

The copyright of this thesis vests in the author. No quotation from it or information derived from it is to be published without full acknowledgement of the source. The thesis is to be used for private study or non-commercial research purposes only.

Published by the University of Cape Town (UCT) in terms of the non-exclusive license granted to UCT by the author.

**COMPETITIVE STRATEGIES IN CONSTRUCTION FIRMS:
THE IMPACT OF ALTERNATIVE PROJECT DELIVERY
SYSTEMS**

University of Cape Town

**Competitive strategies in construction firms: the impact of alternative project
delivery systems**

by

George Mbuthia

University of Cape Town

**Submitted in fulfilment of the requirements for the degree of Master of Science
in Construction Economics and Management, Department of Construction
Economics and Management, University of Cape Town**

September 2001

ACKNOWLEDGEMENTS

I wish to acknowledge the following persons for their invaluable assistance in the completion of this thesis:

This work would not have been possible without the guidance of my supervisor, Mr. Bob Hindle. For his tireless efforts, mentoring and assistance above and beyond the call of duty I am exceedingly grateful.

Professor P. D. Rwelamila for his help and advice

The staff at the Department for Construction Economics and Management, for all their support and encouragement in so many ways

The interviewees who kindly took time and effort to help answer my questions

Ian Durbach and Francesca Little at the Department of Statistics, University of Cape Town, for their help in the analysis of data

Professor Paul Bowen, head of the Department for Construction Economics and Management, for the invaluable assistance in all fields

And to the many friends and colleagues I have met in Cape Town who have made this such an enjoyable experience. Ciru, Dorothy, Kimathi, Abie, Farid and the countless others, it has been a pleasure.

DEDICATIONS

This work is dedicated to the Mbuthia's (and Kibunja's), for being the greatest family ever. And to Ruth, who will be.

University of Cape Town

DECLARATION

I, George Mbuthia, declare that the work contained within this thesis is my own original work and to the best of my knowledge has not been submitted previously for any other degree.

Signature

Date

University of Cape Town

SYNOPSIS

This thesis investigates the impact of the introduction of alternative project delivery systems to the traditional on the competitive strategies of construction firms. The work focuses on project delivery systems from a construction company perspective, and draws from the experiences all over the world for its findings.

A literature review of project delivery systems, their evolution and introduction was undertaken in depth. This showed the types of delivery systems, their advantages and disadvantages and the reasons they were preferred. A review of strategy was then undertaken to introduce and discuss the concepts that influence competing firms. The construction industry has unique characteristics that differentiate it from other industries. A short discussion of these characteristics and how they influence strategy in construction companies was therefore done. This then led to a review of strategy in the construction industry. The concepts of project delivery and strategy in construction companies were then linked to show, with illustrations, how delivery systems are used as competitive strategy.

To investigate the topic further construction companies were surveyed to find out the connection between the two concepts. It was found that alternative delivery systems are increasingly being used by the firms. They were also familiar with concepts of formal strategy and were actively using such concepts. Firms were found to be using delivery systems specifically as a competitive strategy and intended to do so more in future. The findings suggest that the use of delivery in such a manner was not the result of a deliberate plan but more a reaction to the changes in the industry. Construction firms need a greater appreciation of the role of project delivery systems in their strategy as this will help them achieve their objectives better, and result in a more efficient industry.

TABLE OF CONTENTS

| | |
|------------------|-------|
| Title page | (i) |
| Acknowledgements | (ii) |
| Dedications | (iii) |
| Declaration | (iv) |
| Synopsis | (v) |
| List of Tables | (xii) |
| List of Figures | (xiv) |
| Abbreviations | (xv) |

CHAPTER 1: THE PROBLEM AND ITS SETTING

| | | |
|-----|-------------------------|---|
| 1.1 | Introduction | 1 |
| 1.2 | Problem statement | 6 |
| 1.3 | Objectives | 6 |
| 1.4 | Hypotheses | 7 |
| 1.5 | Importance of the study | 7 |
| 1.6 | The delimitation's | 7 |
| 1.7 | Definition of terms | 8 |
| 1.8 | Assumptions | 9 |
| 1.9 | The study outline | |

CHAPTER 2: PROJECT DELIVERY SYSTEMS: THEORY AND PRACTICE

| | | |
|-----|--|----|
| 2.1 | Introduction | 11 |
| | 2.1.1 Definitions: | 11 |
| 2.2 | The evolution of project delivery systems | 13 |
| 2.3 | Reasons for the evolution of new project delivery systems | 15 |
| | 2.3.1 Increasing project complexity | 16 |
| | 2.3.2 The shift to private sector financing of public projects | 16 |
| | 2.3.3 Single point responsibility and improving communications | 17 |
| | 2.3.4 Customer dissatisfaction | 18 |

CHAPTER 2: (continued)

| | | |
|--------|--|----|
| 2.3.5 | Time and its implications on costs | 19 |
| 2.3.6 | The influence of risk management | 19 |
| 2.3.7 | Changing economic fortunes | 21 |
| 2.3.8 | Contractor marketing efforts | 22 |
| 2.3.9 | the effect of speculative building | 23 |
| 2.3.10 | Changing attitudes | 24 |
| 2.3.11 | The effect of globalisation | 24 |
| 2.4 | The theory of project delivery systems | 26 |
| 2.4.1 | Project delivery system and contract strategy | 26 |
| 2.4.2 | Categories of project delivery system | 26 |
| 2.4.3 | Types of project delivery system | 29 |
| | The traditional project delivery system | 29 |
| | Design and build | 33 |
| | Management contracting | 35 |
| | Construction management | 36 |
| | Design and manage | 36 |
| | The British property federation (BPF) system | 37 |
| | Partnering | 38 |
| 2.4.4 | Contractor responses to alternative delivery systems | 42 |
| 2.4.5 | What project delivery system? The client's decision | 45 |
| | Who is the client? | 45 |
| | Client categories | 45 |
| | Client criteria for project performance | 47 |
| | Clients criteria | 49 |
| | Determinism and objectivity | 50 |
| 2.5 | Project delivery system and client satisfaction | 51 |
| 2.6 | The South African situation | 53 |
| 2.7 | Summary | 54 |

CHAPTER 3: STRATEGY

| | | |
|-----|---|----|
| 3.1 | Introduction | 55 |
| 3.2 | Definitions of strategy | 55 |
| | 3.2.1 Components of strategy | 56 |
| | 3.2.2 Levels of strategy | 56 |
| 3.3 | What is the value of strategy? | 56 |
| 3.4 | Emergence of strategic thinking | 57 |
| 3.5 | Strategy and competitive advantage | 59 |
| 3.6 | Management and strategy | 63 |
| 3.7 | Theories of competitive strategy | 65 |
| | 3.7.1 The classical approach | 65 |
| | 3.7.2 The evolutionary approach | 66 |
| | 3.7.3 The processual approach | 67 |
| | 3.7.4 The systemic approach | 68 |
| | 3.7.5 Summary of the attributes of strategy categories | 69 |
| | 3.7.6 Contingency theories of strategy | 69 |
| | Case study tradition | 70 |
| | Organisation theory | 70 |
| | Empirical evidence | 71 |
| | Contingency theories based on conceptualisation | 71 |
| | 3.7.7 Other explanations | 71 |
| 3.8 | Strategy formulation and the strategic planning process | 72 |
| | 3.8.1 Strategy formulation | 72 |
| | 3.8.2 Game theory | 76 |
| | 3.8.3 The strategic planning process | 77 |
| | Definition of strategic planning | 77 |
| | The strategic planning process | 78 |
| 3.9 | Strategic choices | 79 |
| | 3.9.1 The five forces model | 82 |
| | 3.9.2 The market cycle model | 84 |
| | Idea concepts | 84 |
| | Service concepts | 85 |
| | 3.9.3 Portfolio analysis and strategic decision making | 87 |

CHAPTER 3: (continued)

| | | |
|--------|---|----|
| 3.10 | Strategic implementation and evaluation | 88 |
| 3.10.1 | Strategic implementation | 88 |
| 3.10.2 | Strategic evaluation | 90 |
| 3.11 | Conclusions | 91 |

CHAPTER 4: STRATEGY IN CONSTRUCTION

| | | |
|----------------------|---|-----|
| 4.1 | Introduction | 92 |
| 4.2 | The nature of the construction industry | 92 |
| 4.2.1 | Sectors of the industry | 93 |
| 4.2.2 | Fragmentation | 94 |
| 4.2.3 | Other construction industry characteristics | 96 |
| 4.2.4 | Changing demand | 97 |
| 4.2.5 | The nature of construction companies | 98 |
| 4.2.6 | The construction product | 99 |
| The physical product | | 99 |
| The service | | 100 |
| 4.2.7 | Construction markets and market structures | 100 |
| 4.2.8 | Selling to construction markets | 102 |
| Competitive bidding | | 103 |
| Negotiation | | 104 |
| Property development | | 104 |
| 4.2.9 | The organisation and management of construction companies | 104 |
| Project management | | 107 |
| Strategic thinking | | 107 |
| 4.3 | Strategy for construction companies | 108 |
| 4.3.1 | Marketing strategies | 109 |
| 4.3.2 | Production strategy | 110 |
| 4.3.3 | Market orientation versus production orientation | 111 |
| 4.3.4 | The link between corporate, marketing and production strategies | 112 |
| 4.3.5 | The strategic business area | 113 |
| 4.4 | Competitive strategy alternatives for construction companies | 115 |

CHAPTER 4: (continued)

| | | |
|-------|---|-----|
| 4.4.1 | Generic competitive strategies | 118 |
| | Cost leadership | 118 |
| | Differentiation | 119 |
| | Focus | 119 |
| | Expansion (growth) | 120 |
| | Stability | 120 |
| | Retrenchment (divestment) | 121 |
| 4.4.3 | Strategic mode | 121 |
| | Internal strategies | 121 |
| | External strategies | 121 |
| | Combination (joint development) strategies | 122 |
| 4.4.4 | Strategic variations | 122 |
| | Market penetration | 122 |
| | Market development | 122 |
| | Product development | 123 |
| | Diversification | 123 |
| | Regionalisation and internationalisation | 124 |
| 4.5 | Project delivery systems as construction company strategies | 127 |
| 4.5.1 | Project delivery systems as strategies | 130 |
| | As generic competitive strategies | 130 |
| | Focus | 130 |
| | Differentiation | 131 |
| | As strategic variations | 131 |
| 4.6 | Conclusion | 132 |

CHAPTER 5: THE RESEARCH METHODOLOGY

| | | |
|-------|---|-----|
| 5.1 | Introduction | 134 |
| 5.2 | Factors dictating choice of methodology | 134 |
| 5.2.1 | Qualitative or quantitative research? | 134 |
| 5.2.2 | The data | 136 |
| 5.2.3 | Positivist or naturalistic research? | 137 |

CHAPTER 5: (continued)

| | | |
|-------|---------------------------------|-----|
| 5.3 | The methodology | 138 |
| 5.3.1 | Literature survey | 138 |
| 5.3.2 | Structured questionnaire survey | 138 |
| 5.4 | The sample | 139 |
| 5.5 | The response | 140 |
| 5.5.1 | Total response | 140 |
| 5.5.2 | Validity of response | 141 |
| 5.5.3 | Analysis of responses | 141 |

CHAPTER 6: THE RESULTS OF THE SURVEYS AND DATA ANALYSIS

| | | |
|-------|---------------------------|-----|
| 6.1 | Introduction | 142 |
| 6.2 | The results of the survey | 142 |
| 6.3 | Testing the hypotheses | 172 |
| 6.3.1 | Hypothesis 1 | 172 |
| 6.3.2 | Hypothesis 2 | 177 |
| 6.3.3 | Hypothesis 3 | 178 |
| 6.3 | Conclusions | 181 |

CHAPTER 7: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

| | | |
|-----|--|-----|
| 7.1 | Introduction | 180 |
| 7.2 | Conclusions | 180 |
| 7.3 | Summary of findings | 181 |
| 7.4 | Questions arising from the methodology, data | 183 |
| 7.5 | Recommendations | 183 |
| | References | 185 |

LIST OF TABLES

| | | |
|------|--|-----|
| 6.1 | Type of construction work undertaken | 142 |
| 6.2 | Movement between market sectors | 143 |
| 6.3 | Size of firms | 144 |
| 6.4 | Profitability of firms as a percentage of turnover | 145 |
| 6.5 | Methods of getting work | 146 |
| 6.6 | Preferred methods of getting work | 148 |
| 6.7 | Strategy formulators by firm size | 150 |
| 6.8 | Existence of a mission statement by firm size | 151 |
| 6.9 | Importance of strategy | 153 |
| 6.10 | Importance of strategy according to firm size | 153 |
| 6.11 | Construction sectors focussed on | 154 |
| 6.12 | Construction sectors avoided | 154 |
| 6.13 | Sources of competitive advantage leading to the securing of work | 155 |
| 6.14 | Sources of competitive advantage leading to profitability | 156 |
| 6.15 | Number of respondents ranked according to strategy used in the past | 157 |
| 6.16 | Number of respondents ranked according to strategy used at present | 157 |
| 6.17 | Number of respondents ranked according to preferred future strategy | 158 |
| 6.18 | Primary indicators of business success | 160 |
| 6.19 | Primary indicators of business success according to company size | 161 |
| 6.20 | Knowledge of project delivery systems | 161 |
| 6.21 | Knowledge of delivery systems by turnover | 162 |
| 6.22 | Project delivery systems used in the past and at present | 163 |
| 6.23 | Project delivery systems used in the past and at present - p-levels | 164 |
| 6.24 | Percentage of firms using particular delivery systems in the past | 165 |
| 6.25 | Percentage of firms using particular delivery systems at present | 165 |
| 6.26 | Skills required for new delivery systems | 166 |
| 6.27 | Reasons for changes in delivery systems | 167 |
| 6.28 | Significant effect of changes in delivery systems | 168 |
| 6.29 | Reasons for using project delivery systems other than the traditional | 168 |
| 6.30 | Project delivery systems ranked according to ability to generate profits | 169 |
| 6.31 | Firms showing variance between delivery preference and usage | 170 |

| | | |
|------|---|-----|
| 6.32 | Project delivery systems ranked according to financial risk | 170 |
| 6.33 | Advantages of alternative project delivery systems over the traditional | 171 |
| 6.34 | Results of the Mann-Whitney test on question 14 | 174 |
| 6.35 | Results of the Mann-Whitney test on strategy 2 | 175 |
| 6.36 | Results of the Mann-Whitney test on all strategies | 176 |
| 6.37 | Sizes of the groupings | 178 |
| 6.38 | Summary of Mann-Whitney tests | 179 |

University of Cape Town

LIST OF FIGURES

| | | |
|-----|---|-----|
| 2.1 | Allocation of financial risk | 20 |
| 2.2 | Categories of clients | 61 |
| 3.1 | The generic value chain | 57 |
| 3.2 | A Framework of Product Valuation for Customers | 63 |
| 3.3 | Generic perspectives on strategy | 66 |
| 3.4 | Hunger and Whelan's strategy formulation model | 79 |
| 3.5 | The Strategy Clock: Competitive strategy options | 82 |
| 3.6 | The five competitive forces that determine industry profitability | 84 |
| 4.1 | Matrix organisation showing dual project manager and functional structure | 106 |
| 4.2 | The factor of time in manufacturing strategy | 113 |
| 4.3 | Linking corporate, marketing and production strategy | 114 |
| 4.4 | The strategic business area in construction | 115 |
| 4.5 | The construction value chain under the traditional delivery system | 117 |
| 4.6 | The Strategic alternatives for a construction company | 118 |
| 4.7 | The Strategic Paths for a Construction Company | 129 |
| 4.8 | Delivery systems from customer and construction firm points | 120 |
| 5.1 | Triangulation of qualitative and quantitative data | 135 |
| 6.1 | Changes in selling methods | 146 |
| 6.2 | Changes in selling methods | 147 |
| 6.3 | Changes in strategies used | 159 |

ABBREVIATIONS

| | |
|-------------|---|
| BOT | Build-operate-transfer |
| BOOT | Build-own-operate-transfer |
| BPF | British Property Federation |
| CIB | Construction Industry Board (United Kingdom) |
| CIB | International Council for Research and Innovation in Building and Construction |
| DBFO | Design build finance operate |
| DPW | Department of Public Works (South Africa) |
| DPWS | Department of Public Works and Services (New South Wales, Australia) |
| DETR | Department of the Environment, Transport and the Regions (United Kingdom) |
| ISIC | International Standard Industrial Classification of all Economic Activities |
| JCT | Joint Contracts Tribunal |
| NEDO | National Economic Development Office |
| OPEC | Organisation of Petroleum Exporting Countries |
| PFI | Private finance initiatives |

CHAPTER 1

THE PROBLEM AND ITS SETTING

1.1 Introduction

The construction industry is a key industry in economies all over the world, accounting for 7 to 15% of the gross domestic product of most countries and total world construction: and the estimated total spending in the construction market in over 150 nations was approximately US \$3220 billion in 1999 alone (Male and Stocks, 1991; Tulacz, 1999). Its importance in employment and as a regulator of the economy was underlined by Ball (1988), while Wells (1986) stressed the role construction plays in providing capital goods to the economy, with over one half of the capital goods in most countries being produced by the industry. Furthermore, the industry has links to a large number of supplementary industries as a consumer of their products, such as the steel and aluminium industries, glass, plastic and timber product manufacturers and the financial sector (as a consumer of capital).

Because of its importance, the construction industry has come under intensive scrutiny over the past half-century or so for its perceived reputation for poor performance and dissatisfied clients. The Department of the Environment, Transport and the Regions (DETR) (1998) listed time, cost and quality as three areas in which construction was seen by customers to be under-achieving, and Ball (1988) noted that virtually all the industry's clients seemed unhappy with its products, saying frequently construction projects took too long, cost too much, did not meet user requirements and did not last as long as they should have.

Reports of poor quality, project delivery and productivity in the industry know no national boundaries and in various countries attempts have been made to address these and other problems identified by the relevant authorities. The Implementation and Steering Committee (ISC) (1997) identified some of the reform objectives for Queensland's (Australia) construction industry as achieving quality building first time at an affordable price, adequate consumer protection, better dispute resolution and

industry viability and profitability. The Department of Public Works and Services (DPWS, 1998) identified the need -in New South Wales- to improve industry's business practices, capacity and efficiency, with the emphasis being placed on improvements in productivity and quality across the industry.

In South Africa, amongst the challenges that led to the introduction of a government White Paper were falling output and quality, an unstable workload, declining investment and manpower training, and the need to promote empowerment and industry capacity in previously disadvantaged sectors of the economy (Department of Public Works (DPW), 1998). The British construction industry has seen a number of reports aimed at improving the performance of the construction industry since the Second World War (for example, the Simon, Phillips, Banwell and the Latham Reports from 1944 to 1994). These culminated in the Egan report (DETR, 1998) which highlighted client dissatisfaction with the price, quality and delivery time of the product. Construction's low profitability, lack of innovation and marginal investments in capital and research and development were also listed as areas of concern to stakeholders. In Love and Smith's (2001) opinion, the problems faced by construction were not technological by any means, but organisational and cultural.

Apart from the perceived poor quality of products, other drivers for change within the construction industry have been more critical requirements for the project parameters of cost, time and utility (Rwelamila, 1996). High inflation rates have put pressure on project duration in many economies, and Mustapha, Naoum and Aygun (1994) identified this as one of the problems facing Turkey's construction industry. In addition, client desire for an integrated approach to the delivery of constructed facilities has been at the forefront of instigating change in the construction industry in New South Wales (DPWS, 1998) in response to an increasingly fragmented contractor pool.

Contractor-push factors include reaction to increasing competition locally and abroad with international contractors and to technological innovations resulting in changes in the way people do business. Market trends and liberalisation, incorporating privatisation, the transition from command economies to market-oriented economies and the economic panacea also referred to as structural adjustment policies in

developing economies have created client demands for a more productive and efficient industry (McDermott, 1999).

The industry's unique characteristics are responsible for much of the negative opinion that surrounds it. There is the oft-quoted separation of design and production found only in one other industry, the shipbuilding industry, and that to a diminishing extent. There is the fragmented nature of the industry, with myriad professions each in charge of and jealously protecting their turf and all having a say in the construction project. Fragmentation is also evident in the many contractors and specialist sub-contractors who dot the industry's landscape. In the words of Morledge, (1999):

“...the scenario of a fragmented and largely inexperienced customer base and a similarly fragmented but knowledgeable supply side, resulting in disappointment is one where the potential for improvement is significant but the medium for improvement is almost non-existent”.

Comparison with other industries poignantly brings home the deficiencies of construction industry product delivery practice in responding to customer wants (Koskela, 1992; DETR, 1998). Case studies by Doyle and Bridgewater (1998) showed the emphasis the motor vehicle, electronic, airline, fast-moving-consumer-goods and financial services industries place on understanding consumer wants, and then designing and delivering goods to match these wants. They achieve this through a direct interface between customer and producer.

The customer focus mindset is the end result of an evolutionary process that can be traced back to the concept of division of labour espoused in Adam Smith's 1776 book, *The Wealth of Nations* (Hammer and Champy, 1995). Growth in markets and company sizes led to bureaucracies in the 1820's, specialisation and management innovation in the 1920's to 1950's and deterministic management and organisational models in the 1950's and 1960's. By then, an excess of demand over supply characterised the world and quality and service standards were often appallingly low. Increased global competition spurred by the emergence of South East Asia as an economic power zone contributed to the recognition of the importance of marketing. In addition, the excess of supply (capacity) over demand led to the emergence of

marketing (creating consumer preference) rather than manufacturing as the basis for competitive advantage. Finding manufacturing capacity was easier to do (and thus less creating of a unique position) than producing unique brands. Present thinking in these industries has shifted to viewing relationships with customers as all-important, and the focus is therefore on creating loyalty, branding, measuring customer satisfaction and forging closer links with them.

One response to the problems facing construction's supply side has been the introduction of new project delivery systems. As McDermott (1999) pointed out, the concern with broader developmental goals meant that project delivery systems which considered more than speed, quality, price competition, price certainty and risk transfer were needed. In addition the historical linear and sequential relationship between design and construction activities which is a feature of the established traditional project delivery system has been cited as a major contributing factor to many of the industry's problems. The perceived underlying structural deficiencies in construction's social set-up could also be attacked through the proper use of delivery systems, which McDermott, (1999) saw as not only technical and organisational sub-systems but as a much more complex social interaction.

Up to the early 1970's the vast majority of projects were procured using the traditional, or as Cox and Thompson (1998) would prefer, sequential method. The depression brought about by the oil crisis of 1974 ignited the search for alternative ways of construction delivery in an increasingly time and money conscious industry (Franks, 1990). The post-recession period was characterised by changes brought about by shifts in the industry's structure and changing perceptions on the client's side (Masterman, 1992). These changes resulted in the launching of the British Property Federation (BPF) system, the designing of bespoke delivery systems (often with substantial client input), and the increased use of design and build and management-oriented systems. Masterman (1992) credited the clients' desire to improve the building process with the introduction of new methods, although the traditional/sequential method is still widely used.

At present, there are a whole host of new delivery systems available for the discerning client or consultant. Cox and Thompson (1998) identified some of them as

sequential contracting, design and build contracting, performance contracting, partial design and build/sequential contracting (a hybrid of the two), minor works contracting, management contracting, construction management, serial contracting and framework agreements, extended arm contracting, relational contracting, internal contracting and the latest buzz word in the construction industry, partnering. To these we may add the build-operate-transfer (BOT) and build-own-operate-transfer (BOOT) delivery systems used mainly on large projects of a specialised nature such as infrastructure provision. Each of these project delivery systems have their own advantages and disadvantages compared with the traditional method. For example, Sanvido and Kochnar (1999) suggested that where construction speed is critical, design and build proved superior to construction management and to the traditional method but usually to the detriment of project costs, while Masterman (1992) held that design and build resulted in lower costs too.

The impact of these project delivery systems on the construction industry, construction companies and their competitive strategies has not been fully investigated. Porter (1980: xiii) was of the opinion that "every firm competing in an industry has a competitive strategy, whether explicit or implicit", and Male and Stocks (1991) stated that a construction company's strategy determines the method it uses to sell its services and products to the market. This strategy either arises directly from or determines the project delivery system used. Competitive strategy is about how a business should compete, what means it uses to arrive at the end it desires, and is aimed at finding that niche in the industry where a company can derive maximum advantages for itself (Porter, 1980). While there is debate as to whether construction firms can influence the choice of delivery system used, the particular systems the firm specialises in determines the market and conditions that it competes in and is within its ambit to change. According to Ramsay (1989), the consistent use of business strategy has only been seen in the recent past -and that by a select few firms in construction. An example of this is what Hindle (1996) referred to as "quiet revolution", where contractors have turned to alternative business systems instead of the conventional antagonistic business practices common in construction.

This study proposes to investigate the impact of the use of these new project delivery systems on contractor competitive strategies in the modern construction

industry. Changes in the project delivery system used are, in effect, changes in production methods and possibly in the products delivered, and the study will look at whether these have led to changes in the way contractors do business.

1.2 Problem Statement

The construction industry is grappling with problems of poor customer satisfaction, low productivity, low profit margins and a general perception of poor product quality and delivery. New project delivery systems have arisen, ostensibly to provide solutions to these problems. Project delivery systems determine the method construction companies use to sell to their market, which directly influences the company's competitive strategy. There has been little study on the competitive strategies used by construction companies, and how these have adjusted to the changes in the way projects are delivered.

The problem may be stated thus:

How have changes in project delivery systems changed the way constructors produce and sell their products?

