages to the other party (ies) to the contract.
(Potgieter 2009)

5.3.1 Delictual accountability

For delictual accountability to be established, it is necessary that the following five elements are present at all times:

Act

A wilful act must take place; such an act can also be a refrain, i.e. the gatekeeper must close the gate at 4 o clock, but forgets to do so; that is a refrain (‘late”)

Unlawful

The act or refrain that caused the damage must be unlawful, in other words the act must cause a violation of an obligation in terms of the law.

Guilt

Guilt is the blame that strikes a person in terms of the law. Someone who act in terms of the law, cannot be blamed, thus there can only be the question of guilt once someone has acted unlawfully

Damages

A person can only suffer damages to his estate and therefore damages means prejudice to a person’s wealth, and if it flow from juristic viewpoints.

Causality

Before a quantity surveyor can be held delictually accountable, it must be certain that that he caused the damages to the other party. There must be a link between the action of the quantity surveyor and the loss of the other party.

To establish such a causal link, it must be established that an act had a certain consequence, and the following must be kept in mind:

(Potgieter 2009)

5.3.1.1 Tests for liability

The "condition sine qua non" test

According to this an act is the cause of a result if the act cannot disappear without the result also disappearing. The act therefore must be the "condition sine qua non" (cause) of the result. (Potgieter 2009)

Foreseeable test

To establish if a conduct has been negligent, or for the purposes of liability, the foreseeable test is done, which consist of three elements:
A reasonable man would have:

- Foreseen the reasonable possibility of his conduct injuring another in his person or property
- Taken reasonable precaution to prevent such damages
- Ensured that he has taken steps to prevent damages

(Potgieter 2009)

The reasonable man test

Whether the reasonable man could have foreseen probable damage to others and whether he has taken steps to prevent such damage, depends on the circumstances of the matter, the nature of the defendant's actions and the specific qualities of this mystic person - himself. His powers of prediction depend on characteristics such as knowledge, intelligence, concentration, perception, memory, judgement, etc.

The concept of the reasonable man points to a person who has the qualities that the general public would expect from someone who looks after their interests. He is the personification of what the public see as ideal standards of care that they want from people in their daily conduct.

Very important are the following elements of the reasonable man:

Knowledge

The standard of the reasonable man implies that he must have a knowledge that will enable him to realise that certain acts can cause damages. The reasonable man is also observant.

Mental condition

Except where mental illness causes someone to be incapable of guilt, the law makes no allowance for mental condition.

Skills

Skills can be described as a special ability, which is the result of skills developed by special training and experience. A lack of skills or knowledge is not ‘per se” negligence, but it is negligent to participate willingly in activities if the person does not have the knowledge and skill to comply with the responsibilities to complete such activities.

Someone who takes part in a profession that requires special knowledge and skills, should not only apply reasonable care, but must also meet the criteria of the reasonable man when implying that he has got such knowledge.
The skills/ability of a beginner in a specific profession always creates a problem. While it is necessary that beginners gain experience and skills through the exercising of that profession, it is also clear that their lack of experience can cause a danger to other people.
Although a beginner should exercise caution to reduce the risk that his inexperience might cause, it cannot be expected of him to have the same level of skills as an experienced practitioner. On the other hand, if the public is subjected to serious damage because of such inexperience, it cannot be condoned. (Potgieter 2009)

5.3.2 Contractual accountability

When parties contract, and the basis of the consequences for the parties are stipulated, then such a contract put the conditions on which consensus have been reached, on paper. Such basis and conditions should make the following clear:

- The rights and obligations of each party
- The subject about what is contracted
- The different parties and their domiciles
- The result of non-performance of the obligations by any of the parties to the contract.

The result of non-performance can vary, but is normally left to common law, which includes consequential damages. Very important is the fact that the conditions of contract are only valid for the parties to the contract.
(Potgieter 2009)

Example:
A client appoints a quantity surveyor for a building project. The quantity surveyor estimates the building in such a way that the client suffers damages and the tenants cannot conduct their business profitably because they must pay higher rental to make it worthwhile for the client.
The quantity surveyor gets sued by the client. The facts are as follows:

The client contracted with the quantity surveyor in terms of which the client could expect reasonable care and service from the quantity surveyor, but the quantity surveyor allegedly did not exercise such care and as a result the client suffered damages and is contractually obliged to compensate the client.

The tenants did not have a contract with the quantity surveyor, but through the quantity surveyor's actions/refrain, the tenants suffered a loss. The tenants therefore claim from the client their loss through delict.