1.3 Objectives

The objectives of this study are as follows:

- 1.3.1 To identify alternative project delivery systems and trace their use by construction companies.
- 1.3.2 To identify emerging competitive strategies of contractors in light of the changing project delivery systems.
- 1.3.3 To ascertain whether any correlation exists between the project delivery system used and competitive strategies; whether changes in one result in changes in the other.

1.4 Hypotheses

- 1.4.1 Changes in project delivery systems have resulted in changes in the competitive strategies of construction companies.
- 1.4.2 Changes in project delivery systems have resulted in a shift to more direct selling practices between construction companies and their customers.
- 1.4.3 Construction companies use project delivery systems as strategies to achieve competitive advantage.

1.5 Importance of the Study

The two crucial partners in any business transaction are the buyer and seller, the producer and the consumer, and in the case of the construction industry, the contractor and the customer. The study will help identify the reaction of one of those two parties to fundamental changes in the industry, and the possible effects this will have on the other and on best practice for construction project delivery. Aided by its drawing on business practice and sociology, the study will point to directions the industry should take to ensure an efficient, responsive and progressive industry that compares to others in the economy, especially given that the construction industry is seen to be lagging behind the rest.

1.6 The Delimitations

Limitations of time and cost dictate that a geographical boundary has to be set for this study. It is proposed to focus the study on the building sector of the construction industry in the Western Cape region of South Africa.

Construction firms may have many objectives including maximising profitability, increasing market share or just maintaining a presence in the industry. Because of the

complexity that would be involved in studying each of these objectives, it will be assumed that the profit-maximisation motive is the sole objective of the firm.

1.7 Definition of Terms

In this study, some specific terms used are defined as follows:

Project delivery systems: the methods used by the construction industry to deliver a product of construction. In this research the term is used interchangeably with, though in preference to, building procurement systems.

Alternative project delivery system: any other project delivery systems apart from the traditional, or the design-bid-build (as it is also referred to), system.

Strategies: The determination of the long term goals and objectives of an enterprise, the adoption and direction of courses of action and the allocation of resources necessary for carrying out these goals

Competitive strategies: strategies aimed at achieving some advantage over its competitors that will help the firm achieve its objectives.

Customer: there is debate in the construction industry as to who is the actual customer of the construction product - the client, consultants or the end user. While there are merits to all sides of this argument, in this study the term customer is used to mean the client, or the person/organisation initiating the construction process and to whom the keys are given at the time of handing over.

1.8 Assumptions

While the choice of project delivery systems will have a major influence on the successful completion of construction projects, there are other factors that could have a bearing. These include, among others, the competence and expertise of the

construction team, their relationship with the client, prevailing social and economic factors and constraints of time, money, etc. When trying to ascertain the causes of project success or failure it may not be possible to separate the effect of these factors from the choice of project delivery.

1.9 The Study Outline

Chapter 2: Project Delivery Systems: Theory and Practice.

This chapter reviews project delivery systems, their genesis and evolution and current thought on the problems and the way forward.

Chapter 3: Strategy

This chapter involves an overview of the theory of competitive strategy.

Chapter 4: Strategy in Construction

This chapter looks at competitive strategy theory as discussed in the preceding chapter with regard to the construction industry. The linkage between project delivery systems and competitive strategies will be analysed.

Chapter 5: The Research Methodology

The fifth chapter will discuss the research methodology and data sources as well as data collection.

Chapter 6: Results of the Surveys and Data Analysis

The results of the data collected in the surveys are presented and analysed in this chapter. Hypotheses are tested using various statistical methods.

Chapter 7: Summary, Conclusions and Recommendations

This chapter summarises the research and draws conclusions from the data collected in the study, hypotheses testing and literature reviews. Recommendations arising from the study are then made.

Appendices and a list of references will be provided at the end of the document.

CHAPTER 2

PROJECT DELIVERY SYSTEMS: THEORY AND PRACTICE

2.1 Introduction

This chapter begins by tracing the evolution of project delivery systems from the nascent construction industry to its present day structure. This will help identify the pressures that have shaped the industry's delivery methods and shed light on future directions in this regard. It describes the different project delivery systems in use, and their characteristics, advantages and disadvantages as seen by industry practitioners, with a global viewpoint being adopted as to the source of the literature reviewed. The chapter looks at customer satisfaction within the industry as it relates to project delivery systems, though this topic can not be extensively dealt with due to its broad nature. The chapter then looks at the construction industry in South Africa with regard to project delivery systems development.

2.1.1 Definitions: project delivery systems versus building procurement systems

Throughout this thesis the term project delivery system has been used in preference to the more common building procurement system, and this would be an appropriate point to distinguish between the two.

The Oxford English Dictionary (1989) defines procurement thus: to obtain, especially by care or effort; acquire or bring about. Building procurement would therefore be the acquisition of a building, or the bringing about of the existence of a building. Franks (1990:34) defined building procurement as "the amalgam of activities undertaken by the client to obtain a building". As the traditional process of building meant that the client had to use an indirect route to acquire his product (through the professions and involving many sub-contractors and suppliers) a more comprehensive description of the phrase 'building procurement systems' is "the

organisational structure adopted by the client for the management of the design and construction of a building” (Masterman, 1992:1).

The Oxford English Dictionary (1989) gives the meaning of delivery as “the action of handing over, or conveying into the hands of another; esp. the action of a carrier in delivering letters or goods entrusted to him for conveyance to a person at a distance” and “the formal or legal handing over of anything to another; esp. the putting of property into the legal possession of another person”. The emphasis for the purpose of this topic is the transferring of an item, in this case a building, between two parties.

According to Sanvido and Kochnar (1999), a building procurement system is the process by which an owner buys or acquires design and construction services for a project, while a project delivery system defines the relationships, roles and responsibilities of the parties and the sequence of activities required to provide a facility. The project delivery system organises the various participants into a team to deliver the intended facility, while the building procurement system is defined by the sequence of activities the owner uses to select the project team. Procurement begins with project solicitations and ends with the formation of the project team, and examples of procurement methods are open bidding, pre-qualification, proposal, direct selection and negotiated procurement. Examples of project delivery systems are design-build, construction management, design-bid-build, etc.

Cox and Thompson (1998) dismiss the use of procurement because current practice falls shy of all necessary in procurement, e.g., consideration of all variables in the commercial environment to maximise purchaser’s objectives including issues of outsourcing, make or buy decision, optimal sourcing relationships and supply chain management. This assumes procurement decisions need to be all encompassing, or consider matters of the environment in depth, which may not be the case as the cost implications to the client of the purchase will determine the level of detail (and therefore energy and cost) put into making the decision.

2.2 The evolution of project delivery systems

Construction can rightly claim to be one of the oldest industries existing, dating back to the first human settlements on the banks of the great rivers, the Nile, Indus and Tigris. Examples of fine construction also abound in civilisations everywhere; Great Zimbabwe, Angkor Wat, the Harrapan and Mogul structures in India and in the Arab and Ottoman world. Modern construction, however, dates from the Roman Empire, 1500 - 2000 years ago, with the first major publication on architecture and construction being published around this time by Marcus Vitruvius Polo (Sebestyen, 1998). From this point onward the industry began exhibiting one of the characteristics that defined it in later years, that is, fluctuations and resurgences depending on the external political situation. In this case, this was the fluid situation that prevailed in Europe until the end of the seventeenth century (Saalman, 1968).

Social stability helped the industry develop, and craft training and education resulted in the formation of guilds in Europe, which were associations for the improvement and protection of branches of trade. These were hierarchical bodies, divided into master, journeymen and apprentices and further divided into special brotherhoods, perhaps the beginning of the hierarchical mentality that still prevails in the industry (Singer, Holmyard and Hall, 1968). Shand (1954) further described how construction was led by a master mason who designed the building and supervised construction and even acted in the same role as modern quantity surveyors. These mason-architects established the architectural profession through their commissions and increasing division of labour.

With the introduction of new construction methods following the scientific and industrial revolution the guilds started losing their pre-eminent position, eventually giving way to professional designers and contractors (Sebestyen, 1998). At times the architect even took upon himself the role of the master mason, though this brought about a conflict of interest and the temptation to engage in fraud (Ball, 1988). The first formal building arrangements took the shape of customers engaging skilled craftsmen to produce the relevant trade components of the building under the supervision, albeit sometimes, of the architect (Masterman, 1992).

The emergence of the capitalist contractor saw firms undertaking the entire building process and relegating the trades to sub-contracting or employed roles (Masterman, 1992). Furthermore, the professions led by architects moved away from their previously ambiguous role and staked out positions, later enhanced by statute, as 'independent designers of buildings and managers of the construction process' (Franks, 1990). This further entrenched the system of having the architect as the head of a hierarchy of consultants providing the design and pre-tender documentation, which was then used by contractors for tendering in competition.

Technological developments, the emergence of steel as a building material, mechanisation and the invention of Portland cement to name a few examples, led to the emergence of the modern construction industry. Linder (1994) described the emergence of the international constructor as being launched by the extensive urban development, railways, infrastructure and housing projects of the 19th century.

Steady progress took place in the industry up to the Second World War and the traditional project delivery system predominated right up to the end of the Second World War. After hostilities had ceased the rebuilding process saw projects of increasingly greater size and complexity and this was the period of greatest growth in European construction output, mainly due to improving economic conditions, technical progress and the need to rebuild (Sebestyen, 1998).

Dissatisfaction with the traditional project delivery system was already beginning to make itself heard, with the main criticism being the resulting inefficiencies from the separation of design and production. The Simon Report of 1944, Phillips Report in 1950 and Banwell Report in 1967 all advocated for change in the tendering system to non-conventional methods like selective tendering (Masterman, 1992). The Banwell report also noted "the need to form a design team at the outset with all those participating in the design as full members"(Franks, 1992, citing Banwell). This thinking gradually shifted to bringing in the contractor as early as possible so as to take advantage of his knowledge and experience and improve the buildability of the project. Publication of these reports and their underlying tacit approval by the British government gave local authorities, then the largest consumers of housing, the courage

to try out new project delivery systems, stimulating their use throughout the construction industry.

Masterman (1992) divided the history of project delivery into three eras, and the period already discussed from 1945 to 1972 was the first of these. The second period was ushered in by the oil crisis of 1973-1974, which brought growth to a halt as fuel prices rose drastically within a short period. The primary effect of this "oil shock" -and the resulting economic depression- in all industries but most markedly in construction was a renewed focus on efficiency and value for money in products (Masterman, 1992). Manifested by changes in project delivery systems, new customer priorities started a drive for change in the construction industry that gained momentum and marked the start of the third phase around 1980. There was an increasing willingness to try new methods and variants of the old, best exemplified by the British Property Federation and its system of project delivery.

At present, though the traditional system still predominates there has been an increase in the use of other forms. The emphasis in project delivery systems has moved from production to processes, and Taylor *et al.* (1999:164) stated that:

"Perhaps the significant change that has occurred in construction procurement in recent years is that the needs of customers and clients are being considered as important by many of the role players, not so much in terms of the suitability of the resultant product, which some will argue has always been considered, but in terms of the process which customers must endure in order to procure a bespoke product."

2.3 Reasons for the evolution of new project delivery systems

There are many reasons for the development of new project delivery systems, some operating in tandem and others completely independent. An analysis of these reasons gives a good indication of the drivers for change in the construction industry.

2.3.1 Increasing project complexity

The increasing complexity of projects has caused a rethink of appropriate delivery methods in order to achieve the best results. Where highly specialised buildings are to be constructed, systems like turnkey contracting which transfer the onus of design, construction, fit-out and commissioning to the contractor are used. Examples of such buildings are smelters, processing plants, refineries, power stations, etc., and contractors engaging in this type of construction will naturally have built up a wealth of experience in the field. As an example, the cost of erection of semi-conductor fabrication facilities (cleanrooms) was around US\$ 48,500 per square metre in 1999 and is rapidly rising (Sanvido and Mace, 1999). Cleanrooms have stringent contamination control, vibration control, and temperature and relative humidity control requirements. Time is critical in the industry because of the product lead times; every six months the computing power of chips doubles and new semi-conductors are necessary. Users may demand "design and construction schedules that put from 750 to 950 square meters of cleanroom (US\$ 36-45 million) in place per month at submicron quality standards" (Sanvido and Mace, 1999). This type of project was found to be best delivered by the design and build delivery system (Konchar and Sanvido, 1998).

For less involving structures the early involvement of contractors at the design stage facilitates the design of specialist services and complex structures and eventually their constructability. The design team and the client can take advantage of the contractor's expertise at the stage where it is most cost-effective.

2.3.2 The shift to private sector financing of public projects

Traditionally public sector projects were welfare-oriented while private sector projects were profit-motivated (Edwards and Bowen, 1996). The provision of infrastructure and basic services such as water, electricity and sewerage were seen as social goods to be provided by the government and financed through taxation and fees. Increasing competition for scarce government financial and technical resources and a desire for efficiency in resource allocation have seen a shift to collaboration

between public and private sectors in the provision of facilities and infrastructure. The public sector taps private resources to fund projects, while the private sector gains from an expanded market (Cheah, Kuschinsky and Miller, 2001). The difficulty of excluding a party from using these types of goods, their inelastic price demand and the long gestation and payback periods have been previous deterrents to private sector involvement (Alli, 2001). However, political will and the creation of an enabling environment as well as the increasing acceptance of private-public partnerships by investors, financiers and organisations such as the World Bank have accounted for the rise in such methods. Provided the critical success factors identified by Jefferies, Cook, and Rowlinson (2001) for BOOT projects are present the popularity of such methods is expected to rise.

Design-construct-finance, design-build-maintain, design-build-operate, build-operate-transfer and build-own-operate-transfer are all variants of design and build that have arisen to cater for this emerging market. Cheah *et al.* (2001) found that a mix of project delivery and finance mechanisms was emerging to alleviate the problem of insufficient public sector funds. A further development was the adoption of the 2000 Model Procurement Code in the US providing for the simultaneous application of the design-bid-build, design-build, design-build-operate and build-operate-transfer project delivery and finance methods. The application of mixed delivery thinking in the US has gone so far as to develop a suite of proprietary database software called CHOICE which analyses and proposes ideal delivery, financing and capital programming alternatives for projects.

2.3.3 Single point responsibility and improving communications within the production team

Cracks began to show in the traditional system as the lack of liaison and poor communications between the professions, the contractors and clients became the subject of report after report. Banwell decried "the failure of the industry and its professions to think and act together or to reform its approach to the organisation of construction projects" (Masterman, 1992:8). This was to become an oft-repeated complaint over the years. The construction industry has been described as a fragmented industry, composed of numerous independent specialist organisations

that act independently in a single process (Hindle, 1998). The resulting communication gaps between the professions, contractors, labour and eventually the client gave rise to what Rwelamila (1997) called discontinuities. In an attempt to cut down on the high cost in terms of project delays, claims, counter claims, and a decline in quality, pioneering clients introduced new relationships in the industry. The aim was single point responsibility, or barring that, an early introduction of the contractor into the project to increase communication and reduce tension within the project team. Care has to be taken, however, to ensure that responsibilities and duties are well demarcated when professionals and contractors work together in novel contractual arrangements.

2.3.4 Customer dissatisfaction

Perhaps the most significant publication in the construction industry in recent times has been the Egan report (DETR, 1998). Two central points arose from this report; one, that the construction industry's problems had become a matter of deep concern to the clients; and two, that clients are organised, influential and sufficiently knowledgeable of the industry to suggest and implement major changes in its workings. The report noted growing dissatisfaction among private and public sector clients in terms of delivery time, cost and quality (DETR, 1998). Great improvements in providing customer satisfaction in other industries made their captains, some of the biggest consumers of construction products, even more unwilling to accept the industry's poor performance.

The Egan report listed a series of process fundamentals that have worked in manufacturing and service industries, like committed leadership, customer focus, team and process integration around the product, a quality driven agenda and commitment to people, and suggested their adoption if UK construction was to succeed in the 21st century (DETR, 1998). Similar pressure resulted in the British Property Federation designing their own method of project delivery out of the frustration of its members "at the perceived substandard performance of the UK construction industry" (Masterman, 1992:21).

With such clients willing to experiment in an attempt to find a best-fit solution to their construction needs, new project delivery systems proliferated. However, Tookey *et al.* (2000) differentiated between small/occasional/naive clients and large/regular/experienced clients and postulated that there was a large and growing gap between the two. Smaller clients were less able to influence changes in the industry and benefited less from initiatives to improve construction.

2.3.5 Time and its implications on costs

Ever since the Organisation of Petroleum Exporting Countries (OPEC) crisis of 1974 and the resulting inflation, investors in construction have focused on procuring buildings more quickly and cost-effectively. Time has a directly proportional relationship to costs through interest payments, and the cost opportunity of tying up the large sums of money needed in construction means that in projects where funding is external, the relatively slow traditional project delivery system may result in unacceptable costs being incurred.

The rise of the publicly quoted corporation and the attendant need to maximise returns on capital has (for accountability and shareholder satisfaction) emphasised the need for cost and time saving project delivery. In public organisations, an increasingly literate and demanding electorate has taken up the role of shareholder. The purpose of construction is also a factor here, a speculative builder or developer would need to recoup his investment in the quickest possible time, while a client building his retirement home would be more concerned about the overall cost than about time.

2.3.6 The influence of risk management

A further consequence of the shift to external funding for projects (and a greater sensitivity to their financial implications) is the evolution of the risk management concept in construction. Risk is interpreted to mean "the possibility of (financial) gain or loss which may occur during the course of a project" (Ibbs *et al.*, 1986). Sawczuk (1996) classified project delivery system risk under pure and particular risks, including injury to persons and to property by fire water, collapse, subsidence,

vibration, etc.; fundamental risks including those arising from war; and speculative risks such as those attributable to adverse weather, labour and material shortages.

The nature and objectives of clients and projects have changed greatly over the years. As projects grow more complex and margins dwindle, the science of risk management has become more structured and precise. These changes, coupled with the reluctance of professions to evolve accordingly, have resulted in a situation where "inadequate attention is given to matters concerning risk allocation in construction projects" (Rwelamila, 1997).

Successful contract strategies ideally would transfer risks to parties in proportion to their capability to respond to situations should the need arise, and if the desire to minimise risk features high on a client's list of predetermined objectives an appropriate project delivery system would be selected (Ibbs *et al.*, 1986). Generally, fixed price project delivery systems including lump sum fixed and fluctuating price, design and build, guaranteed maximum price and package deals transfer most of the financial risk to the contractor. Construction management derivatives, cost reimbursement and the traditional system put the onus of financial management on the client. Fig. 2.1 shows the apportioning of financial risk between the client and the contractor according to various delivery systems and contractual arrangements.

| Contractual approach | Client | Contractor |
|--|----------|------------|
| Design and build (package deal) | | ← RISK → |
| Lump sum (fixed price) | | ← RISK → |
| Lump sum (fluctuating price) | | ← RISK → |
| Schedule of rates, remeasured upon completion | | ← RISK → |
| Cost reimbursement – guaranteed maximum price with a fixed management fee | | ← RISK → |
| Cost reimbursement – target price with a fixed management fee | ← RISK → | |
| Cost reimbursement – target price with a fluctuating management fee | ← RISK → | |
| Cost reimbursement – dayworks basis | ← RISK → | |
| Construction management – separate trade contracts (contractor or professional consultant) with trades bid upon a fixed lump sum | ← RISK → | |
| Construction management – separate trade contracts (contractor or professional consultant) with trades bid upon cost reimbursement | ← RISK → | |

Figure 2.1 Allocation of financial risk
Source: Masterman, 1992

2.3.7 Changing economic fortunes

The fluctuating fortunes of businesses universally have stimulated the use of new delivery systems. Client companies are tighter with budgets and demanding more value for money than in the past. In Japan, an economic boom fuelled by record exports and positive balance of payments resulted in a surge in construction. The emphasis was more on value than cost, and certainty rather than duration. The recession that begun in the 1990's brought increasing pressure on client costs and, by extension, on construction companies to improve project cost performance. Coupled with the Japanese penchant for building relationships and existing loosely allied *keiretsu* (conglomerates) and *kanekikai* (family of sub-contractors), this resulted in an

increase in the popularity of design and build with a partnering slant (Cox and Townsend, 1998).

Greater competition brought about by the liberalisation of economies has also meant that clients look for all means of cutting costs to survive in their markets, of which facility erection cost is a prime one. As Raftery, Ceste and Hui (2001) found, people were more likely to try new construction methods or techniques in periods of economic downturn than in periods of relative prosperity.

Construction companies have also been forced to look at ways of improving their bottom lines by diversifying into areas where margins are more respectable. Intense competition in the traditional delivery system markets and their focus on price as the means of determining the tender winner have resulted in tender rates being slashed, with contracting companies contriving to make up lost revenue through claims. The shift from this highly competitive market into less price competitive ones has the effect of creating a ready supply-side base for alternative delivery systems.

2.3.8 Contractor marketing efforts

In a natural progression from their passive roles in the construction industry, contractors have started marketing themselves and construction solutions straight to the client. Hindle and Rwelamila (1993) attributed this in South Africa to prolonged recessions and the fact that as a result architects and quantity surveyors have failed in their traditional roles as providers, or marketing agents, to the industry. Construction marketing takes many forms, from needs analysis, design with options and financial packages to construction, operating and maintaining facilities (Hindle, 1998). Contractors began to pitch these services and products directly to customers:

- “by finding prospective customers with whom they negotiated design and build packages
- by identifying potential property development projects and bringing together financial backers and tenants, for which they were awarded construction contracts, and
- by becoming property developers themselves, taking the development risk and ensuring a construction contract” (Hindle, 1991).

The new crop of managers, usually graduates well versed in business management and marketing in the construction industry, have contributed to this change (Hillebrandt, Cannon and Lansley, 1995). Innovative marketing methods like BOOT, the adoption of proven business practices and the move to a more proactive role in the industry are consequences of the advent of the newer, more dynamic construction manager (Hindle, 1998). The result has been a willingness to suggest and implement new methods of delivery to clients who are now more aware of their options in this regard, thanks to contractor marketing.

2.3.9 The effect of speculative building

There has also been a tendency for contractors to engage in speculative projects for various reasons; as a method of investing their profits, a means of creating their own market and hedging against construction demand fluctuations and to take advantage of large land banks. Barlow and Gann (1999) estimated that annually 82% of the new housing in the UK was supplied by private speculative housebuilders, showing a steady increase from 1988. Expertise gained in such endeavours, where the contractors usually use a design and build, construction management or management contracting approach, gives all parties the confidence to try out new approaches to construction. An important result is the development of technology and proprietary industrialised systems. Prefabrication and slip form techniques, the use of time, cost and labour saving techniques have all contributed to the use of new contractual methods, primarily package deals and design and build (Ball, 1988).

The need to use standard building types in speculative housebuilding led to the development of standard housing types. In Japan this resulted in a high degree of standardisation, prefabrication and systems building (the use of prefabricated components and standardisation to produce modular buildings) (Gann, 1996). The companies responsible for much of the development in this field were materials and components manufacturers seeking new markets (Sekisui Heim, an offshoot of Sekisui Chemical Company) and larger firms with expertise developed in other industries, for example Toyota Homes (Toyota Motors) and National Homes (Matsushita). The design build capacity of such firms is enhanced by the use of

computer-aided design and computer-aided manufacturing and computer-controlled production management systems (Gann, 1996) in Japan. Increasing the level of customer choice and satisfaction using such methods is lacking in the UK, however (Barlow and Gann, 1999). Construction management company Mace developed the first off-the-peg offices in Newport, South Wales using pre-engineered building with standard components (Anon., 2001). This signified a move to producing facilities of other types than housing using such methods.

2.3.10 Changing attitudes

The number of clients and consultants who choose to implement new project delivery arrangements has been boosted by the apparent acceptance by the industry of new methods where previously there was reluctance. The publication of the Joint Contracts Tribunal (JCT) 1981 "With Contractors Design" form of contract was the signal that the package deal system was a respectable and sensible way of procuring a new building (Janssens, 1993). The increasing willingness of professions to work with and in contractors' organisations gave this method the design competence necessary to produce high quality work. Furthermore, consultants have become more willing to recommend and support package deals and other systems where contracting companies play a leading role, especially as they design (as independent consultants) a large proportion of the works.

2.3.11 The effect of globalisation

Globalisation has also contributed to the spread of new project delivery systems. Globalisation may be defined as:

"A process, driven largely by business and facilitated mainly by technology, by which natural, cultural and man-made barriers preventing individuals and enterprises concerned with construction operating anywhere in the world are eliminated resulting in activity spreading from many parts of the world to all over the globe." (2nd CIB-TG 29 International Conference on Construction in Developing Countries, 2000)

The breakdown of national barriers in the process of creating regional market groupings is best illustrated in the European Union. Standard rules for procurement and more transparent tendering apply to all countries at the pain of punitive measures against non-conforming countries. Exposure to systems in other countries for both consumer and contractor, encouraged by easier cross-border opportunities, give both a chance to gain experience in and customise previously unused methods. Bovis builds in the United States, where there are a greater variety of project delivery systems and an emphasis on design and build. American companies pioneered the partnering system based on the Japanese *keiretsu* approach. One of the main reasons behind the introduction of the British Property Federation method of delivery was the international experience gained by members of the federation, which caused them to contrast UK construction industry performance unfavourably with Europe and North America.

Multinationals and the experience gained in other countries accelerate the “borrowing” of ideas. After Honda acquired a 20% stake in motor manufacturer Rover, the British firm adapted its internal customer-led procurement philosophy from its partner. The previously used project delivery system was single-stage selective tender, but the focus, at least until its buyout by BMW, was on effective cost management/supplier partnership, its own derivative of partnering (Cox and Townsend, 1998).

Sometime multiple factors cause changes in project delivery systems used. Food giant McDonalds was dissatisfied with the traditional delivery method because of inefficient designs and poor time and cost performance. They found the poor communication between the designer and the end users unacceptable, and needed to greatly slash the “speed to market” for new restaurants. Their solution was an increase in the use of standard, modular components and a “process” (supply chain) approach to restaurant delivery, forging close relationships with a few preferred component suppliers and contractors. Given McDonalds presence in 73 countries and a problem and experience sharing culture emphasised amongst those branches, success with this project delivery method inevitably causes its spread over a wide area (Cox and Townsend, 1998).

2.4 The theory of project delivery systems

2.4.1 Project delivery system and contract strategy

There is a key distinction that should be made at this juncture and that is the difference between delivery systems and contract strategy. Contract strategy is a component of the project delivery system, and is defined as the acquisition and combining of all the necessary resources for the completion of a project, the resources being classified as consultant, contractor, sub-contractor, supplier, or client inputs (Rowlinson, 1999). Rowlinson further defines it by considering seven variables: organisational form; payment method; overlap of project phases; contractor selection process; source of project finance; contract documents; and leadership, authority and responsibility. These taken together comprise the contract strategy. On the other hand, one way of defining project delivery systems follows from the work of Austen and Neale (1984), where the delivery is seen as a mix of contract strategy, culture, management, economics, environment and political issues.

Comparing the effect of project delivery systems on project performance to the effect of conditions of contract brought McDermott (1999) to the conclusion that the latter had minimal effect on performance. An explanation could be that conditions of contract are only necessary where disputes arise within contracts, so where good project prehistory and working relationships exist a smooth-running project will ensue irrespective of delivery method.

2.4.2 Categories of project delivery system

In an attempt to clarify the various organisational forms that pass for project delivery systems, different authors have broadly grouped them into categories that are instructive in showing the different attitudes that govern client-contractor relationships. Masterman (1992) used the relationships between the contracting parties to define the system of project delivery and came up with the following categories:

- Separated and co-operative systems: the separation of the design function from construction is a significant feature of this category. The main project delivery system here is the traditional project delivery system but many variants exist

allowing differing levels of co-operation between the two parties, though they remain as separate entities with different roles in the process.

The variants are negotiation, two-stage tendering, continuity contracts, serial contracts and cost-reimbursable contracts.

- Integrated systems: the design and construction functions of a project are integrated and are the responsibility of one party, usually the contractor. Systems in this category include design and build, package deal, develop and construct and turnkey methods.
- Management oriented systems: the contractor is elevated (sic) to the status of a consultant (note the implication that a contractor is lower in status than a consultant) and the management of design and construction is integrated. The mode of payment is usually in fee form, and the contractor may or may not be required to provide construction services in the course of the contract. The three systems Masterman (1992) places in this category are management contracting, construction management and design and manage.
- The British Property Federation (BPF) system: developed from first principles by the BPF, this system stands alone in its category and has never really caught on. Its importance lies in the fact that it marked the emergence of a strong and assertive clientele, as it was a client response to their dissatisfaction with perceived under-performance in the UK construction industry.

Franks (1990) had a somewhat similar division of systems. His four main categories were:

- Designer-led competitive tender, where there is a designer, normally the architect or the engineer as the leader of the construction process and a division of responsibilities between design and construction. The principal types mentioned are the traditional system and fast-tracking, which can be classified as a variant of the traditional.
- Designer-led construction works managed for a fee: corresponding to Masterman's management oriented systems, these have a management contractor or a construction manager undertaking the management of the works for a fee and, as previously noted, these are usually divisions of construction firms. Two-stage tendering and management contracting/construction management are the identified systems.

- Franks' (1990) third system type is the package deal, which comprises the turnkey, package deal, contractor's design and design-and-build delivery systems. The common feature of this type is the unification of the roles of designer and constructor in one organisation, the contractor's, and single-point responsibility for the client. Services offered may extend to finding sites, arranging financing and sale and leaseback.
- The project manager/client's representative led systems have a single person or firm acting as a "surrogate client" (Franks, 1990:20) and who is the contact point between the client and the rest of the project team. The project manager does not participate in the design or construction aspects of the work and has the sole responsibility of managing the project. This role may be inserted in a traditional system environment or in a package-deal sort of environment.
- The BPF system is recognised by Franks (1990:24) as "having done much to promote the clients interests" and it "unashamedly puts the clients' interests first", but its influence, as has been noted before, is minimal.

Cox and Townsend (1988) used divisions of project delivery options similar to the ones above.

- Traditional tendering is based on and has as its principal characteristic the separation of design and construction. The main types identified are single stage tender two-stage tender and continuity contracts.
- Single source systems are those where one firm is responsible for the delivery of all the clients' construction needs. Cox and Townsend (1998:37) distinguish a number of systems in this category, and see the difference as the varying "balance of responsibilities between client and contractor". The variations are design and build, package deals, turnkey, and more recent emergents being build-operate-transfer, design-build-maintain and design-build-finance-operate, among others.
- Management systems are those where a client engages an organisation to manage and co-ordinate the design and construction of the works. Several variations of this system are noted: management contracting, construction management, design and management and project and management services, with the most common being management contracting and construction management.

- Other systems are grouped together in one generic category, though the only member of this other category is the partnering system. A probable explanation for the appearance of partnering and the non-appearance of the BPF system is time. In the seven or so years since Masterman published his work the partnering method of contracting has become increasingly popular while the BPF system has faded into obscurity. It could be argued, nevertheless, that partnering evolved from the BPF system. At the very least, the mindset that gave rise to one was responsible for the other.

2.4.3 Types of project delivery system

Having looked at the project delivery system categories as proposed by various authors, a closer look at the specific project delivery systems would be useful in revealing more about the nature of business relationships in the construction industry.

The traditional project delivery system

Also known as design-bid-build in the United States and sequential method by Cox and Thompson (1998), the traditional project delivery system is still the most widely used project delivery system globally despite many drawbacks attributed to it. The traditional project delivery system owes its rise to the demise of the late medieval period guilds; the increasing specialisation of the professions and the development of the architect as producer of drawings, specifications and supervisor of works; the growth and preference for obtaining tenders competitively; and the growth of the large-scale building contractor, though it is not clear whether this influenced the development of the new contracting methods or *vice versa* (Satoh, 1995).

The usual procedure is for the client, after perceiving the need for a facility, to engage a lead consultant who is usually the architect. The lead consultant prepares the design brief and quantity surveyors provide estimates of costs, used to refine the design further. Final drawings and specifications are sent to contractors in bill of quantities form, who in turn submit their tenders for the work. The accepted tender is used as the basis of a contract that guides the entire construction process up to the completion of the works and handing over (Franks, 1990).

The traditional system exhibits the following characteristics:

- A sequential delivery process, with the design stage being followed by tendering, contract performance and eventually the handing over of the works.
- The project design is substantially complete before construction begins.
- Contractors are paid on a lump sum or admeasure basis (mainly in the form of interim payments at a regular interval) while the consultants are paid on a fee basis (mainly based on the amount of the accepted tender).
- The design and construction processes are undertaken by different parties who have little interaction with the other's activities and operate in a confrontational atmosphere (Franks, 1990; Masterman, 1992).

Advantages:

- Familiarity with the system gives users, from clients to contractors, confidence in its operation. This may be responsible for inertia and a reluctance to adopt possibly better methods and so is a debatable advantage.
- Within the constraints imposed by the client, this method will most likely result in designs that are aesthetically pleasing and meet client requirements closest.
- Monitoring of project cost from inception to completion is easily done with this method, and the use of bills of quantities makes the valuing of variations to the contract easy to ascertain.
- It is easy to compare tenders from different contractors and the resulting offers are usually quite competitive, at least in terms of the initial offer.

Disadvantages

- Should design not be substantially complete before construction commences excessive variations and disruption of the works may occur.
- The requirement for design to be complete before construction commences adds to the project duration with the associated costs.
- A problem arising from the intense competition that results from open tendering is that firms may tender just low enough to win jobs and hope to make up any losses in margins later through claims and shortcuts, resulting in higher costs in the long run.
- Traditional delivery is unsuitable for co-ordinating the large range of specialist designers found on large-scale and complex projects.

- The traditional project delivery system fosters an adversarial culture, based as it is on the rigid separation of duties and a hierarchical structure. This culture has been blamed for all manner of evil ranging from increased costs due to claims and counter-claims, diminished buildability, more time spent on dispute resolution than would be desired and a lowering of quality as parties pursue conflicting objectives in the project (Franks, 1990; Masterman, 1992).

Variants

Over the years many variants of the traditional system have come into being to counter its perceived shortcomings.

- Two-stage tendering: to alleviate the problems that arose because of the separation of design and construction, two-stage tendering was devised in the 1960's. While the term can be used to describe a variety of procedures, the accepted procedure involves a degree of integration of the design team and the contractor in two stages. A similar process to traditional delivery is followed up to the tender stage where bills of approximate quantities or notional bills of quantities are produced. A pre-selected list of contractors' tenders is drawn up on the basis of the rates derived from this approximate documentation. The tendering may extend to management of the works, design, and construction expertise, resources and site organisation. The winning contractor thus becomes a full participant in the project and can advise on all aspects of the works from design to construction. The tender figure accepted is based on the rates transferred from the approximate or notional bills and on full bills of quantities or remeasurements.

Two-stage tendering has the advantages of time savings and reductions in overruns, but at the loss of price certainty. It is most suited to large or complex projects where the contractor's input is valuable before construction commences, or where the construction period needs to be shortened. Franks (1990) saw two-stage tendering as a management-oriented method, contrary to the accepted classification by other authors who saw it as a traditional project delivery system variant.

- Continuity contracts: these are contracts where the successful tenderer is offered the chance to undertake a future similar contract following completion of the first. Rates for the second contract are negotiated using the first as the basis. Use of this method demands that there be two or more similar projects in close proximity and of a similar nature, and that the schedule of the following project be flexible enough to accommodate changes in the preceding project. Competitive rates are obtained using this method with fewer variations and shorter cost overruns, but the client is tied to using a contractor with no guarantee that the performance the second time around will be similar to the first. There are three forms of continuity contracts: ad-hoc, where rates for the second project are based on the rates for the first; term, where the contractor is appointed for a fixed period and paid according to a schedule of rates; and serial, where similar projects are grouped together for economies of scale.
- Serial contracts: a number of jobs are awarded to one contractor based on master bills of quantities with a separate contract for each job. With projects of a similar nature and geographical proximity, economies of scale can be realised and parallel working can be used to further speed progress. The experience and working relationships built over a project can now be used on other projects with reductions in construction time and costs and an increase in quality achieved.
- Negotiated contracts: past experience or selection based on other appropriate criteria is used to appoint a contractor who joins the project team early in the design stage and provides advice on buildability, value engineering and construction methods. Negotiation may be held with a few chosen contractors with their expertise assessed by clients and contractors, or with one contractor and rates established which form the basis of bills of quantities. Negotiated contracts are useful where the client sees time as of essence, where early starts are required on site, where contractor expertise is required early in the design stage and where contractors are already on site. The disadvantage of this method is that the costs are usually higher than would be the case if other types were used.

- Cost-reimbursable contracts: contractors using this method are paid the costs incurred in executing the project plus a predetermined sum. The sum may be calculated on a cost plus basis, either as a fixed fee, a percentage calculated on the final cost or a percentage based on initial cost plus variations. Contractors may also be paid on a target cost basis with a fixed fee based on an agreed upon cost of the works, and a final fee which can be fixed, or a share of any cost savings. Targets may be set on time, utility or quality in addition to cost (Franks, 1990; Masterman, 1992; Cox and Thompson, 1998; Cox and Townsend, 1998).

Design and build

Design and build was defined by Masterman (1992:56) as “an arrangement where one contracting organisation takes sole responsibility, normally on a lump sum fixed price basis, for the bespoke design and construction of a clients project”. Design and build is characterised by single point responsibility on the part of the contractor, and a unification of the design and construction phases of a project. The method is actually making a comeback, having been the predominant method of construction delivery (in the form of architects who were also builders) until it was supplanted by the traditional project delivery system in the early 18th century (Shand, 1954; Sebestyen, 1998). Its attractiveness derives from its integration of design and construction, which has attendant time and cost savings. The single point responsibility offered to the client is also a major advantage and the contractor usually guarantees the performance of the constructed facility.

Although overall responsibility for project performance lies with the contractor the client may appoint a representative to ensure that quality and cost objectives are met. The main advantages of this system are: overall design and construction times are faster, though individually the two processes may take longer; single point responsibility minimises risk, misunderstandings and simplifies procedures; buildability improves due to contractor experience being brought to bear; and overall costs are lower.

Many variations exist on the design and build theme. The Construction Round Table (CRT) (1995) recognised three: direct, where the contractor is appointed after an appraisal but without any competition on price; competitive, where a consultant prepares a conceptual design which is used as a basis for competition on price and detailed design; and develop and construct where the design is developed further by the consultants before the contractor is asked to step in and complete the design and construction. As can be seen, competition and method of selection vary greatly. The range of services offered by contractors in design and build give rise to variants that include project financing, and these include the build-operate-transfer, build-own-operate-transfer, build-own-manage, and others of such a nature (Cox and Townsend, 1998). Other identified variants on the design and build theme are the package deal, turnkey and develop and construct systems.

- Package deals: Masterman (1992) saw the package deal as differing from design and build only in that package deals use proprietary systems while design and build use bespoke systems. It is unlikely that package deals can satisfy all the client requirements. Proprietary systems have been used in previous situations and have a chequered reputation, with some notable failures such as the Wimpey system (Ball, 1988). The advantages are that the client can see examples of the proprietary systems where they have been used on previous projects, and most of these systems have been used over a period of time and been “debugged”.
- Turnkey: the method involves the contractor taking sole responsibility of a project from design to the stage when the project is handed over and the keys literally turned to open the facility. It is usually used in complex installations like power stations, chemical engineering plants and refineries, where construction might extend to installing and commissioning machinery, and may also involve preliminary site work, and training client staff on its use. The client is saved the trouble of moving in, and can begin activities immediately after handover.
- Develop and construct: this involves the preparation of a sketch design or conceptual drawings by the consultant which are then given to the contractor, the contractor develops the design further and uses his refined drawings,

specifications and costs as the basis for his offer. This is the same method CRT (1995) refers to as direct design and build.

Management contracting

In this system the contractor is appointed on a professional basis as an equal member of the design team to provide construction management services. A contract administrator takes care of client interests, reimbursement is on the basis of a lump sum or percentage fee plus cost of construction and the actual construction work is carried out by package contractors "employed, co-ordinated and administered by the management contractor" (Masterman, 1992:78). The client appoints the design team who produce sketch drawings, working briefs and define project scope. Tenders are invited from management contractors, who submit management proposals and indicate the desired fees (usually in a two-stage step). The selected contractor helps the design team prepare final drawings and specifications, advises on buildability and construction technology, and aids in the preparation of tenders for the works packages. The contractor enters into contracts with the selected works contractors and assists the design team in monitoring progress. This method entails a high level of risk for the client and calls for his continual involvement in the project through representatives.

Though opinion is divided on the general performance of the mode, it is held that costs are higher than those for the traditional system but project completion times are faster and early starts or completion are enabled. Other advantages include a high degree of flexibility, especially in relation to schedules, a separation of the works into packages such that failure on the part of a contractor does not impinge on project performance; and the construction experience of the management contractor ensures better industrial relationships and easier incorporation of new construction techniques and materials. Its disadvantages are that the increase in administrative work detracts from the construction effort and increases costs; greater risk devolves to the client; and the client has no idea of his financial commitment at the commencement of the project due to the absence of a tender sum.

A guaranteed maximum price may be obtained from the contractor in some instances but this places an added burden that may minimise his effectiveness as a client adviser.

Construction management

Similar in most respects to the management contracting system, construction management differs by having the client enter into contracts with the works contractors directly instead of with the contractor. The construction manager is appointed to manage the project as a consultant on a fee basis and all the work is carried out by the package contractors.

Separation of the management from contractual responsibility roles gives this method the advantage that construction can begin separately for each works segment, resulting in faster completion times. The client enters into direct contract with the works contractors resulting in tighter controls over costs and improved cash flows for the contractor. It also brings the client into direct contact with the construction team promoting better working relationships. On the minus side, the client and the contractor's duties have to be clearly spelt out as their roles vary from project to project. As for management contracting, there is usually a cost premium associated with quick construction times and construction management suffers further from being identified closely with fast tracking. The system also requires the client to be conversant with construction and be closely involved in the process.

Design and manage

Design and manage can be undertaken either by a consulting professional or a contractor. The undertaking firm acts as a consultant responsible for the design and construction of the project. Where the consultant acts as the design and management organisation the contracts are signed between the client and the works contractors and professional fees are payable. Where the contractor plays the managing role the contracts are between them and the works contractors and fees are on a fee plus actual costs basis. Most designers are unable to meet the managerial standards

required for construction projects and their unfamiliarity may result in poorly run contracts.

The British Property Federation (BPF) system

The British Property Federation is a body representing the majority of UK property development organisations, retailers and commercial companies active in construction. Tired of the perceived shortcomings of construction industry project delivery methods and the sub-standard performance of the construction industry, the BPF formed a working party with the help of a few consultants to draft an improved system (Masterman, 1992). The system incorporated aspects of the existing project delivery methods considered appropriate, and the end result was a document that “unashamedly put clients first” (Franks, 1990:23).

The procedure involves the client appointing a representative (usually a consultant or a project manager), a design team leader and the design team who prepare detailed drawings and specifications. The design team is paid a lump sum to avoid the lack of incentive that percentage-based fees offer to consultants in order to keep costs down. The process is divided into four stages: preparation of brief, design development, tendering and construction. The lump sum fees are paid at each stage with incentives for completing within time and budget. Tenderers submit quotations based on the drawings in lump sum form, including activity schedules, organisation charts, personnel details, method statements, lists of sub-contractors and schedules of time charges.

Bills of quantities are not prepared, instead a schedule of activities is substituted and the contracting firm is responsible for preparing its own tender quantities and figures. The contract is awarded to the lowest acceptable tender and the client representative and design team ensure compliance with the design terms. Management of the project is vested in the client's representative, supervision rests with a client appointed supervisor and disputes are presided over by an adjudicator, another client appointee. Thus there exists room for duplication of responsibilities and duplication of work.

Advantages:

- The contractor is given latitude, within the confines of the specifications, to choose some design aspects, methods and suppliers.
- Contractors may propose design changes, which if proven to save time or money are rewarded with a share of the savings.
- If the contractor has sufficient information at the project's inception the client benefits from having a firm price offer.
- Consultants are likely to reduce costs.
- Disputes are quickly settled due to the presence of an adjudicator.

Disadvantages:

- The absence of bills of quantities and the increased risk to the contractor will likely result in increased costs to cover eventualities.
- It is difficult to choose between tenders especially where there is a fair amount of contractor-designed work.
- Ambiguous relationships and lines of responsibilities can cause conflict within the project.

The BPF system has never been well received and its use is steadily declining even among federation members.

Partnering

A relatively new phenomenon in the 1990's construction delivery systems, partnering is not a clearly defined concept, seeming to mean many different things to different people. UK's Construction Industry Institute's (CII) (CII, 1991: iv) Partnering Task Force Partnering defines it as:

...a long-term commitment between two or more organisations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant's resources. This requires changing traditional relationships to shared culture without regard to organisational boundaries. The relationship is based on trust, dedication to common goals, and an understanding of each other's individual expectations and values.

Another definition comes from the Construction Industry Board (CIB) Working Group 12 (CIB, 1997), which states that:

"Partnering is a structured management approach to facilitate teamwork across contractual boundaries.... It should not be confused with other good project management practice, or with long-standing relationships, negotiated contracts, or preferred supplier arrangements, all of which lack the structure and objective measures that must support a partnering relationship."

According to Bennett and Jayes (1995) there must be three features before an arrangement can be termed partnering: mutual agreed objectives, a good problem resolution process and an active search for continuous performance improvement.

Dispute continues to rage over whether partnering is a project delivery system or simply a contractual arrangement between two parties. As Bresnen and Marshall (2000) noted:

"...while there is broad agreement about the overall 'philosophy' of partnering, there is considerable variety in its manifestations in practice. In particular, there are wide-ranging and diverse views about the relative importance of contracts and charters, the preferred duration of partnering arrangements, the role of incentives systems in encouraging collaborative behaviour and whether there is a need for formal team building and facilitation. Partnering is thus an imprecise and inclusive concept capturing within it a wide range of attitudes, behaviours, values, practices, tools and techniques."

Cox and Townsend (1998) identified a number of partnering types, including project partnering, post-award project partnering, semi-project partnering, pre-selection agreements, co-ordination arrangements and strategic/full partnering (Table 2.1). These differ on grounds of relationship duration, partner selection and the most appropriate conditions for their application. They note that a whole range of relationships have been identified in partnering, spanning from adversarial, guarded adversarial, informal partners to project partners. Adversarial relationships involve parties pursuing their own interests in the contract and at the other end of the spectrum project partners participate as equals with common goals and objectives. In

between these two relationships guarded adversarial relations co-operate within the bounds of the contract and informal partners move beyond contract boundaries to establish co-operation. Bennett and Jayes (1995) categorised partnering relationships into project partnering and strategic partnering, with the former being undertaken on a once-off basis and the latter used on a long-term basis for more than one project.

Table 2.1: Different forms of partnering

| Forms of partnering | Differentiating Features | | |
|-------------------------|--------------------------|----------------------------|---|
| | Relationship duration | Basis of partner selection | Conditions for use |
| Project | One-off | Competition/negotiation | All projects. Best value for high risk |
| Strategic/Full | Long-term | Competition/negotiation | Where good business case, part of medium-long term strategy |
| Post award | One-off | Competition | Public projects, including series of small projects |
| Pre-selection agreement | One-off/ Long-term | Negotiation | Any project. Advance selection of contractor |
| Co-ordination agreement | One-off/ Long-term | Competition/negotiation | Any project. Agreement overlaid on standard contract |
| Semi-project | One-off | Limited competition | All projects where scope for negotiation is limited |

Adapted from Cox and Townsend (1998)

Rowlinson (1999) also highlighted the need to identify the stakeholders in a construction project in order to identify the benefits that actually accrue from partnering. He drew up a comprehensive list of benefits for stakeholders, that is, the building owner, design team, main contractor, specialist contractors, sub-contractors and suppliers. Main partnering benefits to the building owner are: a reduced exposure to litigation; a lower risk of cost overruns because of better time and cost control; and an easier resolution of any problems resulting from open communication.

The main contractor gains from reduced litigation, better time and cost control and a win-win situation that allows opportunity for more profit. Consultants also benefit from the reduced litigation, an enhanced role as interpreters of design intent and

gains from more financially successful projects. Sub-contractors and suppliers find that improved decision-making avoiding claims and saving money; reduced litigation and more financially successful projects are their main benefits from partnering (Olsen, 2001; Matthews, 1999).

The main criticism of partnering is that it assumes a level of trust in buyer-seller relationships that may be difficult to find. The construction industry is home to adversarial relationships and mistrust, which may be difficult to overcome in practice. Partnering assumes the need for cultural change in construction, as a tenet of its case is the need for attitude change amongst practitioners in the industry. The necessity for collaboration between stakeholders is undermined by the fact that conflict is the norm and collaboration the aberration (Bresnen and Marshall, 2000). In addition, Cox and Townsend contended, the nature of supply relationships is such that they are driven by the distribution of power within the business relationships. A survey of partnering practices in the UK was given in evidence, and it found that: buyer and seller objectives in crucial areas are usually in conflict; co-operation endured as long as mutual competitive advantage did; and success depended on organisational consistency.

It also seems to depend to a great extent on a cultural change within contracting organisations and the industry based on mutual objectives and trust and the manner in which such changes are to be achieved is often left unclear. Some advocate the use of formal tools and techniques actively to 'engineer' project-specific partnering, while others argue that "attitudes and patterns of behaviour within the industry are so deeply ingrained that it is difficult to produce any immediate transformation" (Bresnen and Marshall, 1999). To them, the conflicting interests in the exchange relationship between client and contractor are too great to be gulfed by an appeal to mutual interests, especially in the short term.

Cox and Thompson (1998) also queried the ability of partnering to survive in one-off projects, suggesting it only worked where the buyer had enough clout from his position as a constant purchaser of construction products to dictate the relationship with sellers. The prevailing economic environment may be crucial to the success of a partnering venture as, for example, a buyers' market enables the client to shift risks

to the contractors and influence changes, and a sellers' market does the same for the contractor. The underlying conditions must therefore be conducive to encouraging the two parties to work together (Bresnen and Marshall, 2000).

Partnering remains a potent force in construction industry project delivery system, but as Matthews (1999) pointed out it cannot be seen as a panacea but rather a way out of the traditional problems. It requires, apart from project team building and appropriate tools and techniques, a change in mindset, a strong commitment from the top management, sensitivity to factors that influence working methods, an understanding of group and individual motivation and an appreciation of long-term implementation processes.

2.4.4 Contractor responses to alternative delivery systems

Before the introduction of alternative systems, the overriding criterion on which construction companies competed was cost. Fierce competition resulting from easy entry in construction markets pushed margins and profits down and resulted in poor returns on investment for the companies. Some attempt to limit competition occurred using closed bidding and negotiation variants of traditional delivery, but in the end cost leadership was still the only source of competitive advantage for the selected companies. Porter (1980) identified five processes by which firms could add value to their products: inbound logistics, operations, outbound logistics, marketing and sales and service. Of these, outbound logistics and service were inapplicable using the traditional model. Inbound logistics and marketing and sales were limited to minimal functions as the contractors had little control over the inputs (specified elsewhere and dependent on construction schedules) and marketing and sales (products already sold before the producer was determined and all that remained was ascertaining price). Operations remained the best avenue for adding value, and with design already in the hands of others efficiency in production became the focus for firms' efforts.