Discussion:

The quantity surveyor breached his contract with the client and is therefore accountable for the client's loss on grounds of breach of contract.
Alternatively there was a duty according to law from the quantity surveyor to ensure that the client did not suffer any losses because of his estimate (delictual accountability).
The tenants' losses are recovered from the employer on grounds of delict, as follows:

The act

The client acted negligently, or refrained from acting, which caused negligence.

Unlawfulness

The client had a responsibility to see that third parties (the tenants) did not suffer losses because of their actions

Blame

Because of the client's actions, or lack thereof, the tenants suffered loss and now the law blames the client.

Damage/loss

Because of the client's actions, the tenants cannot continue with their business and is therefore prejudiced.

Cause

The loss suffered by the tenants is the result of the client's actions

Condition sine qua non test

Such loss would not have occurred if the client's actions did not take place.

The reasonable man and foresee-ability test

The knowledge and skills of the reasonable quantity surveyor should have warned the client that their actions could cause damage to the tenants. (Potgieter 2009)

This means that the quantity surveyor will be liable for the damages claimed by the tenants from the client.

5.4 Proving negligence

The quantity surveyor can only be held liable if the client based his decision to proceed with a project based on an inaccurate estimate. Only in the event that the client can prove that he would not have undertaken such a project if he knew the exact costs, will the quantity surveyor be professionally liable. (Potgieter 2009)

If the employer continues with a project and there is a difference between the actual cost and the quantity surveyor's estimate, this may or may not constitute as negligence. The quantity surveyor may or may not be liable for damages arising from such negligence. The negligence of the quantity surveyor must first be proved.

In *Copthorne Hotel (Newcastle) Limited v Arup Associates*, the claimant alleged negligence in respect of the defendant's estimate for piling works. The estimate allowed £425,000 for this work; the successful tender was for £930,000. The Judge said of this discrepancy as follows:

"*I hope and believe that I am not over simplifying if I record the impression that the plaintiff's main hope was that I would be persuaded to find in their*

favour simply by the size of the gap, absolutely proportionately, between the cost estimate and the successful tender. The gap was indeed enormous. It astonished and appalled the parties at the time and it astonishes me. I do not see, however, how that alone can carry the plaintiff home… Culpable underestimation is of course one obvious explanation of such discrepancy, but far from the only one. The Contractor may have over-specified from excessive caution, or to obtain a greater profit, or to suit the drilling equipment available, or for some other reason. Market conditions may have changed, or have been subject to some distortion outside the knowledge or foresight of a reasonably competent professional adviser. These possibilities are not mutually exclusive among themselves or as between them and Arup's negligence, but without evidence on which I can make a finding as to the sum which Arup, acting with due care and skill, should have advised… I am not in a position to find that negligence was even one of the causes." (www.fenwickelliott.co.uk Access: 3 September 2010)

The above would suggest that proving negligence in the case of a deviation between the estimate and the actual cost would be almost impossible.

In the case of *Savage v Board of School Trustees*, the estimate of $110,000 was twice given in respect of proposed works. When tenders were received, the lowest was $157,800, 43% over the estimated cost. The scope of the project was significantly reduced. The claimant again estimated that the project would cost no more than $110,000, yet the lowest tender for even the scaled down project was $132,900. The Judge commented *"So on this one school, the plaintiff was three times gravely in error in his estimates. And three times are a lot"*. (www.fenwickelliott.co.uk Access: 3 September 2010)

The finding that the plaintiff had been negligent was based largely upon the scale of the underestimation, and the frequency with which it was repeated. But on analysis, the Court's conclusion was based in large part upon a careful consideration of the plaintiff's workings, and the conclusion that

"much of the plaintiff's difficulty was caused by his methods of checking and re-checking his estimates". The mere fact that an estimate is very significantly less than the final cost is not, on its own, enough to justify a finding of negligence. (www.fenwickelliott.co.uk Access: 3 September 2010)

If the Employer specifies a cost limit, the quantity surveyor must consider whether the limit is likely to be exceeded and give any relevant warning. In *Flanagan –v- Mate* the quantity surveyor's fee claim failed because no warning had been given by them to the Employer that the Employer's cost limit could not be achieved. Although a building project might have cost the Employer more than he reasonably anticipated, it will also be worth more than would otherwise have been expected, and the basis for the assessment of damages arising from a negligent estimate is far from clear cut. The overrun may be the starting point for any assessment of damages. Even if the claimant has ultimately obtained value for his unexpected expenditure, he may still have a claim for increased interest payments on the additional money borrowed to finance the more expensive project. Other possible heads of claim would include any additional maintenance or staff costs for the completed building arising due to the additional cost of the work. (www.fenwickelliott.co.uk Access: 3 September 2010)

From the above it can be deduced that it is difficult to prove negligence in the case of an inaccurate estimate. The amount for which damages can be claimed is also a difficult matter.