Alternative delivery methods gave some initiative back to construction companies, by passing over responsibilities in design and construction methods (design and build variants), service (BOT, design and manage, design and maintain). The expectation would be that contractors would embrace alternative delivery systems as a way of

getting away from competition and appropriating more value from the construction process for themselves. Their responses, however, have been varied.

Firms develop consistent patterns of behaviour or ways of responding to their environments (Hofer and Schendel 1978; Miles and Snow, 1978, Porter 1980) which is referred to as their strategic orientation. There are various typologies, and one described by Miles and Snow (1978) identified four strategic orientations: defender, prospector, analyser and reactor. Defenders have narrow product or market domain and try to create and maintain niches with a limited range of products or services. By not searching for new opportunities they become highly dependent on a narrow product/market area and protect that area through tactics like lower prices, higher quality, and superior delivery. A prospector firm continually searches for new opportunities, and has broad and flexible product/market domain and technological base. The firm usually reacts quickly to change and uncertainty, sees opportunities before the rest and is the first to enter or exploit new markets. Product and market innovations are important to the organisation. Analyser firms tend to move into new markets only if prospectors have already explored them, and are characterised by a cautious approach. By combining flexibility with stability they seek the best of both, and are successful at marketing the ideas of prospectors. Reactor firms are passive takers of the market with no long-term goals or strategies. They do not have a defined product/market domain, and do not investigate or try to capitalise on new opportunities (Miles and Snow, 1978; Bahae, 1992).

Firms in construction corresponding to all four orientations can be identified by their response to alternative project delivery. The majority of construction firms are defenders and reactors. Defender response has been to remain in the traditional building system market area and compete on lower prices - at the expense of margins-, higher quality of work, focus on exclusive niches and superior delivery times. Reactor firms have simply taken the market as it is and carry out work as and where they find it.

The reactions of the analysers and prospector category firms have been most interesting, however. Construction companies have a production oriented, or at best a sales oriented, culture (Preece and Khalil, 2000). The shift in client needs and

expectations, however, led to new business paradigms where flatter and more dynamic organisations are preferable to the pyramidal management structures (Mintzberg, 1991). Part of this paradigm is an increasing client indifference to how the services are delivered and a focus instead on an “uninterrupted flow of services at predetermined levels of quality” (Allen *et al.*, 1999). Downsizing and rightsizing have left client companies without technical expertise and they will increasingly rely on contracting companies to provide across the board solutions that solve not only to their technical but their business problems too (Poggiolini, 2000). Clients hire firms that can do more than perform some scope of work. They often seek teams who have the ability to determine and prioritise what needs to be done. That includes finding out what’s driving the need, how success can be measured, who else will be affected by the results, and so forth. They are able to define and deliver high value, providing benefits that far exceed the cost of services. By identifying what it is that the client really wants, they have moved to providing solutions rather than a part of the solution.

Prospector firms were the first to move into design and build and its other variants such as BOT, BOOT, design and manage and turnkey projects. Along the way there have been casualties and analyser firms have learnt from the mistakes of the prospectors to move into the next phase, the marketing of services using prospector’s ideas. The ideas generated have been used to drive developments in such project types as design and build, turnkey and public-private partnerships.

With the acceptance of alternative project delivery systems a number of construction firms have gone the market-oriented route and redefined the contracting role to include financing, designing, management of construction, facilities management, property development and housebuilding. The firms have in effect moved upstream or downstream along the construction value chain as defined by Cox and Townsend (1998). Amongst the reasons for this is the need to counteract fluctuations in demand, the increase in experienced habitual clients, the wider range of project delivery systems and the ease of obtaining project for the larger, more diversified firms (Hillebrandt *et al.*, 1995; Lavender, 1996).

2.4.5 What Project Delivery System? The Client's Decision

Who is the client?

Before taking into account the factors affecting the client's choice of delivery, consideration must be made of the definition of the client. The client can simply be the sponsor of the building process, the initiator of construction and the appointer of the project team. The client may also be a multi-organisation, either temporary or permanent. In such a case there will be many conflicting project priorities and construction needs. The separation of ownership and occupation is another aspect of many projects that needs to be considered in specifying project priorities. The set-up that has traditionally predominated in the construction industry has a design team led by the architect selecting the contractor based on tenders prepared by the team. This results in the architect becoming, for the contractor, a "surrogate client" and inserting themselves in between the client and the construction team (Rowlinson, 1999:31). This is partly a reason for the dissatisfaction already noted within the construction industry. For this reason Rowlinson (1999) chose to look at projects from a multi-organisational perspective and preferred this view to be introduced into any methodology seeking to select a project delivery system.

Client categories

Masterman (1994), before examining the reasons clients select project delivery systems, saw it fit to, first, identify the various types of clients and their characteristics. This is because different classes of clients determine project success using different criteria. The conventional way of categorising clients splits them into two divisions: public and private clients. These have been further divided into experienced and inexperienced clients, and the suggested cut-off for experienced clients is one new project every five years. Clients carrying out more than this would then be termed experienced (Masterman, 1994). Another criterion for categorisation is the end use of the constructed facility. Here two groups are identified: primary constructors, whose main business activity is the construction of buildings for sale lease or investment; and secondary constructors, to whom construction is a peripheral activity to their main business activities and whose expenditure on construction represents a small

proportion of their annual turnover. He thus arrived at a classification system for clients which he suggested was capable of further sub-division (Fig. 2.2).

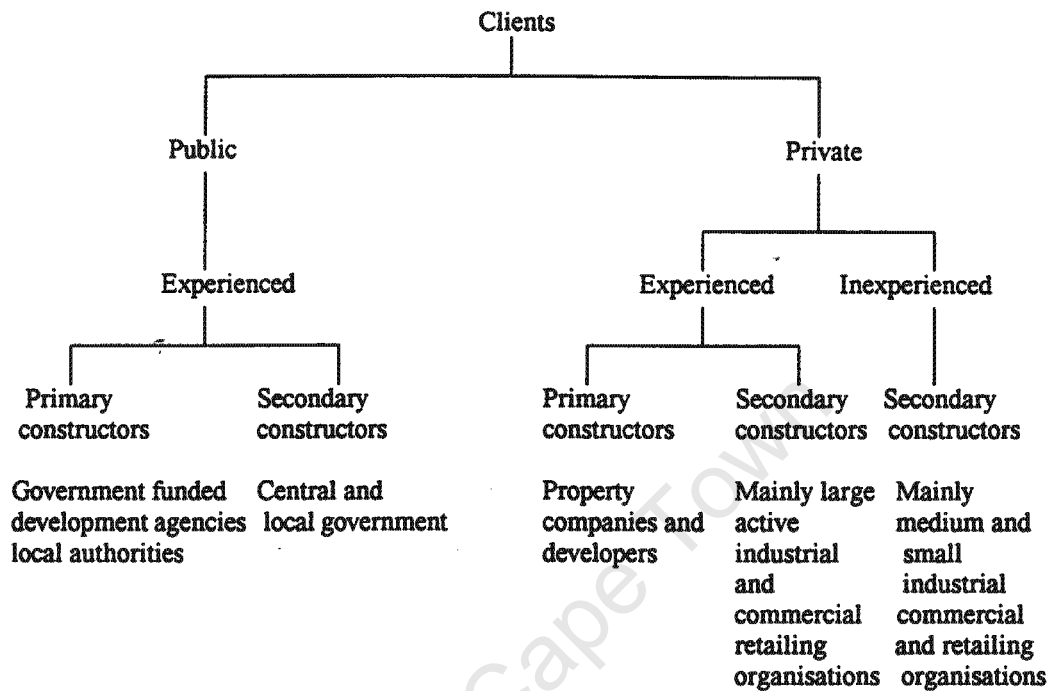


Figure 2.2 Categories of clients
Source: Masterman, 1994

The client categories can be listed as:

- Public experienced primary clients
- Public experienced secondary clients
- Private experienced primary clients
- Private experienced secondary clients and
- Private inexperienced secondary clients

The client's experience and reason for construction should therefore be a major factor influencing the choice of delivery systems.

Rowlinson (1999) held the view that the client had moved from being:

- "An occasional builder to a regular builder;
- Naive of the construction process to being highly sophisticated;

- A distinct person or body to a much more unfocused and temporary multi-organisation;
- Outside the industry to within it.”

Rowlinson (1999) identified another school of thought which held that only particular clients could use particular delivery systems. This assumed that client organisations are incapable of learning, however, and was criticised for taking a narrow view of contract strategy. The view that only certain types of clients can use certain strategies concurred with Cox's (1998) thinking that the vast majority of construction customers could not implement delivery systems such as partnering in the style of the British Airports Authority. This was because of the lack of knowledge and purchasing clout among the predominant one-off buyers which large companies have. Power in the industry resides mainly with the suppliers (contractors, consultants), power in this case defined as the ability of an individual or an organisation to own (or to control) specific resources or assets (goods, services or know-how) within a particular construction supply chain. This control is exercised in such a way that it allows them either to “appropriate the majority of the value that flows within the chain, or to determine the allocation of value to other participants throughout the entire supply chain” (Cox and Townsend, 1998:3).

Client criteria for project performance

The conventional view on client criteria for project performance is that these should be based on time, cost, quality and utility concepts, and to a lesser degree the additional concepts of flexibility and risk allocation. This can be traced back to the Banwell report (Wood, 1975), and most client guides that have been produced to help in the project delivery decision are based around finding the right balance of time, cost, quality and utility requirements. National Economic Development Office (NEDO) (1985) listed nine criteria for clients to select project priorities:

- time, or speed of construction required;
- time certainty, a firm completion date;
- cost certainty; price competition;
- flexibility;

- complexity;
- quality required;
- responsibility, encompassing single point responsibility to the client and the design team's professional responsibility, and;
- risk allocation of cost and time slippage.

Singh (1990) used eight similar variables to help determine the comparative performance of contracting systems, these being:

- speed of design and construction;
- certainty of cost, time and payment schedules;
- flexibility in accommodating design changes;
- quality levels; complexity;
- risk avoidance and responsibility;
- price competition which included the value for money issue; and
- dispute resolution and arbitration.

Masterman's (1992) study showed that different client categories had different criteria for determining successful projects and there was sufficient evidence to consider that priorities in projects depended on client type and project typology, as shown in Table 2.2.

Table 2.2 Rankings of criteria by various clients

| Clients criteria | Rating by public experienced primary clients* | Rating by public experienced secondary clients* | Rating by private experienced primary clients* | Rating by private experienced secondary clients* | Rating by private inexperienced secondary clients* | Overall rating* |
|---|---|---|--|--|--|-----------------|
| Certainty of completion date | 11 | 3 | 1 | 2 | 1 | 1 |
| Value for money | 3 | 4 | 4 | 3 | 3 | 2 |
| Desire to be involved/informed | 4 | 5 | 2 | 9 | 2 | 3 |
| Certainty of final cost | 6 | 2 | 3 | 4 | 7 | 4 |
| Accountability | 2 | 7 | 7 | 1 | 6 | 5 |
| Elimination/reduction of financial risk | 8 | 11 | 5 | 7 | 4 | 6 |
| Lowest possible tender | 1 | 1 | 6 | 5 | 9 | 7 |
| Single-point responsibility | 5 | 8 | 9 | 6 | 10 | 8 |
| Shortest design and construction period | 1 | 6 | 8 | 10 | 8 | 9 |
| High quality architecture and innovation design | 7 | 10 | 11 | 8 | 11 | 10 |
| Flexibility to change design | 9 | 9 | 10 | 11 | 5 | 11 |

* The rankings are just an indicator of perception, not a measure of importance. For example, public experienced secondary clients considered the first four criteria they ranked as very important (1 being the most important and 11 the least).

Adapted from Masterman, 1992

Liu and Walker (1998), on the other hand, saw the issue of selection criteria as more complex than merely matching criteria to contract strategy. They evaluated project outcomes on the basis of project goals, participant's behaviour and project organisation performance. Individual perceptions added dimensions to the evaluation of project outcome and in a two-level model they identified a first level of project success and linked it to second level, participant satisfaction. A similar argument holds that the perception and response to project objectives and the social aspects of organising for

project delivery were critical in determining delivery systems suitability and not an emphasis on the technical logistics of delivery (McDermott, 1999).

Introducing a fresh angle to the issue, Tookey *et al.* (2000) reported that there was evidence that clients were increasingly selecting contractors based on their ability to construct using 'preferred modalities' of approach throughout project delivery, such as supply chain management, lean construction, partnering and superior information technology. These preferential modalities were not synonymous with particular delivery systems but were generic types of best practice applicable to all systems. This was best exemplified by the UK Ministry of Defence's (MOD) 'Building Down Barriers' initiative, also known as prime contracting.

It may be fallacious to try to derive a selection model for contract strategy, as this would consider only a limited set of criteria. Not all delivery system options would be considered, and in any case contract strategies are country and time-dependent. The type of technology used can determine the delivery system and the project environment, legal, economic, political, technological and sociological, will affect selection. These are rarely considered in project delivery system selection (Liu and Walker, 1998). In addition, Rowlinson (1999) noted that some selection criteria could be addressed without necessarily impacting on project delivery system type. Using experienced staff can mute project complexity, seen by some as an issue to be addressed during selection.

Determinism and objectivity

The deterministic school of thought assumes that an optimal project delivery system exists for any given project. Projects exist in a complex environment with many participating organisations with differing objectives, however, and what is optimal for one organisation may not be optimal for the others. Cox and Townsend (1998) were of the opinion that there could never be a best practice, only better practice, in construction project delivery.

Objectivity is assumed in the choice of project delivery system, which may not necessarily be so. Construction consultants have been accused on occasion of not

advising clients fully on the range of project delivery systems. It remains to be seen whether the consultants will act in the clients' best interest and suggest the use of methods even when those methods curtail the powers of, or eliminate altogether, the consultants. The client has evolved tremendously over the last decade while by all accounts construction industry consultants have not and so may not be best placed to offer advice. Whoever the adviser, be it consultants outside the industry, contractors, construction industry consultants, or the developers of knowledge based systems such as the SPACE or ELSIE systems derived in the UK, their bias will always cloud the selection decision.

2.5 Project delivery system and client satisfaction

One of the undisputed facts arising from studies, researches and reports on the construction industry in the recent past has been the general level of client dissatisfaction with its products and processes. DETR (1998) identified unpredictable delivery time, failure to keep within anticipated costs, and failure to achieve desired quality levels as the grounds for customer dissatisfaction. Morledge (1999) found that the UK construction industry's reputation for delivering defective buildings, and delivering them late and above cost, was partly justified. He cited a survey of construction customers, which indicated that a third of the projects were delivered both late and over budget. According to the Construction Clients' Forum (1997), in 70% of cases the completed building itself usually met client requirements, but problems during the project delivery process and during the post-construction period tended to mar the level of client satisfaction.

By all accounts client satisfaction should be the driving force, and the measuring rod, of industry's performance. Up until the 1950's an excess of demand over supply characterized most of the world's industries, and quality and service standards were often appallingly low. Amongst other reasons, recovery and the economic boom following from World War 2, the emergence of new competitor nations such as the South East Asian tigers meant supply (capacity) began exceeding demand. Marketing (in essence the creation of consumer preference), rather than manufacturing, became the basis for competitive advantage, and finding manufacturing capacity was easier

than producing unique brands. Company priorities then changed from selling to understanding consumer wants, and then designing and delivering goods to match these wants (Doyle and Bridgewater, 1998).

To Doyle and Bridgewater (1998) the essence of business today is creating organisations and strategies that meet consumer needs more effectively than the competition. A successful business strategy is one that focuses on relationships, especially given that new customers are difficult and expensive to attract, spend less and are more price sensitive. The emphasis is therefore on creating loyalty, branding, measuring customer satisfaction and forging closer links with them. Drucker (1971) and Peters (1982) suggested that the only purpose of a business was to create a satisfied customer. What a business thought it produced was not of first importance - especially not to the future of the business and to its success. What the customer thought he was buying, what he considered "value", was decisive.

Gitomer (1998) saw the basis of customer satisfaction as (1) identifying customer needs and (2) ensuring their satisfaction. To McNealy (1994), customer satisfaction occurred when client expectations were met or exceeded, and Anderson's (1973) reverse view defined customer dissatisfaction as the disparity between expectation and perceived product performance. The use of already established client criteria for project performance can be used as a basis for measuring customer satisfaction, and Bowen, Pearl and Edwards (1999) highlighted the importance of client briefing to the attainment of client objectives and the achieving of customer satisfaction.

Though satisfaction is a subjective concept difficult to measure to any quantifiable degree, Procter (1997) identified mathematical models that have been developed to show relationships and expected outcomes in customer satisfaction behaviour. Client satisfaction was defined as a function of service quality, and repeat purchasing as a function of satisfaction, prior intention and attitude. Procter (1997) considered the relationship between client satisfaction and service quality using the relevance of expectations and perceptions as a measure of performance and therefore satisfaction. Service quality was related to client satisfaction and this relationship is the premise upon which a SERVQUAL model evaluating expectation and perceptions of performance was used for the analysis of service quality in service industries.

Smyth (1999) perceived improving satisfaction as the client-orientated approach to business, with the desired outcome of client satisfaction audits an attitude and commitment to serving clients geared to matching service delivery with specific client needs, improved levels of repeat business and/or improved referrals. Customer-orientated cultures try to redefine quality service and products in a partially subjective way to become more responsive to the needs and requirements of the customer directly (Hammuda and Dulaimi, 1999). Their customer focus is simply a way of trying to ensure that what is produced corresponds to what the customer wants, and the customer is asked in one way or another to assess the quality of products and services and, by implication, the processes responsible for these goods and services.

While many models have been put forward to match clients with their ideal project delivery system, research on satisfaction after the project and any relationship to the project delivery system is sorely lacking. In one study, Rwelamila and Hindle (1993) found that the adoption of new project delivery systems resulted in lower quality standards compared to projects built using the traditional project delivery system, and suggested reasons for this.

While the overall picture points to an industry that does not emphasise customer satisfaction, a survey of the US construction industry by consultants Deloitte & Touche and the Associated General Contractors of America found that there is a trend by construction companies to rank customer satisfaction as the primary indicator of business success, above net income and gross profits (Deloitte and Touche, 2000). Significantly, the same survey also found that construction companies are enjoying healthier profitability and increased work availability during the same period, but there is no indication as to whether a focus on client satisfaction has a beneficial effect on profits, or vice versa.

2.6 The South African Situation

The construction industry in South Africa accounts for 3% of gross domestic product and 35% of gross domestic fixed investment, and is estimated to rise to twice this figure over the next few years (DPW, 1998). It employs over 40,000 people and is seen as a major player in the Reconstruction and Development Programme's drive to improve the lot of previously disadvantaged communities. Ofori, Hindle and Hugo (1996) analysed the strengths and weaknesses of the South Africa construction industry and listed proposals for the future development of the industry. Some of the challenges facing the industry have been identified as re-integrating into a global economy; overcoming capacity constraints arising from almost ten years of sustained decline; and improving output and performance in a manner that includes those historically disadvantaged by the policies of the past (Allen *et al.*, 1999).

Demand in the industry, as in the construction industry globally, has been subject to cyclic patterns of 'boom and bust', an estimated 35% of construction workers losing their jobs in the 1970's recession and 30% losing their jobs in the late 1980's and early 1990's. According to the South Africa Reserve Bank the contribution of construction to Gross Domestic Product fell from 5.37% in 1975 to 2.87% in 1997 (DPW, 1998). Hindle (2000a) observed a steady reduction in demand by 31.5% over the last twenty years and 18.8% over the last 9 years. Furthermore, there has also been a shift in demand source, from the public to the private sector. The civil engineering and roads construction markets are identified as those with the greatest reductions, while housing and general building have experienced growth during the same period. Affirmative procurement has also shrunk the market further for some established contractors especially as the private sector has adopted policies geared to redressing South Africa's inequalities.

A study carried out by Mooki (1996) found that contrary to assertions that the use of the traditional project delivery system and its variants was declining and design and build and management-oriented project delivery system increasing, the opposite was the case. This was ascribed to inertia, the desire to stick with proven methods, a lack of knowledge and the lack of clarity as to the scope of the briefing process on the part of both clients and consultants. Hindle and Rwelamila (1993) noted that there

had been a shift towards the use of closed bidding and negotiation, which may be seen as hybrid versions of the traditional conventional system. An interesting result of a survey of clients and consultants (Bowen *et al.*, 1999) is that South African contractors appear not to favour the use of the design and build and management-oriented project delivery systems, considering that these give the contractor the prominent role in the project.

The industry is at the time of writing in the process of restructuring with new acts governing the construction professions having been introduced in parliament. There is some degree of argument about the introduction of these bills; Hindle and Rwelamila (2000) and Hindle (2000b) are of the opinion that this will further stifle the development of the construction industry in South Africa. In addition, there is also the proposed introduction of the construction industry development board to regulate construction, incorporate the development policies articulated in the RDP, improve value for money in the industry and allow the government to direct the development of the industry.

Allen *et al.* (1999) envisioned the direction for the industry as a new demand paradigm involving more public-private sector partnerships and a shift from the purchase of assets to services; and a new supply paradigm based on partnering and trust, virtual teams and supply chain integration and the increasing use of technology in construction. Confidence in the industry's potential is high (DPW, 1998), and research and industry are displaying increasing synergies (Snyman, 1999).

2.7 Summary

This chapter has introduced and explained the different project delivery systems in the construction industry, and has also discussed the nature of the industry. The next chapter will focus on strategies in the industry in general and the construction industry in particular. That will set the stage for connecting this section of project delivery systems with strategy in the construction industry, which is the ultimate aim of this thesis.

CHAPTER 3

STRATEGY

3.1 Introduction

This chapter introduces and discusses the theories and components of business strategy. It looks at various definitions and levels of strategy, the value of strategy and traces the emergence of strategic thinking from the 1960's to the present date. Management and strategy are then discussed together with the role of leadership, and the theories of competitive strategy are expounded upon. These include the four different approaches to strategy as well as the contingency theories of strategy.

The strategic planning process and strategy formulation, game theory and strategic choices and options are critical for a comprehensive understanding of the topic and are included together with a short discourse on the market cycle model. The chapter concludes with a look at strategic implementation and evaluation. This will then set the groundwork for an understanding of the role strategy plays in successful business practice and how this applies to construction companies; the topic for the next chapter.

3.2 Definitions of strategy

Mintzberg *et al.* (1998) argued that strategy actually encompasses five definitions. Strategy can be perceived as a plan, a course for the future (intended strategy); as a pattern of behaviour over time (realised strategy); as a position denoting the location of products in markets; as a perspective or vision of the organisation's intention; and as a ploy intended to fool competitors.

Strategy was defined by Chandler (1966:16) as "the determination of the basic long term goals and objectives of an enterprise, and the adoption of courses of action and the allocation of resources necessary for carrying out these goals." Similarly,

Johnson and Scholes (1999:10) defined strategy as “the direction and scope of an organisation over the long term: which achieves advantage for the organisation through its configuration of resources within a changing environment, to meet the needs of markets and fulfil stakeholder expectations”.

Lynch (1997) saw strategy as a broad program for defining and achieving an organisation’s objectives and implementing its missions. To Wheelan and Hunger (1989:5), strategy, “includes the determination and evaluation of alternative paths to achieve and organisation’s objectives and mission and, eventually, a choice of alternatives that are to be adopted.”

For Porter (1980: xvi), competitive strategy was “a combination of the ends (goals) for which the firm is striving and the means (policies) by which it is seeking to get there”.

It can therefore be seen that a universal definition of strategy does not exist. While some include the purpose of the organisation among their definitions, others distinguish between the purpose and the actions involved in carrying out the objectives (Lynch, 1997).

3.2.1 Components of strategy

Brown (1996) summarised the common features of strategy as:

- involving decisions with long-term impact,
- formed by senior management,
- serving to focus on the organisation’s aims and objectives and
- generating possible options which would then be narrowed down to specific choices to be implemented.

3.2.2 Levels of strategy

Johnson and Scholes (1999) recognised three levels of strategy: corporate level strategy (overall purpose and scope of the organisation); business unit level strategy (competing in a particular market); and operational level strategy (concerning

component parts of the organisation and their delivery of the corporate or business level strategy). Jensen (1998) introduced a different perspective by looking at a firm's strategy as composed of three main elements: its competitive strategy, its organisation strategy and its human strategy.

3.3 What is the value of strategy?

Strategy defines the fundamental issues that affect corporations and their futures. It integrates all the functional areas of the organisation, covering the range of its activities. Furthermore, it is essential in developing the organisation's distinct identity, which can translate to a source of sustainable competitive advantage (Lynch, 1997). Whittington (1993) perceived this as a consequence of processualist thinking where imperfections in the markets and in organisations underline the crucial importance of an organisation's unique talents and skills.

3.4 Emergence of strategic thinking

Though some would single out Sun Tzu's "The Art of War" as the first treatise on strategy of any form, Ansoff (1979) and Chandler (1966) traced the origins of the strategically oriented company to the turbulent period of the post-industrial era, circa the 1950's. The industrial history of the United States, where the issues of strategy and management were first studied, is divided into four periods. These are: the industrial revolution period characterised by inventions and advances in manufacturing and transport; the mass-production era and its emphasis on standard products at the lowest price; the mass-marketing era which emphasised a market approach rather than a production oriented one; and the post-industrial era that saw increasing changes in the dynamics, boundaries and structure of the business environment. In the course of this evolution, firms' concerns shifted from producing at the lowest cost to effective marketing, and in the post-industrial stage, to product innovation, expansion and diversification.

Strategic thinking grew out of the advances in management views that came about in the early 1960's led by Chandler, Ansoff and Sloan, and Andrews and Christensen at the Harvard Business School, to explain the changes in the post-industrial era (Montgomery and Porter, 1991; Whittington, 1993). At the time, companies still adhered to the principles of specialisation and the division of labour advocated by Smith (1976). As companies grew larger and labour more specialised and fragmented, there was a need for a more efficient system to manage the organisations, streamline production and improve returns on investment. Sloan (1963:49), at the time the head of General Motors was a pioneer in strategic thinking, and defined the profit-orientated goal of strategy:

"It is as I see it the strategic aim of a business to earn a return on capital, and if in any particular case the return in the long run is not satisfactory, the deficiency should be corrected or the activity abandoned."

Under Sloan, General Motors decentralised their management structure, highlighted the importance of placing money where it would earn greater return and emphasised executive expertise in finance instead of engineering or manufacturing, all seemingly straightforward now but at the time radical thinking.

Ansoff (1965) saw firms as seeking to achieve their objectives through the accumulation of profit, the *raison d'etre* of the organisation and the cornerstone of business, by converting their resources into goods or services and selling these to customers. He classified business decisions into three categories, operating, administrative and strategic, each pertaining to a different aspect of the resource conversion process. Operating decisions aim at maximising the efficiency of the resource conversion process and the profitability of operations through resource allocation, operation scheduling, performance monitoring and applying control actions. Administrative decisions deal with structuring the firms' resources to maximise performance potential. This includes structuring the organisation by delineating authority and responsibility relationships, work and information flows, distribution channels and facility locations as well as the acquisition and development of resources. Strategic decisions focus on the external problems facing the firm rather than the internal, strategic in this case referring to the relationship between the firm and its environment. The main decisions for the firm were the

product mix and the market, defining the firm objectives and goals and how to exploit and develop present product/market positions.

In constructing a model of strategic decisions, Ansoff (1965) saw them as aimed at selecting a combination of products/markets for a firm, either by adding to, divesting from, expansion or contraction of existing products/markets. He laid out four steps in strategic problem solving; the perception of a decision need or opportunity, formulation of alternative courses, evaluation of alternative courses and the choosing of one or more alternatives for implementation.

While Ansoff concentrated on strategic decisions and perceived the structure of a firm as following the strategy, Chandler (1966:13) concentrated more on the administrative side, saying:

“The thesis that different organisational forms result from different types of growth can be stated more precisely if the planning and carrying out of such growth is considered a strategy and the organisation devised to administer these enlarged activities and resources. Strategy can be defined as the determination of basic long-term goals and objectives of an enterprise, and the adoption of action and allocation of resources necessary to carrying out those goals.”

Chandler (1966) recognised that strategy changed in relation to changes in opportunities and needs created by changes in population and demographics, national income, and technological innovation. The need to expand or employ existing resources to meet these new demands could be met through changes in structure, the design of the organisation through which projects were administered.

One of the major difficulties inhibiting the recognition of the strategy's importance in business management has been the role of the entrepreneur in start-up firms. Entrepreneurs create firms from a novel idea to supply a product or service satisfying consumer needs while providing the assuager of the need with a profit. This key idea or strategy is not usually explicitly written out but kept in the founder's head, guiding his decision making through-out the growth of the firm (Schendel and Hofer, 1979).

Changes in the business environment and nature now require that strategies be explicitly identified and understood. These changes include the increase in interdependencies, the rate of change in the business environment and the growth in size and complexity of firms,

To Schendel and Hofer (1979), the above strategy paradigms all suffered from the flaw of not distinguishing between corporate-level and business-level strategy. Also, they did not clarify the relationship between policies and strategy in integrating the firm with its environment across several organisational levels. Ansoff (1979) expounds further, adding that whereas the original mismatch was between the firm and the market environment interface, the internal organisation of firms were the ones mismatched with the surrounding turbulence and additional mismatches occurred within the socio-political, ecological and resource environments.

3.5 Strategy and competitive advantage

“The essence of strategy is for a firm to achieve a long-term sustainable advantage over its competitors in every business in which it participates” (Hax, 1987:3). This succinct statement implies that strategy exists primarily for the pursuit of sustainable competitive advantage. Competitive advantage grows out of and is sustained by the value created by the firm which exceeds the cost to the firm of creating that value (Porter, 1985).

According to Porter (1980), there are two basic types of competitive advantage, which are related to the generic competitive strategies: cost leadership and differentiation. Davies (1995) made the important point that competitive advantage is judged by the buyer or the customer according to their values, and not by the seller. These values give rise to the concept of value chains, which is an aggregation of the firm's activities that add value to its product from reception of inputs to the delivery of the finished product (Porter, 1985). (The definition of value chains here is different from the one offered by Cox and Thompson (1998), which is the process by which money is exchanged through the supply chain in response to an initial supply offering). The total value created at the end of the chain is evaluated by the customer

in comparison to other chains, and forms the basis of his purchase decision. Value activities are divided into primary activities, those involved in production, transfer and after sales service, and secondary activities that support the primary activity. The margin is the difference between the total value and the cost to the firm of creating that value. An example of a generic value chain is given in Fig. 3.1.

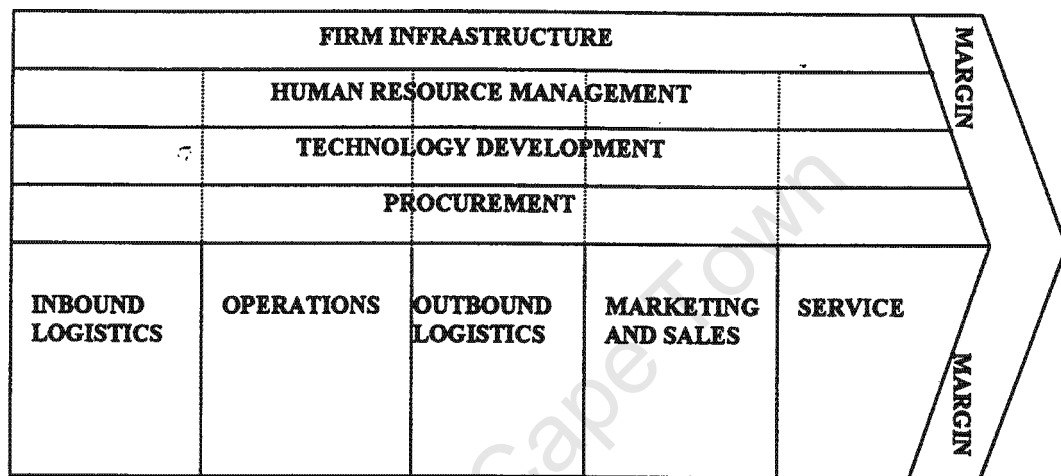


Fig. 3.1 The generic value chain
Source: Porter (1985)

Value as perceived by the buyer, however, is a difficult concept to pin down and may have many different meanings. For example, should value be measured at the time of purchase or consumption? Lai (1995) identified differences between the meaning of customer value to marketing strategists and its meaning to consumer behaviour researchers. To marketing strategists customer values stresses the buyers' evaluation of a product at the time of purchase while to consumer researchers, customer values stress buyer valuation of the product on its consumption or possession. In construction, purchase takes place well before production in contrast to most other industries. This means that (a) the decision to purchase is not determined by the customers valuation of the product, and (b) customer values may not be indicative of the true consumption value of a product with a possible life span of up to thirty years.

Ascertaining value in construction is further complicated by the deep cultural and personal meaning encoded in homes, as shown by Claiborne and Ozanne (1990).

They used a culture and consumption model to show that custom-made homes served as a metaphor for the consumer's life, underlining the difficulty in putting a figure to an object viewed with such subjectivity.

As a product, construction represents a sizeable investment and in the case of the residential market it may well be the single largest purchase a consumer makes. To consumers, purchasing a home is the start of a continuing consumption relationship with the product that may span decades (Claiborne and Ozanne, 1990). This need to look beyond the purchase behaviour of buyers to the use behaviour of consumers was noted by Boyd and Levy (1963), who pointed out that customers purchase products depending on how well the products serve the use to which they are put. This was further influenced by the total consumption system comprising the product in question and related ones.

Lai (1995) devised a framework of product evaluation for consumers (Fig. 3.2) which took into account the cultural values, personal values, consumption values, and generic and perceived product benefits.

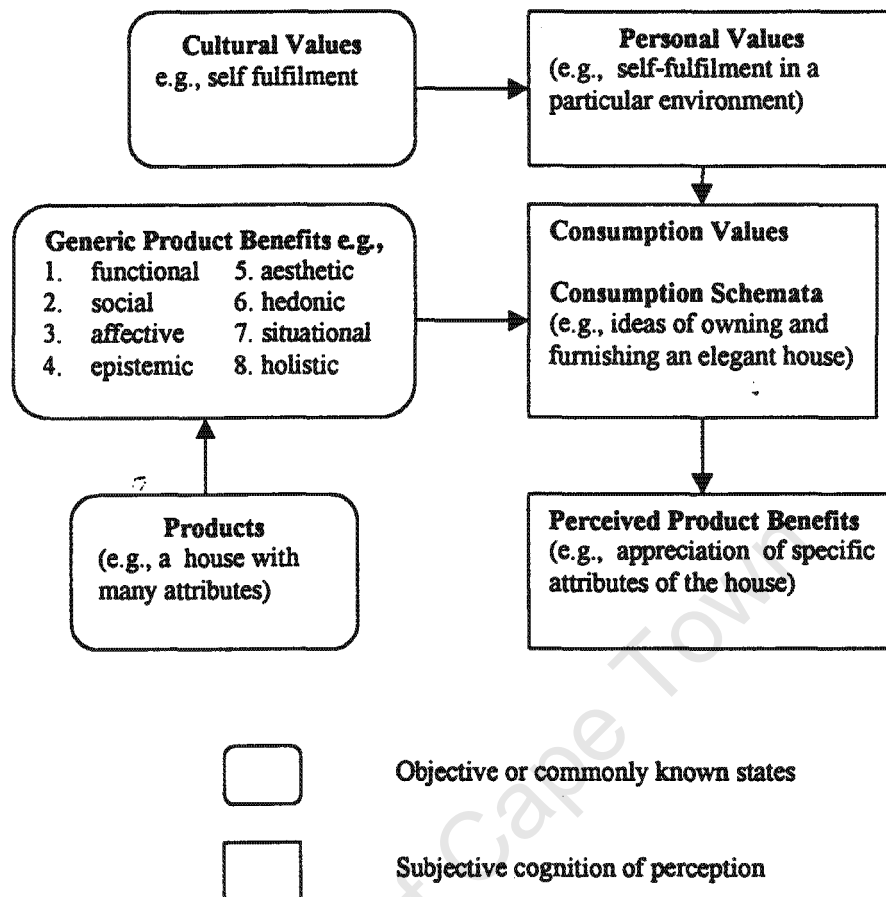


Fig. 3.2 A Framework of Product Valuation for Customers

Source: Lai (1995)

The value chain's importance lies in its use as a tool for analysing the competitive advantage of the firm and that of other firms. Each firm has a unique value chain, determined by its history, strategy, strategy implementation and culture among other factors. Once the firm has determined its value chains and those of the competition, it is then in a position to decide whether to compete on cost leadership and develop the necessary strategies, or search for a unique defensible position for a differentiation strategy (Davies, 1995).

Value chains are the individual firm components of the supply chain; what Porter refers to as his value system. Again, it is critical to note the importance of the

consumer's perception of value, which may be different from constructors', and around which constructors should design their value chains. This was emphasised by Cox (1997:119) who defined entrepreneurial activity as the "ability to understand how the stream of value within a supply chain (not a market) can be radically changed by contingent forces".

3.6 Management and strategy

Management has been variously described as the conducting or supervising of, for example, a business; the act or art of managing, the art of organising people and the judicious use of means to accomplish an end. The Oxford English Dictionary (1989) describes management as the application of skill or care in the manipulation, use, treatment, or control of things or persons, or in the conduct of an enterprise, operation, etc.

New industries tend to adopt the style of previous industries before developing their own style, and since the major organisations and industries of the pre-industrial period were the military and agriculture, it was not surprising that early industrial enterprises were based on the hierarchical military management style. They gradually developed their own modern management methods, the starting point being early industrial research which held that larger companies, large-scale production, longer production series, standardisation and repetitive processes were the optimal ways of organising production. Workers were seen as motivated by income considerations only, and there existed ideal methods of technology and management, which only needed to be identified and refined for the best results. Management therefore concentrated on achieving these goals.

There was a realisation, in the period following the Second World War, that small company sizes had their advantages, not the least of which was flexibility and innovation. Smaller corporations would result in a more co-operative as opposed to centralised management system and fitter, leaner companies. Porter (1985) redefined the whole management scenario when he developed the prevailing thinking from the theory of comparative to competitive advantage. Arguing that comparative advantage

was not as important as the ability to innovate and develop products, he developed his five forces model to help explain the avenues for strategic advantage. Production systems also moved from ignoring worker attitudes to stressing more human concepts of management.

About this time, the growth of scientific strategic management approaches and strategy as a management tool forced a change in managers' perceptions of the operating values and external forces affecting their organisations. Strategic management is "the way in which successful executives formulate and implement strategies that achieve the goals and objectives of their organisations" (Rowe, Mason and Dickel, 1985:2), and involves an intimate knowledge of a business and its environment. Rowe *et al.* (1985:11) further expanded the definition to mean "the decision process that conjoins the organisation's internal capability with the opportunities and threats it faces in its environment so that its values can be realised". Strategic management involves identifying the business's values, assessing its environment, resources and capabilities, and specifying the business's components (units) to which resources are allocated and further developing the decisions taken by management. It is a multi-faceted undertaking involving strategic planning and control, organisational considerations and resource requirements.

Classical thinking envisions senior management as visionary leaders who inspire and motivate the organisation. Nonaka (1988) differed from this view, and postulated that the role of middle management was underplayed and top management overrated in setting corporate directions. Nonaka (1988) advocated a synthesis of top-down and bottom-up management styles to into what he termed symbiotic, or compressive, management, where top management's function was to create and set the strategic vision while middle management created and implemented the concepts that brought about the strategic vision. Kotter (1990) emphasised the role of leadership over plain management, seeing leadership as dealing with change as opposed to management which dealt with the day to day issues of running the firm. The dramatic growth of knowledge-based technology companies and the Internet economy have helped maintain, and even bolstered, the image of the heroic leader *a la* Jeff Bezos, Larry Ellison and Bill Gates.

The systemic approach sees leadership as the function of a social class rather than the individual. Whittington (1993) saw leadership in a systemic context particularly dependent on culture and further pointed out that a particular class, group or profession usually dominated top management positions. Leadership then became the “collective advance of self-interested groups” be they managers or the professions, and strategies influenced by the same groups’ interests.

3.7 Theories of competitive strategy

Whittington (1993) identified four generic approaches to strategy: classical, evolutionary, processualist and systemic. These differed on their attitude to profit maximisation and their views on the origins of strategy, as seen in Fig. 3.3.

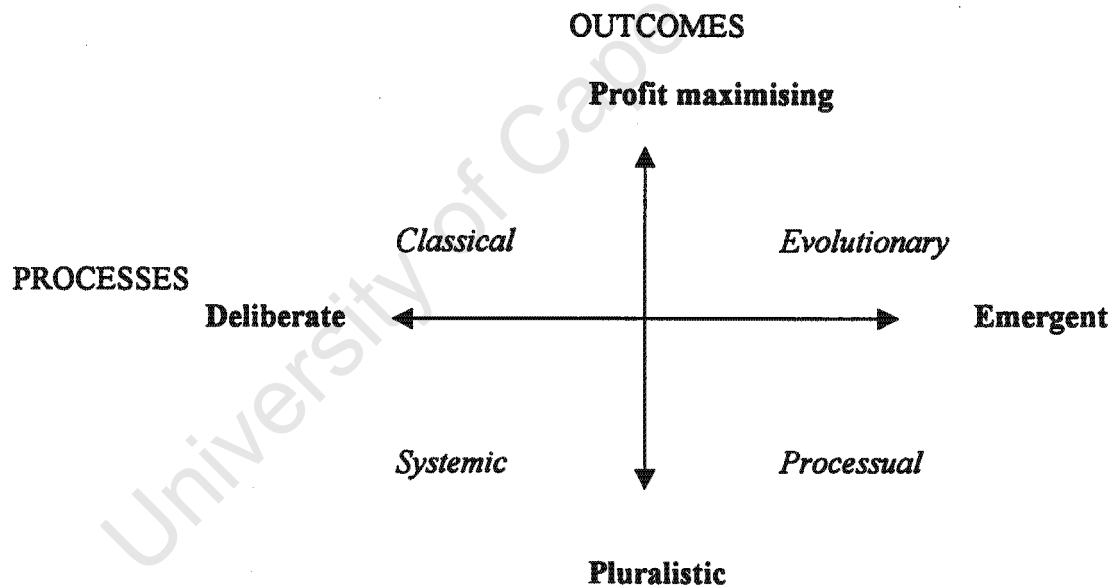


Fig. 3.3 Generic perspectives on strategy

Source: Whittington (1993)

3.7.1 The Classical Approach

Competitive strategy can be defined as a broad formula for determining the mode of competing goals and policies of a business. To classical theorists, profit

maximisation is the goal for businesses and rational planning the means to achieve it. Strategy is seen as "the rational process of deliberate calculation and analysis designed to maximise long-term advantage" (Whittington, 1993:3) and to classicists it is important because rational analysis and objective decisions make the difference between success and failure in the long run. Industry structure analysis as championed by Porter (1980) and Williamson's (1985) concept of transaction costs are examples of classical techniques aimed at providing a clear method of deriving strategy.

At the heart of classical thinking lies the concept of firms led by the rational economic man who is ruled by self-interest and lays emphasis on maximising the financial returns on all investments. There is an element of militaristic thinking in this school of thought, as strategy -a controlled and conscious process of thought- is formulated at the head by a manager or managers and implemented down the line without question. For Srivastava (1994) the emphasis on a hierarchical capitalist management was a "self-servingly conservative political ideology".

Classical techniques have also been accused of focusing solely on market forces and ignoring the social, cultural and political elements that affect the organisation, witness Porter's (1980) concentration on five economic forces while downplaying government and labour.

3.7.2 The Evolutionary Approach

To Henderson (1991), Gause's Principle of Competitive Exclusion perfectly explains the reason strategy exists in business. After a study of protozoans in a competitive environment, Gause arrived at the conclusion that no two species can co-exist that make their living in the identical way. Henderson (1991) drew parallels between competition in ecological and business settings. Many species have evolved in different environments. The richer the environment, the more the potential competitors, and the more Darwinian concepts of natural selection weeds out the weak and enables the fittest to survive. Referring to Gause's Principle, each competitor has to have a unique advantage over another, be it in price, function, time and place utility, or merely consumer perception. A competitor trying to usurp the

advantage of rivals is trying in effect to engineer evolution to suit himself. Henderson (1991:5) thus viewed strategy as all about a "deliberate search for a plan of action that will develop a business's competitive advantage and compound it".

While the evolutionary approach agrees with the classical in seeing profit maximisation as the desired goal of business, they differ in their views on the origin of strategy. To the evolutionary approach, strategy evolves from the chaotic environment of competition and individual companies adapt to the environment as best as they can, with the strongest surviving and the weak becoming extinct. This is diametrically opposed to classical approaches which view strategy as the by-product of clear rational thinking and planning by the managerial force.

3.7.3 The Processual Approach

Proponents of the processual approach see -as evolutionists do- that strategy does not arise from rational approaches but a confused and chaotic process. However they recognise that the profit motive may not be all that drives a firm, and indeed may not be an outcome guaranteed by markets. Whittington (1993) perceived the two fundamental themes of processualism as a realisation that the rational man does not exist, and firms are not united in pursuing a single objective such as profit but are a coalition of individuals with different objectives and cognitive biases. The latter thus brings into play the political nature of the organisation, with members bargaining with each other in order to arrive at a consensus of objectives which then determine strategy. Strategies are not the by-product of rational analysis but a way in which managers try to create order out of a complex and chaotic world.

The processual approach to strategy differs in four ways from the classical approach; strategy may serve to uncover decisions and simplify the environment to enable managers to cope; plans serve as much as reassurances to managers as they are tools for guidance; strategy may emerge retrospectively instead of preceding action; and internal competencies are as important in strategy as external positioning.

3.7.4 The Systemic Approach

Systemic theory views strategy as peculiar to the socio-economic and cultural systems in which firms find themselves. Decision-makers do not operate purely on calculated economic bases but are influenced and guided by their society and its cultural rules. Despite the trend towards globalisation the founding country still shapes the business form, from Korean *chaebols* and Japanese *keiretsu* to the large western multi-nationals and smaller South East Asian firms, and most retain a majority of local shareholders and directors. As Whittington (1993:28) puts it, "behaviour that may look irrational or inefficient to a classical theorist may be perfectly rational and efficient according to the local criteria *modus operandi* of the particular social context".

According to the systemic approach strategy as we know it may be unique to the North American culture, placing as it does the onus to act and the responsibility for the outcome on the individual, rather than any quirk of fate, luck or history. The bias is towards Western (particularly US and UK) concepts of an individual free-market economy emphasising profits and markets while disregarding state resources and national interests. Systemic thinkers see this as the product of very particular historic and economic circumstances (Whittington, 1993).

Furthermore, differences in strategy have to occur because economic and social conditions underpinning markets vary from culture to culture. Whittington (1993) sees one example of this in differing shareholder attitudes in the German, Japanese and US economies. In the two former countries financing institutions are deeply involved in industry and often own substantial shares or have loose co-operative agreements. This results in more patient shareholders and a preference for the longer-term view on investment. Such companies tend to target market share over return on investment, while the converse is true for firms in the US.

It is a contention of systemic thinkers that the historical dynamics of societies influence strategy, and, like most societies, are still developing. The main message in this approach is that no single model of strategy can be used universally, and strategy must be socially sensitive.

3.7.5 Summary of the attributes of strategy categories

The table below, taken from Whittington (1993), shows a summary of the main attributes of the four strategy categories. This is not a rigid classification, and there are variants of and different perspectives on the classes that may overlap.

Table 3.1. The four perspectives on strategy

| | <i>Classic</i> | <i>Processual</i> | <i>Evolutionary</i> | <i>Systemic</i> |
|----------------|------------------------------|---|--------------------------------|-----------------------|
| Strategy | Formal | Crafted | Efficient | Embedded |
| Rationale | Profit maximization | Vague | Survival | Local |
| Focus | Internal (plans) | Internal (politics/cognitions) | External (markets) | External (societies) |
| Processes | Analytical | Bargaining/learning | Darwinian | Social |
| Key influences | Economics/military | Psychology | Economics/biology | Sociology |
| Key authors | Chandler Ansoff Porter | Cyert & March Mintzberg Pettigrew | Hannan & Freeman Williamson | Granovetter Marris |
| Key period | 1960s | 1970s | 1980s | 1990s |

Source: Whittington (1993)

3.7.6 Contingency theories of strategy

The contingency theory approach attempts to find a middle ground between “the view that there are universal principles of organisation and management and the view that each organisation is unique and that each situation must be analysed separately” (Steiner, 1979: 405). This can also be seen as common ground between the positions of universal truths and unique situations. The approach tries to determine the correlation between observable behavioural responses in organisations and specified environment conditions. Inherent in the contingency theory is the idea that different organisational structures arise in firms at different stages in their growth due to environmental forces. By emphasising inter-relationships and causal relationships in situations it attempts to identify the structures and actions that best meet the needs of an organisation (Steiner, 1979).

Steiner (1979) proposed four divisions of contingency theory development: based on case study tradition; derived from organisation theory; derived from empirical experience and based on conceptualisation.

Case study tradition

Contingency theories derived from case analyses incorporate a wide range of variables. In this category, theories are developed after actual studies of the actions and reactions of firms in the market. For example, one theory holds that product life cycles are the most crucial factor in determining business strategy and the variables involved in developing appropriate strategies are (i) market and consumer behaviour variables, (ii) industrial structure variables, (iii) competitor variables, (iv) supplier variables, (v) broader environment variables and (vi) organisational characteristics and resources. These are the major determinants of business strategy and are used to formulate normative contingency hypotheses that dictate what businesses should do in response to external pressures.

Organisation theory

Organisation theory contingency theories are derived from Chandler's opinion that strategy was related to and influenced by the application of the firm's resources to market demands. According to this approach, external environmental variables determine the decisions and effectiveness of managers and explain the differences between firms. Organisations and their sub-systems react to the environment differently, and the sub-systems must all react appropriately if the firm is to be effective. In support of organisation-centred theory contingency theories, stable environments have been shown to result in centralised organisations with specialised task orientation, close worker supervision, a clear chain of command and inflexible procedures. Rapidly changing environments, on the other hand, result in decentralised organisation structures with goal orientation pre-dominating, participatory decision-making and interpersonal managerial styles. The premise is that there is no right way to react to environmental changes but organisational design must be tailored to each situation.

Another approach has been isolating conditions for two environmental contingency variables, environmental uncertainty (certain or uncertain) and the perceived need for strategic change (high or low), and proposing different strategies for different combinations of the conditions.

Empirical evidence

Contingency theories have been developed based on empirical research in such areas as leadership, research and development strategies and diversification strategies. For example, empirical research on factors influencing profitability concluded that vertically integrated businesses have advantages in mature industries in the long run. High research and development pay off most in slow-growing markets, profitability from new markets is greatest in stable products, higher market share translates to greater profitability and market share is most important in markets with infrequent buyers. Further empirical study results have helped draft strategy on leadership, showing the interdependencies between effective leadership and group situations.