5.5 Conclusion

A client will also have a figure in mind when asking for an estimate. If the estimate is over this amount the client may instruct the quantity surveyor to lower the estimate by fiddling with the rates, quantities, or specifications in the estimate. If the quantity surveyor is influenced by the client's expectations then he is not acting as an independent expert.

The estimates of the building costs themselves must be reasonably accurate and capable of being justified in detail. (www.fenwickelliott.co.uk Access: 3 September 2010)

Quantity surveyors do not always grasp the seriousness of an estimate while producing it. More care should be taken to make sure that estimates are accurate and independent.

5.6 Hypotheses

The quantity surveyor is liable for costs incurred by the client if he bases his decision to continue with the project on the estimate prepared by the quantity surveyor.
The original hypothesis is correct.

Chapter 6: Summary and Conclusions

6.1 Background

Estimating: A valid exercise or a false sense of security?

Estimating is an exercise where the cost of a project is determined. The appointed quantity surveyor will usually do the exercise. The quantity surveyor must use his knowledge and expertise to complete an estimate, as many of the design and specification are incomplete at this stage.

The uses of estimates vary from project to project. Essentially an estimate will show the required budget to complete the project.

Clients have their own budget or figure in mind from the beginning. Estimates will often be subject to adjustment in order to fit within the client's budget. This can be due to the quantity surveyor seeking appointment, or the client's belief that the project to be completed is within his budget.

The research aims to explore the importance of an accurate estimate.

6.2 Summary

The aim of this study was to examine the importance of an accurate estimate for all the parties involved in the construction process; to recommend good practices when compiling estimates; and identify the flaws of estimating. The study focuses on estimating in South Africa.

The introductory chapter 1 sets out the main objective of the study as well as the sub problems. Chapter 1 also contains the delimitations, assumptions, and the importance of the study.

Chapter 2 gives a broad outline of the production and uses of estimates by discussing standard methods currently used in practice to produce estimates for construction work.

The use of computers in the built environment is on the rise; chapter 3 discusses whether this will improve the production of estimates. This is an important chapter because it is a relatively new and constantly changing field. Information is gathered, fittingly, through online brochures and websites of the common software developers.

Chapter 4 seeks to identify common sources of errors, and advise on how to minimise or avoid these errors. To gather information interviews were conducted and online discussions were referenced.

A developer will want to avoid financial loss or unrealised returns on investment. Many often overlook the serious effects and consequences of an inaccurate estimate. Chapter 5 is dedicated to the risks and responsibilities the parties involved may have.

6.3 Conclusion

The estimating methods used for estimating construction costs differ from project to project as well as between the stages of projects. The degree of accuracy depends on the information available and the method used. Lack of experience of the estimator, coupled with the unsuitability of comparable information, is usually the factors that produce unreliable and inaccurate construction estimates. Therefore care must be taken provide for supervision of inexperienced staff, and to select the correct comparable projects (as well as adjusting the variances between them responsibly).

The fact that there are a number of standard methods used for estimating, with variable approaches and degrees of accuracy, supports the idea that clients and quantity surveyors alike are not satisfied with the gap between estimates and actual construction costs. The hypotheses of chapter 1 states: “An accurate estimate by a responsible quantity surveyor is very useful to measure the feasibility of, as well as to provide an initial budget for a project.” This can only be true if accuracy is attained.

Estimating the construction cost of projects is more accurate and less time consuming because of the use of construction cost estimating software. Note that the software is an aid and that it still requires a knowledgeable operator for the estimate to be realistic. By improving the accuracy of, and time needed to complete an estimate, estimating software solutions are creating better estimates.

Accuracy of the estimate is normally hampered by common human errors. By following guidelines and with the use of computers, these errors may be avoided.

Estimating involves planning for future events. There will always be changes and unforeseen events, and the parties involved should keep this in mind when using an estimate. The quantity surveyor should not rely on the fact that an estimate is only an indication of costs, as he is liable for costs incurred by the client if he bases his decision to continue with the project on the estimate prepared by the quantity surveyor.
The decision whether to proceed or cancel a project may depend directly on the estimates. The estimate should as far as possible reflect the expected final cost of construction.

Quantity surveyors must take into account the seriousness of an estimate before fiddling with the rates or quantities of an estimate. Architects and clients should try to provide as much information as possible to ensure an accurate estimate. They should then accept the results, and make changes accordingly. An unsuccessful project will have a negative effect on all stakeholders.

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