Contingency theories based on conceptualisation

Two types can be distinguished in this category, comprehensive conceptualisations and listings of hypotheses and propositions. Ansoff's (1965) work on corporate strategy would fall in the first class and the life cycle proposition lists developed by Luck (1972) in the second.

3.7.7 Other explanations

A further classification of theories of strategic management comes from Johnson and Scholes, who used the extent of managerial choice and control to arrive at five theories: rational planning, crafting or logical incrementalism, chaos/complexity, cultural/institutional and ecological/natural selection. Logical incrementalism is a blend of formal analysis, behavioural techniques and power politics geared towards achieving predetermined objectives in a step-by-step manner (Quinn, 1987).

3.8 Strategy formulation and the strategic planning process

The process of developing a strategy is a continuous one from planning to implementation and monitoring, and is subject to revision at any point along the line. It begins with a clear declaration by management of the purpose of the organisation and a mission statement, or a statement of strategic intent declaring the desired future state or aspirations of the organisation. This helps it focus and acquire strategic direction and is the first step in formulation (Johnson and Scholes, 1999). The mission statement, according to Edum-Fotwe, Price and Thorpe (1996), is the company's reason for being. It expresses the intended strategies of the organisation and assesses previous company performance, forming a basis for its long term vision.

Further to this, the strategic scope of the organisation needs to be clearly defined. Strategic scope is the boundary of the organisation's geographical spread, product/service diversity or business style and methods. Brown (1996) highlighted the fundamental steps in strategy development: understanding the firm's internal key competencies and the strengths that provide it with an advantage in the market; acquiring knowledge about external factors; setting targets and objectives; generating options and formulating plans; and implementing and monitoring the plan through control instruments.

3.8.1 Strategy formulation

Strategy may be implicit as in the case of small businesses, or explicit and formalised for larger corporations. Whatever the case, all organisations undertake a strategy formulation process designed to "structure the unstructured problems a firm faces" (Schendel and Hofer, 1979:95). Grant and King (1979) defined strategy formulation as the sequence of steps taken between the time at which resources, the operating requirements and a set of goals were preliminarily identified and the time at which a proposed strategy was subjected to evaluation. For them strategy formulation involves identification of the factors which comprise an appropriate strategy for the organisation and specification for alternative strategies for consideration in the evaluation/selection phase. Schendel and Hofer (1979) divided formulation into

constituent processes of problem identification, problem analysis, generation of appropriate alternative solutions, evaluation of alternatives and choosing the strategy.

Different schools of thought on strategy formulation exist following on the approaches to strategy, and, as has been seen, some reject the notion that formal processes are relevant or bear fruit in fluid business environments. Mintzberg (1991) preferred the concept of crafting strategy as opposed to planning strategy, implying as it does an image of skill, dedication and mastery of detail instead of a reason-oriented analysis of competitors and markets, strengths and weaknesses. Drawing an analogy between a potter and a manager, he believed formulation was more the result of individual creative thinking than the result of a formal and structured process.

A similar distinction summarised the two main approaches to strategic development as the prescriptive or deliberate approaches and emergent approaches (Lynch, 1997). In a prescriptive approach the objective and main elements of strategy are determined in advance, while emergent strategies develop in the course of the organisation's life by responding to developments and adapting to organisational needs. Possibly better results could be achieved by allowing the firm's actions and experiences to guide the evolution and development of the strategy (Mintzberg, 1991). Emergent strategies arise without clear intentions and may later become company policy if recognised as valuable by management.

Because of future uncertainties and the advisability of forward planning, strategy evolves as a combination of emergent and deliberate processes. A purely emergent strategy would imply an organisation without a shred of control, just as a purely deliberate strategy would imply an organisation incapable of learning. There is thus a continuum between the two, with some strategies falling closer to one end or the other.

Examples abound of consensus strategies combining elements of emergence and premeditation, such as Honda in the United States, and Canada's National Film Board. Deliberation and control are combined with flexibility and organisational learning. Mintzberg (1991) also suggested that as important to an organisation as planning and visionary strategists are strategists who recognise strategy as it

emerges. Furthermore, in what Mintzberg (1991) termed umbrella strategies, management outlined the overall strategy (deliberate) while leaving the specifics for those lower down the organisational ladder (emergent). Mintzberg (1991) also identified an approach where management controls the strategy formulation process while leaving the actual content of strategy to others, which he termed process strategy. An oxymoronic situation arises because strategic management acknowledges and exists because of continuous change in the company and its environment strategy, while the formulation of strategy imposes stability on an organisation, resulting in a situation where having a strategy creates resistance to changes in that strategy.

Miller and Friesen (1984) developed a quantum theory of strategic change in which they postulated, after studying a large number of companies, that most firms enjoy long periods of stable strategies until a faster changing external environment becomes discordant with the organisation. A brief period of revolutionary strategic change then occurs in the organisation, somewhat akin to a commercial version of Stephen Jay Gould's "punctuated equilibrium" theory. At this point any emergent strategies are used as an alternative to importing from firms in and out of the industry. Mintzberg (1991) suggested that organisations need to have alternative cycles of change and stability, change to ensure that the organisation keeps pace with changes in the business world and stability in order to settle down and develop core competencies that exploit determined strategies.

Porter (1980) identified the four key factors that needed to be considered in strategy formulation, seeing as they determined the firm's scope. These were:

Internal limits

- Company strengths and weaknesses: these are a profile of its assets and skills relative to competitors
- Personal values of the key implementers of strategy.

External limits

- Industry opportunities and threats: define the competitive environment
- Broader societal expectations: involve the impact on the firm of factors such as government policy, social concerns and evolving mores.

Porter (1980) devised a process for formulating strategy that involved identifying the current strategy; factoring in assumptions on the company's relative position, the industry and competitors; industry, competitor and societal analyses; testing assumptions; identifying feasible alternative and making choices.

Mintzberg *et al.* (1998) proposed ten schools of thought on strategic formulation, each a perspective on rather than an all-encompassing explanation of the process.

These are:

Prescriptive schools: concerned more with how strategies should be formed rather than how they are formed

- The design school: sees strategy formulation as a process of informal design, in particular conception
- The planning school: formalised the design perspective incorporating a more detached and systematic process of formal planning
- The positioning school: envisages an analytical process focusing on the selection of strategic positions

Descriptive schools: describe how strategies are, rather than how they should be made, and consider specific aspects of the formulation process.

- The entrepreneurial school: strategy as an extension of the entrepreneurial vision, a visionary process
- The cognitive school: uses the field of cognitive psychology to understand the strategist's intentions
- The learning school: the complexity of the environment results in strategy formulation being an emergent process as the organisation adapts or learns
- The power school: strategy formulation is seen as a process of negotiation between the organisation and its environment
- The cultural school: the culture of the organisation determines the strategy that emerges, within a collective and co-operative process
- The environmental school: formulation is a reactive process with the initiative outside the organisation and not inside it

Integrative schools: combines features of all the other schools

- The configuration school: the above schools are seen as stages in an organisation's strategy-making process, sometimes corresponding with the life cycle of the firm.

3.8.2 Game theory

Game theory is to economics the study of how groups of people interact and to psychologists the theory of social situations. It has been described as the science of conflict (Levin and DesJardins, 1970), or, more comprehensively, a method for the study of decision-making in situations of conflict (Shubik, 1984). Game theory occupies a central place in economics as the other main branches of economic theory, decision theory, general equilibrium theory and mechanism design theory, are closely connected to game theory. There are two main branches of game theory: co-operative and non-co-operative game theory.

Levin and DesJardins (1970) pointed out that it was important to realise that game theory did not concern itself with identifying appropriate or optimum strategies but in providing universally applicable rules governing strategic behaviour. For a game to be recognised as such five conditions must be satisfied:

- conflict of interest between players,
- multiplicity of choices for the players,
- the rules governing choices are known to all,
- the game's outcome is affected by the choices the players make and
- the outcome for all known choices is known in advance and can be numerically defined.

Game theory was first documented by Zermelo in his theorem on chess in 1913, which asserted that chess has only one individually rational payoff profile in pure strategies (Levin and DesJardins, 1970). Previously, however, Waldegrave had provided the first known mixed strategy solution to a two-person game and Cournot had discussed the special case of duopoly and utilised a solution concept in his "Researches into the Mathematical Principles of the Theory of Wealth". Emile Borel provided the first modern formulation and proofs of mixed strategy as well as finding

the minimax solution for two-person games with three or five possible strategies in 1921. In 1938, Ville gives the first basic proof of the minimax theorem, further expounded upon in von Neumann and Morgenstern's *Theory of Games and Economic Behaviour* published in 1944. Steady developments since then have occurred, leading to the award in 1994 of the Central Bank of Sweden Prize in Economic Science in Memory of Alfred Nobel to John Nash, John C. Harsanyi and Reinhard Selten for their contributions to game theory (Levin and DesJardins, 1970; Walker, 1995).

Being the study of strategic decision making, game theory has been used by decision units (individuals, groups, organisations or society) to identify situations where logic and the rules of strategy apply and where they do not. Outcomes that cannot be reduced to numerical values and are based instead on some value judgements become difficult to compare, however.

The easiest way to illustrate a game is by listing the players (or individuals) participating in a matrix. The choices (referred to as actions or strategies) available to each player are then listed, and in the case of a two-player game, the actions of the first player form the rows, and the actions of the second player the columns, of the matrix. The utility or payoffs to the players represented numerically as entries in the matrix (Levine, 1995). Dixit and Nalebuff (1991) looked at the most common game theories, providing insights on their application in everyday strategic thinking, including games with catchy titles such as the Prisoner's Dilemma.

3.8.3 The strategic planning process

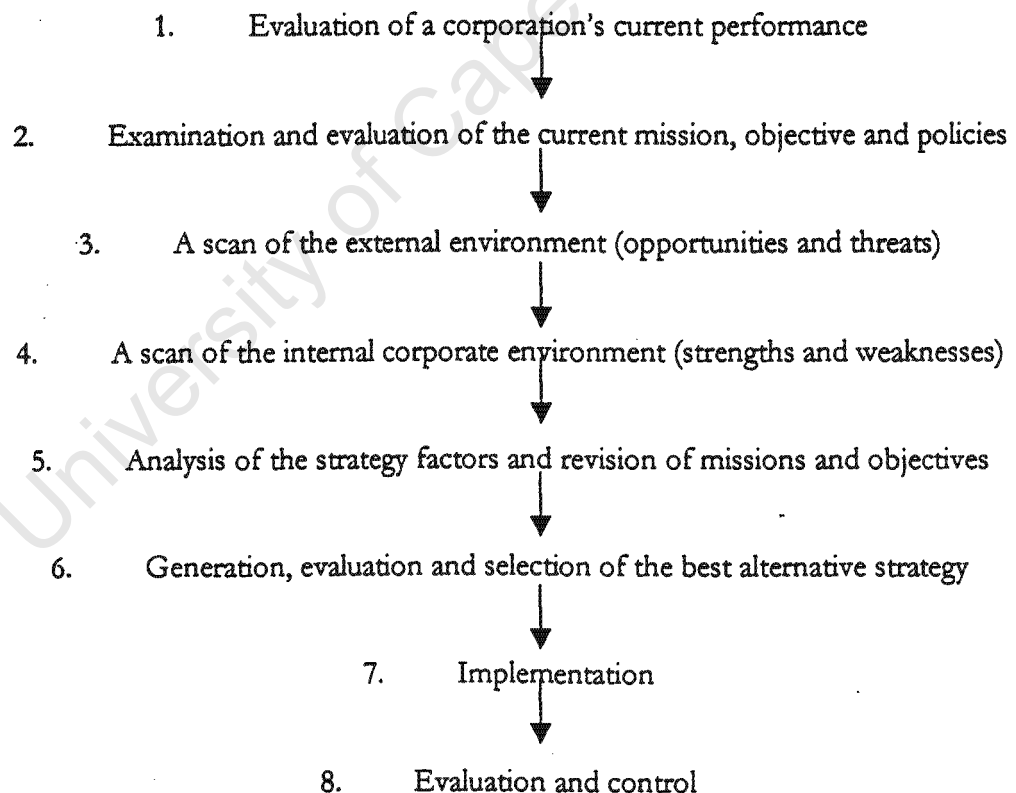
Definition of strategic planning

The ultimate mission of the strategic planning process is to influence managerial behaviour. It generates the specific actions needed to carry out a given strategy.

The strategic planning process

Rowe *et al.* (1975) distinguished between the rigid and traditional closed strategic planning systems where the plan itself was all-important, and open planning systems with the plan as a transactional component and an integrating factor for overall performance and productivity.

Brown (1996) used a flowchart from Wheelan and Hunger (1993) (Fig. 3.4) to show the eight steps in the strategy planning process but warned that the models were theoretical and in practice not neatly sequenced but interactive, constantly being refined and reshaped.



**Figure 3.4 Hunger and Whelan's strategy formulation model
From Brown (1996)**

3.9 Strategic choices

What strategic options does a firm have? Porter (1980), whose work has become strategy's reference text, identified three generic competitive strategies used by firms: overall cost leadership, differentiation and focus. Using overall cost leadership, a firm commits itself to producing at a lower cost relative to other competitors. Cost cutting and strict cost control, efficient production facilities, cost minimisation in areas not seen as core to the company's efforts and concentration on higher-margin customers are all ways cost leadership is achieved.

Differentiation is the systematic attempt to create features in a company's product or service that are seen to be unique by customers. Customer support and service, branding, technology and quality are examples of differentiating tactics commonly used. While costs are not ignored, they take second place to differentiating features and because of resulting brand loyalty higher costs can be charged for products than in a cost-leadership environment.

Focus as a generic strategy aims at identifying and serving a small segment of the market more efficiently than a broad market. The firm may benefit from differentiation by meeting the needs of this narrow segment better, or from cost advantages or a combination of the two. It may involve market share and profitability.

Porter (1980) split up the generic competitive strategies further into specialisation, brand identification, push versus pull (brand identification versus distribution channel support) distribution channel selection, product quality, technological leadership, vertical integration, cost position, service, price policy, leverage, relationship with parent company and relationship to home and host government.

Echoing Porter, Johnson and Scholes (1999) used a "strategy clock", showing various combinations of perceived added value and price vis-à-vis competitors, to identify the main competitive strategies available to firms. Price based strategies either combine lower perceived added value with lower price -a 'no frills strategy'- or similar perceived added value with lower price -low price strategies- (Fig. 3.5).

Differentiation strategies use various bases to provide unique products and services from those of competitors either with or without a price premium. There are hybrid strategies combining differentiation with low price and focused differentiation strategies characterised by high perceived value and commensurate price premiums.

Interestingly, Johnson and Scholes (1999) also identified failure strategies, that is, those unlikely to succeed. These were those providing combinations of lower relative perceived value with higher prices, lower relative perceived value with similar prices to competitors and higher prices with similar relative perceived value to competitors (only successful where barriers to entry for competitors in the industry are large).

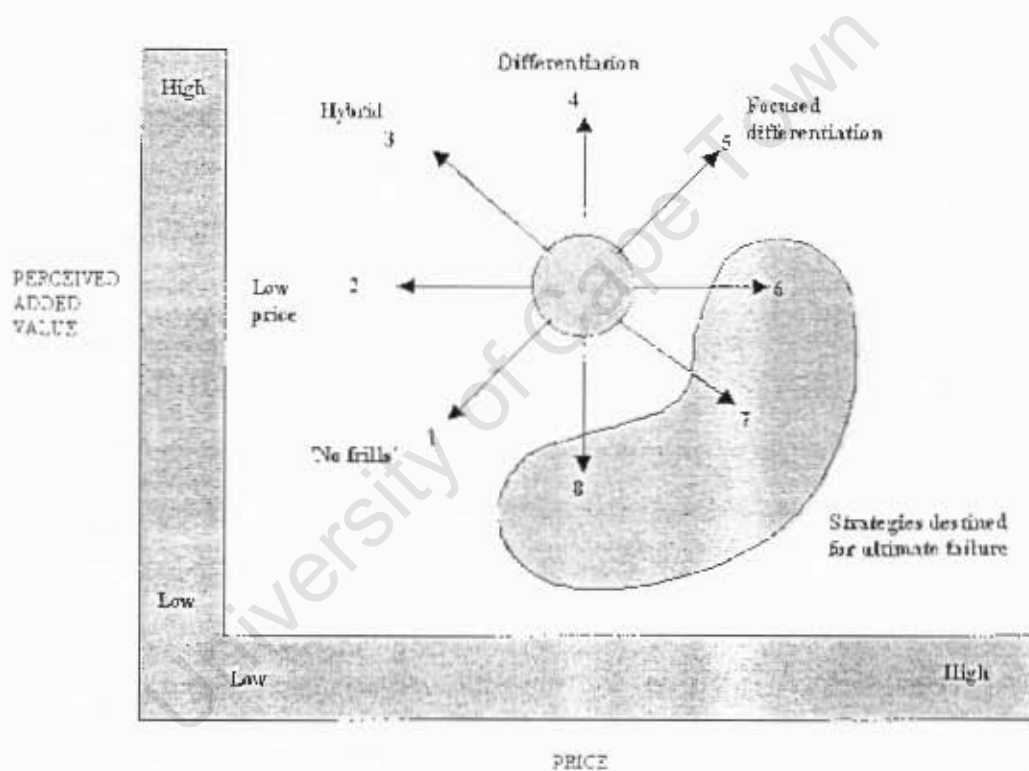


Figure 3.5 The Strategy Clock: Competitive strategy options
Source: Johnson and Scholes

| | Needs/risks | |
|-----------------------------------|--|-------------------|
| 1. 'No frills' | Likely to be segment specific | } Differentiation |
| 2. Low price | Risk of price war and low margins: need to be a cost leader | |
| 3. Hybrid | Low cost base and reinvestment in low price and differentiation | |
| 4. Differentiation | | |
| (a) Without price premium | Perceived added value by user, yielding market share benefits | } Differentiation |
| (b) With price premium | Perceived added value sufficient to bear price premium | |
| 5. Focused differentiation | Perceived added value to a particular segment, warranting price premium | } Likely failure |
| 6. Increased price/standard value | Higher margins if competitors do not follow: risk of losing market share | |
| 7. Increased price/low value | Only feasible in monopoly situation | |
| 8. Low value/standard price | Loss of market share | |

Brown (1996) listed options that a firm may choose from (Table 3.2).

Table 3.2 The four perspectives on strategy

| Direction | Development methods | | |
|---|--|--|---|
| | Internal | Acquisition | Joint Ventures |
| 'Do nothing' | - | - | - |
| Withdraw | Liquidate | Complete sell-out Partial divestment Management buyout | Licensing Subcontracting |
| Consolidation | Grow with market, increase quality, productivity, marketing Capacity reduction | Buy and shut down | Technology transfer subcontracting |
| Market penetration | Increase quality, productivity, marketing | Buy market share Industry rationalization | Collaboration |
| Product/service development | R&D Modifications Extensions | Buy-in products | Licensing, franchising Consortia Lease facilities |
| Market development | Extend sales area Export New segments New uses | Buy competitors | New agents Licensing Consortia |
| Integration: Backward Horizontal Forward Unrelated Diversification | Switch 'focus' New units Create subsidiaries | Minority holdings Buy subsidiaries | Technology sharing Exclusive agreements Tied arrangements Franchising Consortia |

Source: Brown (1996)

Brown's (1996) strategic choices include the already discussed generic choices, and in addition growth, divestment, diversification and integration and alliances. Growth may involve the developing of existing markets, seeking new markets locally or internationally, diversification or the widening of product ranges. It should be pursued within the context of the firm's objectives as growth for its own sake serves little purpose. Divestment can be achieved by selling business units or removing products from markets due to the firm or product not meeting profit, cost or market requirements. In diversification the move may be into different markets, geographic zones customer segments, industries or products. Horizontal and vertical integration and strategic alliances are the main methods of integration and alliance. The growth in importance of supply chain management has raised the desirability and profile of alliances. Strategic alliances take many forms, licensing agreements, joint ventures, buyer-seller relationships, (just-in-time manufacturing) research and development and marketing alliances, franchises and consortia.

3.9.1 The Five Forces Model

Porter (1980) recognised that competitive strategy is the search for a favourable competitive position in an industry, and that the choice of competitive strategy determined by both the attractiveness of industry for long-term profitability and the relative competitive position of the firm within the industry. Porter also realised that competitive strategies not only responded to a firm's environment but also had the ability to change the environment to suit the firm, as its competitive strategy could work to make an industry more attractive.

The three generic strategies of cost leadership, differentiation and focus are geared to helping the firm achieve competitive advantage. Porter (1980) postulated five competitive forces that determined an industry's attractiveness and which could be influenced through strategy. Once that was done, by analysing competitors and placing them into strategic groups, the most attractive positions in the industry could be assessed. The five competitive forces in any industry are the threat of new entrants, the threat of substitute products or services, the bargaining power of suppliers, the bargaining power of buyers, and rivalry among the existing competitors (Fig. 3.6). The strength of these forces, and thus the industry's

profitability, depends on the structure and the underlying economic and technical characteristics of the industry.

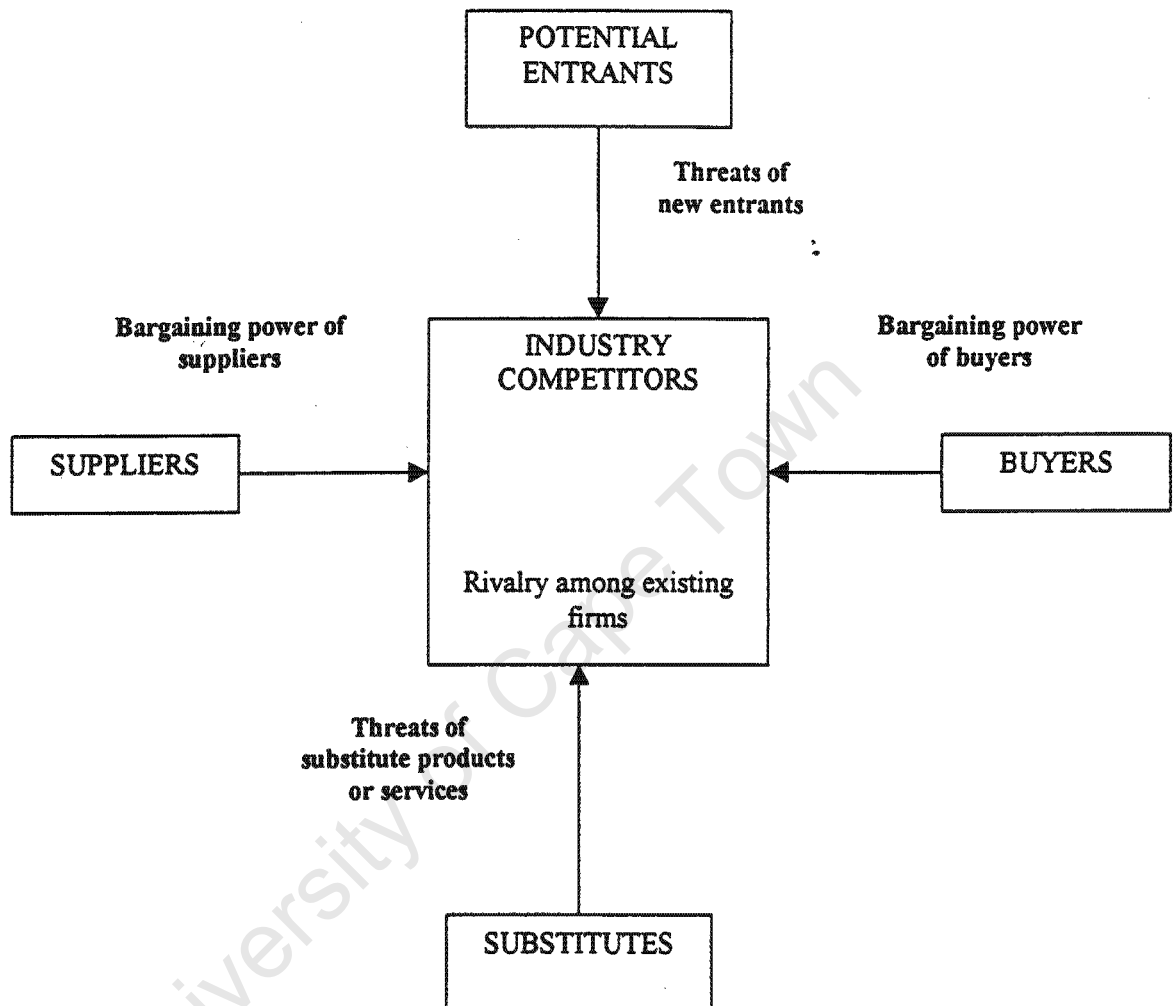


Figure 3.6 Five forces driving industry competition
Source: Porter (1980)

The five competitive forces determine an industry's attractiveness by influencing the elements of return on investment for a firm: the said elements being price, costs and the required investment. For example, the power of the buyers determines the distribution of the value created by a firm, whether it goes to the buyer in a fiercely competitive market or to the firm where competition is milder. As Cox and Townsend (1998) saw it, the leverage a firm has, its control over resources in the supply chain, determines its appropriation of profit versus the customers, suppliers, employees and competitors.

The strategies adopted by firms can change the five forces in an industry and thus the industry's structure and its attractiveness. It is not a "prisoner of its industry's structure" (Porter, 1980:7) and can modify the rules of competition within that industry.

Shen and Dong (2000) used the five forces model for a detailed structural analysis of the housing sector in Hong Kong in the aftermath of its financial turmoil, and Wang and Yang (2000) adopted a modified model of Porter's analysis to identify the characteristics and changes in Australia's construction industry. The strength of each of the five forces varies among different industries. In the construction industry, the threat of the substitute can be assumed non-existent because of the non-substitutional nature of the products or services provided by the industry. In addition, government plays an important role in its economic development and therefore the threat of substitutes in Porter's model was replaced with the effect of government.

3.9.2 The Market Cycle Model

The market cycle model was developed by the consulting firm Coxe Group as a market positioning model for assessing external market needs and the firm's internal skills, strengths and requirements for meeting those needs (Adams and Bradford, 1997). The model focuses on the life cycle of concepts, and postulates that as concepts move from the new and radical to the tried and tested, the values that the client needs and that the firm should provide change correspondingly. The market cycle model is also referred to as the idea-service-delivery model.

Idea concepts

In the idea stage of the model, the market requires innovative and creative solutions to new, unusual, high risk or complex client problems. The firms set out to analyse the market and create or exploit demand for their unique products or services. Client emphasis is on the satisfactory solution of problems rather than cost and the delivering firm emphasises its skills and ability to solve challenging problems.

Service concepts

Projects not involving new or challenging concepts but still having a high level of complexity require highly regarded firms with the necessary know-how to execute them. What sets firms apart at this level are qualifications, personnel and experience, with client relationships and price important but secondary considerations.

Delivery concepts

At this point the projects are simple enough for any number of firms to be able to provide effective solutions. The factors on which firms now compete are efficiency and cost. Table 3.3 summarises the market cycle model and the motives and driving forces behind the stakeholders.

Table 3.3 The Market Cycle Model

| | Ideas | Service | Delivery |
|--|---|---|---|
| Value and Buying Motive | Client buys the expertise of a brainpower firm. | Client buys the experience of a grey hair firm | Client buys the efficiency of a procedure firm. |
| Organisation and Internal Systems | Star-based. Support/recognise stars who get and do work. Marketing traditionally focused on relationship development and reputation in the marketplace. Tendency for repeat work. | Team-based. Support/recognise teams. High level of proactive business development. Depth and breadth of resources. | Paraprofessional teams working under direct supervision of senior professional personnel. Moderate to high level of proactive marketing |
| Hiring and Staff Retention | Recruit the best and brightest who will want to move up quickly or leave the firm. Seek individual recognition and rewards. | Recruit career-oriented professionals with strong sense of commitment who seek both individual and team rewards. Low turnover. | Recruit trained paraprofessionals with commitment to getting a specific job done efficiently. Limited long-term security except at the top. |
| Project Process | Projects performed by star or small team with star directing the effort. Creative solution is key to client satisfaction. | Projects performed by a technical team under the direction of a project manager or principal. Project success depends on talent of project manager in managing the team. Reliable solution is key to client satisfaction. | Streamlined process with strict adherence to standards and schedules. Quality and cost control are key to client satisfaction. |

Table 3.3 The Market Cycle Model (continued)

| | Ideas | Service | Delivery |
|---|--|---|---|
| Labour Cost, Fees, and Client Risk | High labour cost. High fees – charge rates based on value not cost. Low volume. high margin. Client perceives high risk – providing services they have never tried before. | Moderate labour costs. Moderate fees – price work hourly with moderate profits or lump sum with low non-billable time and overhead costs. Variable volume, variable margin. Client perceives moderate risk – providing services that have been done before but still require customisation. | Low labour costs. Low fees – lump sum pricing, with profits coming from efficiency. High volume, low margin. Client perceives low risk – routing services provided. |
| Client Type | Clients with one-of-a-kind problems or a problem for which you have a unique solution. Client wants you to solve problem | Institutions and agencies with complex problems that require skill to solve cost effectively. | Volume developer and organisations use to quick turnaround and proven, repeat solutions. Client trusts judgement of principal. |
| Marketing and Sales Techniques | Set skills and reputation of gurus to clients with unique problems. Image based on star's reputation. Star deals with top decision-makers in client organisation. | Sell experience of the firm and technical teams to solve complex problems. Cultivate high repeat business from satisfied clients. Requires principals and project managers who develop client relationships and trust. Principal/ project manager deals with project managers in client organisation. Firms with knowledge, past experience, and rapport with client can use this to advantage. | Sell low price and efficiency to organisations in need of reliable solutions and often tangible, physical results. Extremely cost competitive. |

Source: Adams and Bradford (1997)

Business concepts will move from the initial idea phase through a continuum to the delivery phase in the market cycle, and through market research a firm should aim to identify at just what stage a concept is in. Adams and Bradford (1997) suggested that while it was thought a firm should concentrate on competing in one phase to the

exclusion of others, a firm could function in all three, though naturally its strengths and focus should be on one phase. Furthermore, a firm should recognise whenever its field of operation moved from one phase to another and react accordingly, either by leaving the market or changing its internal systems to compete effectively.

3.9.3 Portfolio analysis and strategic decision making

While in smaller businesses there is no distinction between strategic business unit and corporate level strategy, this phenomenon in large corporations forces the parent company to evaluate the business unit as a portfolio of investments. A number of matrices have been developed to help management decide the best fit of businesses in the portfolio. The Boston Consulting Group matrix groups businesses into high share, high market growth stars; low share, high growth question marks; high share, low growth cash cows and low share, low growth dogs, according to their market share and market growth (Schendel and Hofer, 1979). The idea is that an organisation should have products or strategic business units that generate the cash (cash cows) that caters for its potential future money earners (question marks and stars).

The directional policy matrix (Brown, 1996) positions business units according to the long-term attractiveness of the market they are in and the competitive strength of the business unit in that market. The competitive strength of the business unit in any market is determined by its market share and the superiority of its resources, be they financial, managerial or other. Product/market evolution matrices plot the competitive position of a business unit against the stage of product or market evolution, the stages of evolution being declining, maturing, shaking out, growing and developing stages (Schendel and Hofer, 1979). The public sector portfolio matrix plots public need and support together with funding effectiveness against the ability to serve effectively.

In the life-cycle portfolio matrix, the relative strength or weakness of a firm is combined with the stage of the product(s) life cycle. The stage of the product(s) life cycle is graded from embryonic, growth, mature and ageing while the competitive

position of the firm ranges from dominant, through strong, favourable and tenable to weak (Hax, 1987).

Corporate financial strategy is affected by and affects business unit strategy and overall corporate strategy. The risk/reward relationship will vary depending on the particular business unit's characteristics. Using the Boston Consulting Group matrix for illustration, high-risk question mark investments are usually offset by sourcing of funds from investors who in turn spread their risk by having a portfolio of such investments. Lower risk cash cows and dogs may be financed by borrowing against assets or equity (Johnson and Scholes, 1999).

The use of matrices has been criticised on various grounds. They rely on a strict and narrow definition of markets, which in some industries is difficult and can lead to an erroneous picture of the organisation's exposure. They also assume it is easy to ascertain the stage a product is in, whether in decline or growth. Resurgences in sales, for example, have been known to happen to various products over time as tastes come full circle. Slowdowns in sales of particular products may not be directly related to the desirability of that product and may be due to market instability and economic cycles. Besides this, matrices do not consider the difficulty of divesting; the barriers to exit that organisation's may face in their product fields or strategic business units (Brown, 1996).

3.10 Strategic implementation and evaluation

In an emergent approach, strategy implementation occurs in conjunction with strategic development as strategies emerge and are considered, developed and tested. In a prescriptive atmosphere, however, there occurs a more structured and separated process.

3.10.1 Strategic implementation

One of the problems with many existing companies is the separation of the implementation of strategy from the day to day running of the organisation. Rowe *et*

al. (1985) identified five phases of action in order for management to successfully implement strategic change. These were analysing and planning the change, communicating it, gaining acceptance of the necessary behavioural changes, making the actual transition to the new strategies and consolidation and follow-up. They used a social change model to analyse the perceptions of strategic plans by stakeholders, and steps management could take to overcome resistance. Logical incrementalism could also be used to implement strategy. Incorporating organisational and behavioural aspects, logical incrementalism uses the organisations particular blend of politics, bargaining, negotiations and coalitions to mould strategic issues into an overarching adopted strategy. Rowe *et al.* (1985) also listed management by objectives and management control as other methods that could be used for strategy implementation.

To Rowe *et al.* (1985) the organisational culture -the norms, values, beliefs and assumptions underlying organisational decisions- and climate -the level of openness, trust and consensus- was fundamental in determining strategic implementation and change. Culture and climate directly affected the ability and ease of the organisation to implement change, and culture clash and the resulting impact on proposed strategies was suggested as one of the main reasons why most mergers failed.

The role of intrapreneurs, individuals specifically licensed to introduce entrepreneurship within a firm, is a more radical method of getting strategy implemented, which by going round the organisation's sometimes stultifying atmosphere encourages innovation and a more appropriate culture. This approach gained favour after International Business Machines (IBM) used it to develop its desktop computers, and is now the norm for 'bricks-and-mortar' companies looking to set up Internet offshoots, or integrate the Internet and its procurement, logistics and marketing operations (Doyle and Bridgewater, 1998).

3.10.2 Strategic evaluation

Ansoff (1979) suggested that a model of project evaluation must:

- Allocate resources between present and future objectives, considering the difficulty of obtaining accurate data for future predictions for evaluating specific project-market opportunities
- Identify opportunities with outstanding competitive advantages
- Handle a vector of conflicting objectives as a firm's objectives are usually conflicting, for example, worker satisfaction – a function of salaries – is diametrically opposed to profits
- Evaluate synergies resulting to a firm and the competition for resources internally
- Evaluate long-term potential despite unreliable data and cash-flow projections.

The decision rules for evaluating products and markets will differ from firm to firm. These rules are determined at two levels: the firm level, pertaining to the business the firm is in and the business it should be in, and the project level, where the opportunities and objectives facing the firm are considered. Ansoff (1979) used a cascade approach where general terms were refined in successive convergence.

Kepner and Tregoe (1965) suggested the use of the Pareto law as a basis for selecting the best alternatives. Pareto law states that 20% of an operational variable has an impact of 80% of the outcome. Beginning from the premise that alternatives can be best evaluated based on their measure of achieving objectives, they identified key objectives and scored each alternative by considering whether the solution was consistent with the objectives. By using a weighted score and a negative Pareto distribution alternatives were then chosen. The choice of weighting method, scoring of alternatives and the subjectivity involved in ranking company objectives -keeping in mind that these often differ- are obvious difficulties in the implementation of this approach.

Cost-benefit analyses can be used to determine whether the benefits of an alternative outweigh the cost and to choose alternatives providing maximum benefits to the firm.

(Rowe *et al.*, 1985) Similarly, weighted multi-attribute decision making can be used to evaluate alternative against several criteria, sometimes informally.

Assessing the success of a company's strategy may be a difficult proposition. What proportion of its success is due to competitive advantages resulting from strategies? What is as a result of, say, the control of key resources? Even amongst strategy types it may be difficult to attribute success to competitive strategies as opposed to directional or other strategies. In addition, success is not a clearly defined term for complex organisations. Profits and market share are obvious indicators, but the success of a company's strategies can best be measured by reference to its initial aims and objectives (Glueck, 1980). These may change from time to time, or vary depending on the articulator. Profits, furthermore, are dependent on other variables such as fixed costs, costs of finance and other inputs and management efficiencies.

The simplest yardsticks to use may be financial indicators, for example Sherrard's (1986) use of long-term price ratios from the stock exchange to indicate companies that performed strategically better than others.

3.11 Conclusions

Strategy continues to be one of the most dynamic and researched fields in the humanities. Developments are trumpeted with regularity and directions are constantly changing. Developments in the fields of physics, history, biology exemplified by punctuated equilibrium, chaos theory and revolutions, can provide insights and models on strategy change in organisations (Mintzberg *et al.*, 1998). The core lessons of strategy, however, remain as true now as they were when first stated by Ansoff, Chandler, Sloan and others (Whittington, 1993). These principles form the guiding charter for many a successful company in all industries. The next question is how strategy is applied to the construction industry with all its unique characteristics, and where project delivery systems fail within that sphere of a firm's operations.

CHAPTER 4

STRATEGY IN CONSTRUCTION

4.1 Introduction

The aim of this chapter is to connect the theory of project delivery systems to competitive strategy in construction. It begins with a brief look at the nature of the industry and the construction environment and tries to cover all the salient ground that a person intending to understand concepts of strategy in construction would require. The chapter then looks at different strategies available in the industry and finishes with competitive strategy and project delivery systems. The issues to be investigated or covered in the fieldwork should be apparent in the last section.

4.2 The nature of the construction industry

The construction industry is characterised by poor quality products, low productivity, low profit margins for contracting firms, subcontracting, relatively few skilled labourers, insolvencies and fragmentation (Ball, 1988; Cox and Thompson, 1992). This has been attributed to boom or bust cycles, the cyclical nature of demand, which has the resulting negative effects of uncertainty and instability in demand (Cox and Thompson, 1992). Bennett (2000) saw competition and the reliance on market forces to regulate the industry as other causes of the problems bedevilling the industry.

Rowlinson and McDermott (1999) suggested that the perception of the construction industry as having poor profitability and high failure rates arose from the industry's lack of proper organisational structures. The separation of design and construction has been widely blamed for the dissatisfaction with construction products, especially those relating to buildability. This led to the introduction of the agency construction manager to assist facility owners manage the design and construction entities, and

later to the concept of contractor involvement in the design process as a construction manager.

Outwardly adversarial short-term attitudes are common throughout the supply side instead of the entrepreneurial risk-taking culture common in dynamic and progressive industries such as the electronics industry.

While the problems are easy to agree with, there are conflicting approaches to solutions which, according to Cox and Thompson, (1992), err by:

- concentrating on industry's symptoms rather than the underlying problems,
- concentrating on the present problems rather than working towards the ideal industry of the future,
- being specific for and biased towards some sectors of the industry,
- trying to cover the whole industry, which they do superficially and without addressing the fundamental issues to any significant depth.

The formulation and implementation of strategy in the construction industry takes place in a unique context. The industry is unlike most others in terms of its nature and products and this has implications for management. The following sections look at the construction industry, markets and companies.

4.2.1 Sectors of the industry

An industry can be defined as a particular form or branch of productive labour; a trade or manufacture, or a group of firms producing products or services which are close substitutes for each other (The Oxford English Dictionary, 1989). When referring to the construction industry, however, there is uncertainty as to its exact scope. Despite perceptions of it as a coherent whole there is not one industry but many sub-industries coming together under the umbrella of the main industry concept. This is the reason behind many of the inappropriate comparisons with other industries, the treatment of inherent characteristics as problems and confusion over the extent to which macro-economic planning is appropriate for the industry's development (Hindle, 1997,b).

The main sub-sectors of construction are the civil engineering, building and housing industries, which may actually be industries based on the International Standard Industrial Classification of all Economic Activities (ISIC) definition (Hindle, 1997a). The industry may also be defined according to customer type, similarity of end products or services offered, a combination of type and end products, similarity of inputs (substitution of resources between outputs), technology group/production function, project size, market sector or structure and degree of formality. All these form separate sub-sectors of construction each exhibiting different characteristics from the other, and are each separate markets in their own right.

Hillebrandt *et al.* (1995) divided the industry into various sectors or markets, namely:

- Public housing
- Private housing
- Public infrastructure
- Private infrastructure
- Public non-housing
- Private industrial
- Private commercial
- Public and private housing repairs and maintenance
- Public non-housing repairs and maintenance
- Private non-housing repairs and maintenance

Hindle (1997a) classified the industry using a combination of customer type (public or private) and markets (industrial, consumer and reseller) to arrive at similar sectors.

4.2.2 Fragmentation

According to Porter's (1990) definition, construction is a fragmented industry, one where no firm has a significant share of the market and there are many small and medium firms and few large ones. It is further fragmented in terms of having many professions each with a say in the construction project and jealously protecting their turf. Fragmentation is evident in the many contractors and specialist sub-contractors who dot the industry landscape. Morledge (1999) described the scenario of a

fragmented and largely inexperienced customer base and a similarly fragmented but knowledgeable supply side, noting that "the potential for improvement is significant but the medium for improvement is almost non-existent".

Fragmentation is thought to be caused by: lack of economies of scale; low barriers to entry; high transport costs for inputs, giving the advantage to local firms and fluctuations in demand and supply. There is still some debate as to the existence of barriers to entry in construction. While Hillebrandt (1958) thought there were no barriers to entry, signified by the absence of supernormal profits within the industry, Ball, Farshchi and Grilli (2000) had data showing the contrary. Mule (1991) identified barriers to entry and concluded that they existed but mainly at the higher end of company and project size. Demands on managerial expertise and financial requirements mean that only a few companies can compete at this end of the scale.

Most of the work in the industry is undertaken by many relatively small firms delivering small projects. Morledge (1999) noted how 30% of all construction work in the United Kingdom in 1995 was carried out by 95% of companies. Each employed, on average, less than 8 employees and only 7% of the total number of projects in the industrial and commercial sectors exceeded £1 million in value. Furthermore, the Department of Public Works and Services (DPWS, 1998) found that in Australia, 65% of the firms engaged in contracting and sub-contracting employed two people or less while less than 1% employed more than 50 people. To give an idea of the disparities between large and small firms, 88% of the surveyed firms had turnovers of less than A\$ 500,000 (R 2,000,000) while 3% had turnovers of A\$ 20,000,000 (R 80,000,000 in 1998) or more.

Stumpf (2000) observed that middle-sized contractors in the UK exhibited poorer survival, growth and financial performance than small or large contractors. Small firms were seen as having niche-filling, speed and flexibility advantages while the larger firms had the benefits arising from economies of scale and access to capital. Furthermore, during periods of depression and tight job markets larger firms tended to take on smaller jobs than would normally be the case, encroaching on the market mid-sized firms normally operated in at their expense.

The fragmented structure of the industry and the low barriers to entry encourage a proliferation of companies, and while this results in a highly competitive industry there is the negative effect of cut-throat competition resulting in hyper-competition and low margins. Even in the more specialised and high-value-project sectors of construction, excess profits are constrained by this competitiveness. In the civil engineering market firms defend their territory from competitors by lowering tender bids to a level that chases away competition (Briscoe, 1988). The consequences are increased contractual claims, disputes, undesirable variations and little investment in research and development. Most of these firms are also undercapitalised and subject to the vicissitudes of a highly variable industry. The firms thus experience marked variations in turnover and profitability.

4.2.3 Other construction industry characteristics

Hillebrandt (1984) observed three categories of characteristics that occurred in combination only in the construction industry. These were those relating to the nature of the products, the product delivery process and the organisation of the industry. To Hindle (1997) the two characteristics most responsible for the industry being retrogressive were the hierarchical nature of the industry's social structure, and the high degree of technological flexibility it exhibited.

Construction industry demand has the following features: it is project specific and short term, ad hoc, hence fluctuations in workloads; and one-off, negating the use of demand consolidation and resulting in high transaction costs per project. The one-off aspect of construction also has the effect of minimising the transfer of learning and the basis for comparison of projects. In addition, the basis of scrutinising projects is technical rather than commercial. Considering the fact that most clients (95% by number, 60% by workload experience, according to Cox and Thompson (1992)) have no construction, a separate, 'independent' body of consultants whose purpose is to mediate between the client and the contracting organisation has come into existence. This has given rise to the perception that the consultants, and in particular architects, are "surrogate clients" (Rowlinson and McDermott, 1999).

A study by the Construction Clients' Forum in the United Kingdom found that the majority of construction clients were Small and Occasional Clients (SOCs), and that most SOCs did not understand construction project delivery processes and relied upon their consultant advisers. Daunted by the reputation of the construction industry, this majority of inexperienced clients are often nervous about engaging in new construction (Morledge, 1999).

4.2.4 Changing demand

The nature of demand in the construction industry has changed in the recent past. Shifts to private sector from public sector demand have been influenced by the trend towards privatisation in developed economies which, though multi-national donor agencies, has spread as a guiding policy in developing country economies. The tendency is now towards having the government as an enabler of private sector production and not as a provider of goods (Hillebrandt *et al.*, 1995). This tendency has been accelerated by the emergence of trading blocs, like the European Union, Common Market for Eastern and Southern Africa (COMESA) and Association of South East Asian Nations (ASEAN), which emphasize the need for free market policies and non-interference of government in business. One side effect of this is pressure on the supply side as private clients place more emphasis on delivering with better quality and speed than the public clients. Male (1999) identified shifts to private sector demand, client monopsonist power, an increase in the market for repair and maintenance and a strong cyclical pattern of order placing as characteristics of construction industry demand.

The implications of the shift to private sector-driven demand are that companies specialising in public sector works have to adapt to the different emphases of the private sector. In addition, some of the large infrastructural projects that were previously undertaken by the government are now delivered through build-operate-transfer, build-own-operate-transfer or similar project delivery systems. This calls for new sets of skills in addition to production expertise.

4.2.5 The nature of construction companies

One of the universal features of the construction industry is the presence of many small and medium-sized firms and a few large ones; what Ofori (1991) terms its 'pyramid structure'. There is an 'inverted pyramid' structure where the few large firms undertake the bulk of the projects by contract price (Ofori, 1991; Hillebrandt *et al.*, 1995). This is especially marked in developing countries. Small contractors have limited access to finance and credit, tend to move in and out of the industry in response to the current economic conditions and are unable or unwilling to employ qualified personnel.

In terms of strategy, Ngowi, Iwisi and Rwelamila (2000) showed that small firms had no intentions of creating specific strategic positions and confined their operations to their local neighbourhood, while the large firms sought to create and sustain strategic positions, using such approaches as negotiating funding and applying competitive intelligence. However, Bahae (1992) refuted the notion that the strategies, processes and concepts useful to large firms were not applicable to smaller firms. Many strategic management concepts were so generic and essential in managing businesses as to be applicable across size and other boundaries.

Construction companies are for the most part construction managers, sometimes because they are appointed in that capacity on management contracting, construction management or project manager arrangements, but primarily because they subcontract the majority of their tendered work out and focus on management. Ball *et al.* (2000) thought this enabled firms to concentrate on the area of their greatest competitive advantage and served to increase their financial flexibility. The downside, however, was a reduction in economic rent or value added. Ball *et al.* (2000) identified the main sources of economic rent as innovation in products, techniques or marketing methods; marketing, through branding or formal sales and marketing networks; using skilled personnel as an asset base; and monopolies.

For Cox and Thompson (1998) the appropriation of economic rent could only be done through the control of power and the accumulation of value from supply chains for the firm at the expense of others in the industry. Power was seen as the control of

resources or assets within a supply chain, and the basis for power was positioning along the supply chain in order to control and accumulate maximum value for the firm.

4.2.6 The construction product

The ultimate objective of construction is a physical product that fulfils the client's requirements in terms of cost, quality, time and utility. Since attaining these objectives usually necessitates a trade-off between one or the other clients have to determine their priorities in a clear brief. The consultants interpret and modify the brief such that at the end of the day the characteristics of the product are determined by both the design team and the client.

Because the products of the industry are of such a homogenous nature, it is not possible to distinguish between the works of producers, which also applies to the producers of the designs, the architects.

The application of principles developed in industries like manufacturing to the construction industry is complicated by the fact that the construction product can be seen as either a physical product or a service.

The physical product

The physical product of construction is unique in that it is produced mostly on-site, is immovable and is produced using labour intensive methods. The major inputs are:

- Materials – which form approximately 40-50% of costs. Materials are bulky so transport costs in construction are high and local production is correspondingly important
- Labour – which constitutes roughly a third of construction costs
- Site management
- Plant and equipment
- Capital in the form of finance (Lavender, 1996).

The high incidence of sub-contracting in the industry is because of factors ranging from the unpredictable nature of demand in the industry and the project-based nature of work. Sub-contracting is a production strategy to help reduce the operational costs of the firm, and while it has beneficial short-term effects on company balance statements there are negative long-term effects of reduction in training and quality of work, and increases in adversarial relationships in the industry. The sub-contractors are suppliers of labour and technical expertise to the industry, and as suppliers form part of Porter's (1985) 'five forces' model. Their bargaining power is important in determining the costs of the inputs they provide and ultimately the costs of production.

The service

Services are intangible activities or benefits that one party offers another for a consideration (Cowell, 1984). Apart from consultants, builders can also be said to offer services in the construction industry because the conversion process of materials to a facility is intangible, heterogeneous, perishable and production and consumption are inseparable (Stocks, 1991). The services in construction are management services that entail the supervision of the process and project management. Construction management and management contracting are project delivery systems that have taken service provision to the next level in construction.

4.2.7 Construction markets and market structures

Construction companies are usually classified according to the markets they operate in. There are various categories of markets, according to geographic location, type of work, size of project, and the selected method of classification depends much on the researcher's motives. Ease of entry and exit into different markets creates an "arbitrage-like" situation that equalises risk and return over the industry (Ball *et al.*, 2000). Construction markets in the main correspond to the sectors of the industry already identified though construction projects commonly have components of different sectors, for example a civil engineering and a building component. There are unique difficulties posed by the industry, however. The product is not easily classified. Firms sell their services as assemblers of building and civil engineering

goods, in which case the product is the service to the client. The product could also be the project delivery system used to deliver the final product (Langford and Male, 1991). Therefore the market could be either a project type or a service.

The difficulty in identifying substitutes in construction led Langford and Male (1991) to argue that there were four perspectives for viewing substitutes: between design and build and project management; management contracting and construction management; between both the above classes; and between new construction and refurbishment, repair and maintenance or renovation.

Classical economists indicate that in a free market firms locate in the areas where they anticipate reaping maximum benefits. The output decision -the decision as to which market or combination of markets to enter- is influenced by the firm's size, expertise and available financial resources (Briscoe, 1988). Once this is determined the focus turns to cost-efficiency which can be achieved through the control of material, labour and plant resources and dominance over the supply chain. Small to medium-sized firms have advantages of flexibility and efficiency at the smaller tasks/projects end of the construction spectrum, while larger firms have higher fixed costs and overheads and invest in plant and equipment and specialist staff. This gives them the advantage of being able to diversify into many markets and handle a wider range of projects within those markets.

According to Bail (1988) there are two distinct market structures for construction companies. Contracting involved firms contracting to construct a facility under typical contract conditions and according to predetermined project delivery systems. The effort is in response to a client need and is shaped by the client's brief. The other structure is speculative construction, which involves the anticipation, creation or response to a demand. The initiator of the project in this instance is the construction company itself.

The industry's characteristics, the market and the market structure of the industry directly determine the nature and form of Porter's (1980) five forces determining competitive strategies. Of the forces, Male (1991) was of the opinion that the consultants largely influenced the nature and form of a firm's competitors. While this

may be true for a traditional delivery system structure, the changes wrought by the Latham and Egan reports and directions towards new delivery systems have served to dilute the importance of consultants in defining the competitive arena.

4.2.8 Selling to construction markets

In free market economies the fundamental role of profit-seeking companies is to produce goods and services that create customers and customer value (Drucker, 1954; Cronje *et al.*, 1987; Lai, 1995). The entrepreneur and his enterprise attempt to satisfy the needs of their society at the risk of financial loss and with the expectation of reward in the form of profits (Samuelson, 1980; Lipsey, 1995). Free entry and exit into markets ensures that there are a number of firms offering similar products, trying to convince potential consumers of the superiority of their products and/or meeting consumer needs better than their competition. Selling is the effort of the firm to convert their products into income (Davies, 1995) as distinct from marketing which identifies the needs of the customer and hence the product the firm will try to sell. Both selling and marketing are thus essential activities without which the firm cannot survive.

The way in which firms in the industry traditionally sought to turn their products into income was (and is) radically different from most other industries. The point of sale occurs after the product has already been defined, negating the use of marketing techniques to determine the product that meeting customer needs best. Sales are based on lowest seller bids as opposed to off-the-shelf purchasing in manufacturing industries. The prospective buyers of the products are not known, nor indeed are the products themselves, and it is "difficult to locate and influence each prospective client" (Hillebrandt and Cannon, 1990). As Pearce (1999) puts it, "buyers of construction services do not visit the superstore on Friday evening and browse the fixtures to find this week's contractors".

Innovation, customer satisfaction and customer loyalty, used by entrepreneurs in other industries as a means of ensuring a market for their goods, are difficult to practice. Contractors have a passive role in the purchase process; limited to putting in and waiting to be selected based on their bids. The industry consequently resorted to

relationship marketing -creating and maintaining mutually beneficial relationships between supplier and customer- as their dominant selling strategy (Pearce, 1999).

Arditi *et al.* (2006) were of the opinion that sales in the construction industry could be equated to bidding. Performance in sales could thus be evaluated by assessing a company's success in bidding, with a high rate of bidding success assuring continued production and growth for the company. Hindie (1991: 115) defined contractor-selling systems as "the systems used to get the contractor and client to the point of sale", in other words synonymous to the contractor selection system. These were divided into two types: competitive bidding and negotiation.

Competitive bidding

This is the most frequently used method of selling, where contractors were invited to submit bids which were then evaluated by the client and the consultants and the contractor was usually chosen on the basis of lowest price tendered. Two basic types exist:

- Open bidding: with a few minor qualifications bidding is open to all, and usually the work to be tendered for is advertised in the media. Open tendering is especially valued by the public sector as it gives the appearance of transparency critical for those accountable to the public (Masterman, 1992).
- Closed (invited) bidding: selected contractors are invited, using criteria determined by the client or project needs, to submit tenders. The advantages here lie in the pre-selection of competent contractors reducing the chance of poor project execution, and less competition resulting in better margins for contractors, and less chances of discordant bids (Crowley, 1996).
- Two stage bidding: open bidding using a limited set of criteria is used to select a list of contractors with whom further negotiations are entered into. The seller is chosen on the basis of these negotiations.
- Serial bidding: selection on one project leads to the contractor also undertaking similar work with the client. In another interpretation, the project is broken up into packages that will be carried out serially and the winner of the first gets to carry out the rest.

Negotiation

In negotiation, a contractor and a client agree on a mutually acceptable price for a project. The norm is for clients to identify a suitable firm, which is then invited to negotiate, but increasingly there is a tendency for the construction firm to initiate the negotiations. Self-instigated negotiation is similar to and used to mean the same thing as the term unsolicited proposals.

Property development

Apart from competitive bidding and negotiation, there are other selling methods in use. Speculative building is common in the UK, which has a strong house-building industry sub-sector. There is no certainty that developing company will find buyers for its developments, and one company is the client and the contractor all in one. Capon (1990) prefers to call such companies 'constructors' as distinct from 'contractors'.

As the industry landscape changes, new selling systems are coming into place in conjunction with the increasing usage of alternative delivery systems.

4.2.9 The organisation and management of construction companies

Significant differences exist between the construction industry and industries such as manufacturing, especially as pertains to the nature of the product and the method of production. This gives rise to the view that the two cannot be similarly analysed (and by extension, managed?). Bresnen (1990) made the important distinction between project organisations, that is, those that have historically been project oriented in organisation and management, and organisations undertaking more recurrent and stable activities. Contracting firms are complex organisations differentiated horizontally into departments/divisions and vertically in an organisational hierarchy, and further differentiated by the geographic distribution of offices and projects. Maie's (1991) analysis clearly brought out the dual nature of the construction firm's structure by using an organisational role model. A formal structure with a hierarchy

of individuals exists at the headquarters or regional office, and at the project or site level an informal structure with looser relationships predominates. Small companies with few ongoing projects have looser structures which get tighter as the size and number of projects increases.

Male (1991) identified a number of structure types that a contracting organisation could assume. Small owner-managed firms have a simple structure, and one step above that in terms of complexity is a functional structure with the organisation divided into departments carrying out separate tasks. Divisional and sector structures were found amongst larger companies with a wide geographic spread and resulted from an attempt to create a federal system with greater autonomy for units. A holding company structure took the federated principle one step further by having a number of businesses that may be unconnected under the umbrella of a parent company. Matrix structured companies, as shown in Fig. 4.1, combined existing configurations, either temporarily (an example being project structures in construction) or permanently. Large contractors have both linear and functional staff, organised either along a military-style system of general staff with linear subordinates, or by the general matrix management method of dual structure project managers and functional divisions (Bresnen, 1990).

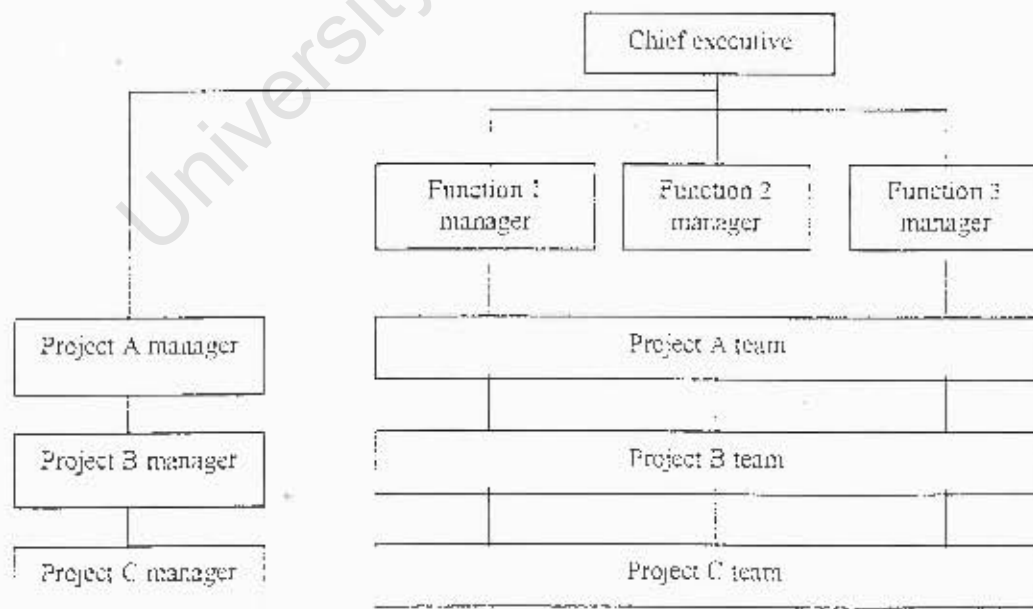


Figure 4.1 Matrix organisation showing dual project manager and functional structure

Source: Bresnen (1990)

Multi-nationals usually form divisions to look after branches overseas, creating a global structure where country offices may operate autonomously. Male (1991) also listed machine bureaucracies, professional bureaucracies and adhocracies as structural types found in the industry.

These structures are important in defining the framework within which strategies are developed and implemented. They also are a result of strategy, as in the case of divisional structures, which may be the outcome of a diversification strategy. The strategies adopted by a construction company and its structure are a result of management decisions. In other words, "industry and market structure impact on a firm through organisational structure, and a contracting company, depending on how senior management perceive the environment and respond to it, structures the company by delineating a strategic domain within the broader industry environment" (Male, 1991:40).

Management has general and specific principles relating to the field it is applied in, and while most of the advances in the construction industry have been of a technical nature, the management side still lags behind. There has, however, been an increasing willingness to adopt techniques developed by and for more progressive industries, most notably the motor vehicle industry. Considering the wide range of firm types in the construction industry from one-man operations to multi-nationals, the effect of advances in management has been varied and difficult to establish. Furthermore, emphasis tends to be placed on the management of the construction process rather than the management of construction firms, which is seen disdainfully by construction practitioners as of use to academic researchers only (Sebestyen, 1998).

Management derives its principles from organisation theory, business strategy and human resources management. In a construction company, its main purposes are project management and strategic thinking (Male and Stocks, 1991).

Project management

Project management involves the application of knowledge, skills, tools and techniques to project activities in order to meet stakeholders' needs and expectations (Burke, 1999), or the managing of "one-off arrangements using resources specifically gathered for that project" (Woodward, 1997:3). While almost every organisation will undertake a project of one type or another in the course of its business activities, the construction company is unique in dealing solely with project based production for its revenue, as opposed to steady-state production in operations oriented companies.

The proper management of a portfolio of projects is also critical to the success of construction firms (Bañl 1988; Langford and Male, 1991). A "balanced mix" of projects under construction, and being bid for, has strong positive effects on cashflows and profitability. Other advantages accrue from strategic portfolio management, including the spreading of risks over a number of projects and markets, and increased bargaining power resulting from an expanded client base (Langford and Male, 1991)

Strategic thinking

The foremost element of strategy is to determine the optimum conditions in which the firm can operate. Control over various aspects of production is important and the peculiarities of the traditional project delivery system offer little scope for this control. In the traditional project delivery system the customers initiate production, producers have limited say over the product and the price is agreed upon before production (Ramsay, 1989). Many aspects of conventional business strategy are therefore inapplicable to construction. Strategic thinking can be useful when determining diversification options, going global or undertaking acquisitions and mergers. Matrices like the Boston Consulting Group matrix can be used to determine the 'stars' and 'dogs' in a contractor's business and possibly the markets in which to operate. They serve as a business portfolio management tool, despite many limitations, and aid in achieving a balanced mix of project types (Langford and Male, 1991).

'Game theory' and 'life cycle theory' are examples of aspects of conventional strategy that find little application in construction. Game theory is difficult to relate to because of the contractor's lack of control over the construction process, and the applicability of life cycle theory is nullified by the bespoke, consumer-determined nature of the product. Male (1991) saw the need for a long-term perspective in construction and a departure from internal, production-oriented thinking to an externally focused strategic orientation.

4.3 Strategy for construction companies

The preceding sections and chapters have explored the environment and the basis for implementing strategy in construction companies. What are the strategies available to such companies and where does competitive strategy fit in?

Strategy in the industry is influenced by the size of the firm, its management style and its form of corporate leadership (Langford and Male, 1991). Seven constituent fields of strategic management feed in the inputs from which strategy is derived (Chinowsky, 2001). These are vision, mission and goals; core competencies; human and technology resources; education and knowledge management; finance; markets and competition. Of these, Chinowsky's study found that the emphasis on education and knowledge management and the awareness of core competencies were the fields companies laid least emphasis on.

Henderson (1991) thought that similar to species, firms could not coexist in an environment characterised by high competition and scarce resources if they made their living in identical ways. Firms needed to have a unique advantage over their competitors, especially in tough markets, which would enable them to out-compete rivals in supplying a product on a sustainable (long-term) and viable (profitable) basis (Arditi, Koksal and Kale, 2000). Porter's (1980) five forces determine the state of competition in an industry, and set the strategic agenda of action. Arditi *et al.* (2000) surmised that contractors should therefore position themselves to be as

efficient as possible or they should position themselves to offer services that are as distinctive as possible. On this the basis of competitive advantage would be built.

Competitive strategies form only one aspect of strategy that companies devise to help them achieve their ultimate objectives. Production and marketing strategies differ from competitive strategy in their universal application. Whatever competitive strategy a firm may chose to follow, methods and techniques for maximising production output at minimum cost and for identifying, adapting and satisfying customer requirements are essential. The next section looks at these strategies and their relationship to competitive strategy.

4.3.1 Marketing Strategies

Fisher (1986) described marketing as identifying or anticipating changes in the market. Male and Stocks (1991) saw it as the management function concerned with identifying, analysing and anticipating the customer needs so as to supply these needs, within the company's capabilities, to the identified target market at a profit. The Chartered Institute of Marketing's definition refers to it as the management function responsible for identifying, anticipating and satisfying customer requirements profitably. According to Doyle and Bridgewater (1998), the modern concept of marketing has moved from that previously held in the 1950's and 1960's. Then, marketing was seen as a way to get the customer to buy what the company was producing, i.e. as purely advertising and sales functions. In the 1970's there was a shift to understanding consumer needs and designing products to meet those needs, which has evolved today to include measuring customer satisfaction and forming and encouraging closer links with the customer.

Today, marketing is seen as the core function of any company, indeed, management guru Peter Drucker (1995) has written that business has two -and only two- basic functions: marketing and innovation. The construction industry is, contrary to all prevailing wisdom, loathe to embrace the marketing concept fully, with the exception of speculative house-builders (Moore, 1984; Fisher, 1986; Hillebrandt *et al.*, 1995; Male and Stocks, 1991). Amongst the reasons given are:

- Confusion as to the meaning and implications of marketing for construction firms, and a lack of appreciation of the possible benefits of making marketing a core company function.
- A belief, rightly or wrongly held, that construction products do not need marketing as they sell themselves
- The relocation of an essential marketing component, that of determining the product to be manufactured, to the client and the building industry professions
- The nature of the industry, for example, its fragmentation and the fluctuations in demand it faces.

Marketing strategies are geared to achieving competitive advantage through the marketing function. Bouma (1997) listed the key elements of strategic marketing, and noted the paucity of literature and practical examples in the construction industry.

4.3.2 Production strategy

One of the more common criticisms of the construction industry is its focus on short-term technically based production -which is subject to the fluctuations that plague construction- at the expense of a longer-term corporate orientation emphasising the relationship between the company and its environment. Preece and Khalil (2000) commented on the production-oriented culture of construction companies with their minimal emphasis on marketing. Brown (1996) pointed out that production is the core of the company's activities. Determining and understanding the firm's product helps in the strategic formulation process by clarifying what business it is in, the first step towards defining what business it should be in. This supports and helps define the company's mission.

Construction industry production strategy is unique because of the nature of the product and the characteristics of the industry. The two main determinants of the production strategy are delivery systems and project organisation. Delivery systems have already been discussed, save to add that the site organisation will vary under different project delivery systems. Site management can, because of their influence on production decisions, affect the strategies that a company puts in place. The shift

is towards more managerial roles for site management, away from technical roles, mainly due to the increased importance of sub-contracting and managing sub-contract relationships. Plant purchases are also particularly important in construction production strategies, as they are often the largest investments made by construction companies.

4.3.3 Market orientation versus production orientation

A market-oriented firm puts the needs of customers and potential customers at the core of its production, planning its activities around the market. A production-oriented firm will concentrate its activities around its products preferring to have superior products and let the goods sell themselves (Lavender, 1996). Construction firms exhibit different orientations, depending on the project delivery system they choose to produce under. The traditional project delivery system gives the firm little leeway in determining the nature of the product as the client and design team have appropriated that role. Smyth (2000) noted that product had been taken out of the four traditional components of marketing, price, promotion, place and product (the marketing mix). Design and build and similar delivery arrangements were attempts to streamline the industry and make it more efficient but firms in this sector still did a poor job of marketing themselves, being more reactive than proactive (Smyth, 2000). The contractor competes solely on price and reputation, though Stokes (1977) argued that reputation and quality count for little in obtaining work in the construction industry. However, by their courting of consultants and clients it can be argued that firms aim at satisfying customers in search of repeat business.

With the acceptance of alternative project delivery systems a number of construction firms have gone the market-oriented route and redefined the contracting role to include financing, designing, management of construction, facilities management, property development and housebuilding. Reasons for this are, amongst others, the need to counteract fluctuations in demand, the rise of habitual clients, the wider range of project delivery systems and the ease of obtaining a project for the larger, more diversified firms (Hillebrandt *et al.*, 1995; Lavender, 1996).

4.3.4 The link between corporate, marketing and production strategies

Brown (1996) linked the three levels of strategy and emphasised the importance in having an integrated view of the three. The corporate vision ties together the marketing and production functions, irrespective of the strategy at that level. A holistic approach was necessary to prevent a situation where corporation activities were dictated by marketing plans, which may not take into account the technical limitations of production. There was also a danger of gaps in implementation time causing a misalignment of the corporate, marketing and production strategies (Fig 4.2).

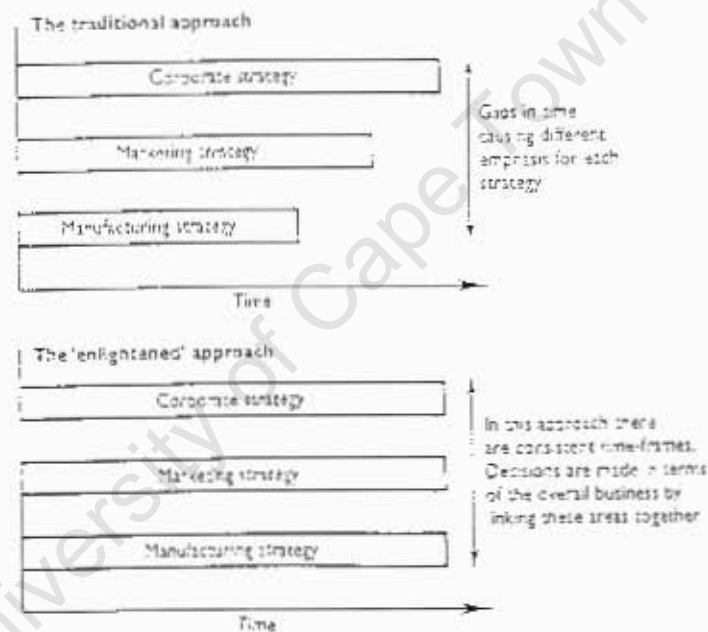
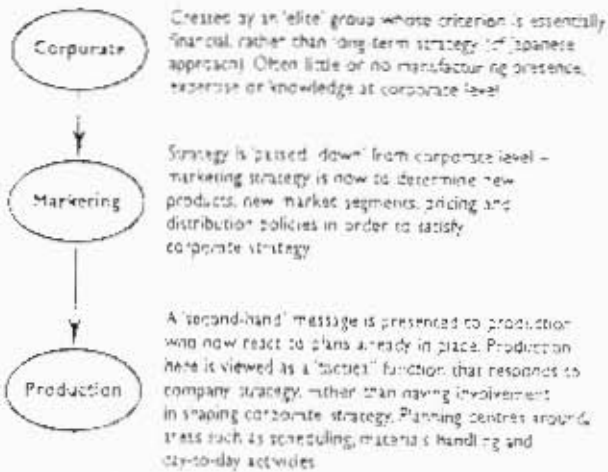


Figure 4.2 The factor of time in manufacturing strategy

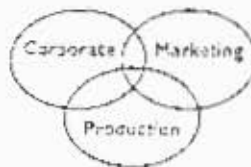
Source: Brown (1996)

An integrated strategy enables a better match between internal capabilities and external markets and removes the onus of creating the ideas that guide the company's strategy. Such an integrated strategy is shown in Fig. 4.3.

Traditional mode:



Enlightened mode:



This is clearly the approach taken by world class manufacturers. Time horizons are long term for corporate, manufacturing and marketing strategies and plans are made in an holistic approach by jointly agreeing internal capabilities and matching these to market opportunities. The firm is now focused and clear in its mission. Such an approach allows the company to avoid targeting markets in which it cannot succeed. Market requirements of cost, flexibility, delivery speed and reliability, together with quality requirements, are clearly understood by all and resources are allocated to meet these requirements.

Figure 4.3 Linking corporate, marketing and production strategy

Source: Brown (1996)

4.3.5 The strategic business area

The strategic business area determines the setting strategy operates in and is worth looking at before considering competitive strategies. According to Male (1991) the application of strategic business areas in construction required the identification of: future market needs as determined by the customer; project technologies to serve those needs, the particular customers with that need; and the project location or geographic setting in which the customer has the need. The contractor would not only be managing a portfolio of projects but also a portfolio of strategic business areas. Fig. 4.4 shows a model of the strategic business area in construction.

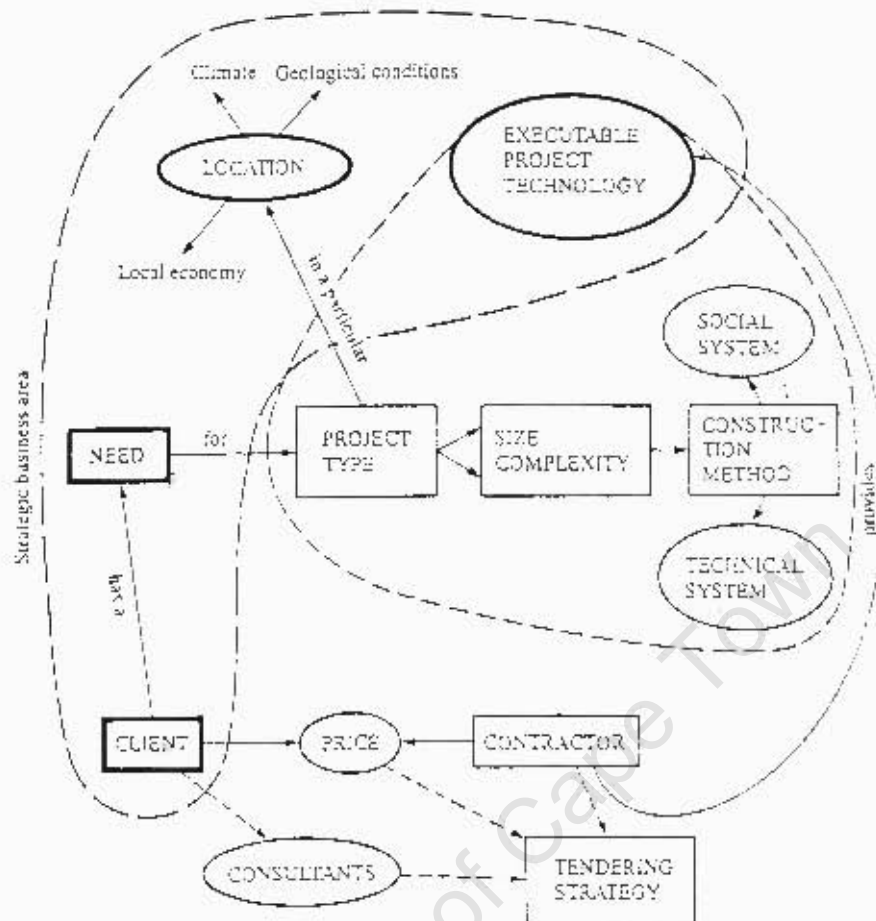


Figure 4.4 The strategic business area in construction

Source: Male (1991)

The portfolio's strategy comprises:

- geographic growth vector specifying the scope and direction of the company's future business
- the competitive advantage the company will seek, through competitive strategy, in each business area
- the identification and use of synergies present within the company and
- the strategic flexibility of the strategic business portfolio through external means through diversification and internally through transfer of resources.

Whether the product is a physical product or service is now a moot point as they are both the outcome of a market need. The competitive strategy can be determined by considering the individual strategic business areas.

4.4 Competitive strategy alternatives for construction companies

The wide range of markets, company sizes and unique characteristics of construction result in a wide variety of appropriate competitive strategies for firms. Further compounding the mix is the question of whether construction companies are manufacturing or service companies (Langford and Male, 1991). A wide range of choices is available to the firm.

The competitive strategy chosen depends on the analysis of strengths, weaknesses of the firm and the opportunities and threats it faces in the industry. It is also dependent on the prevailing economic conditions such as recessions and the international economic environment in which they find themselves (Ofori and Chan, 2000). This involves an analysis of the value chain activities and how these are configured into the construction value chain, which is different from those of other industries (Porter, 1980; Cox and Townsend, 1998)

Fig. 4.5 shows an example of a value chain in construction under the traditional project delivery system. Little outbound logistics and after sales service activity takes place in this model, and the role of marketing or sales staff is usually reduced to pricing tenders. The responsibility for bringing in work falls on those high up in the company ladder. Other delivery systems place different requirements of contractors. Design and manage, BOT and BOOT, for instance, place greater emphasis on after-construction maintenance for the contractor

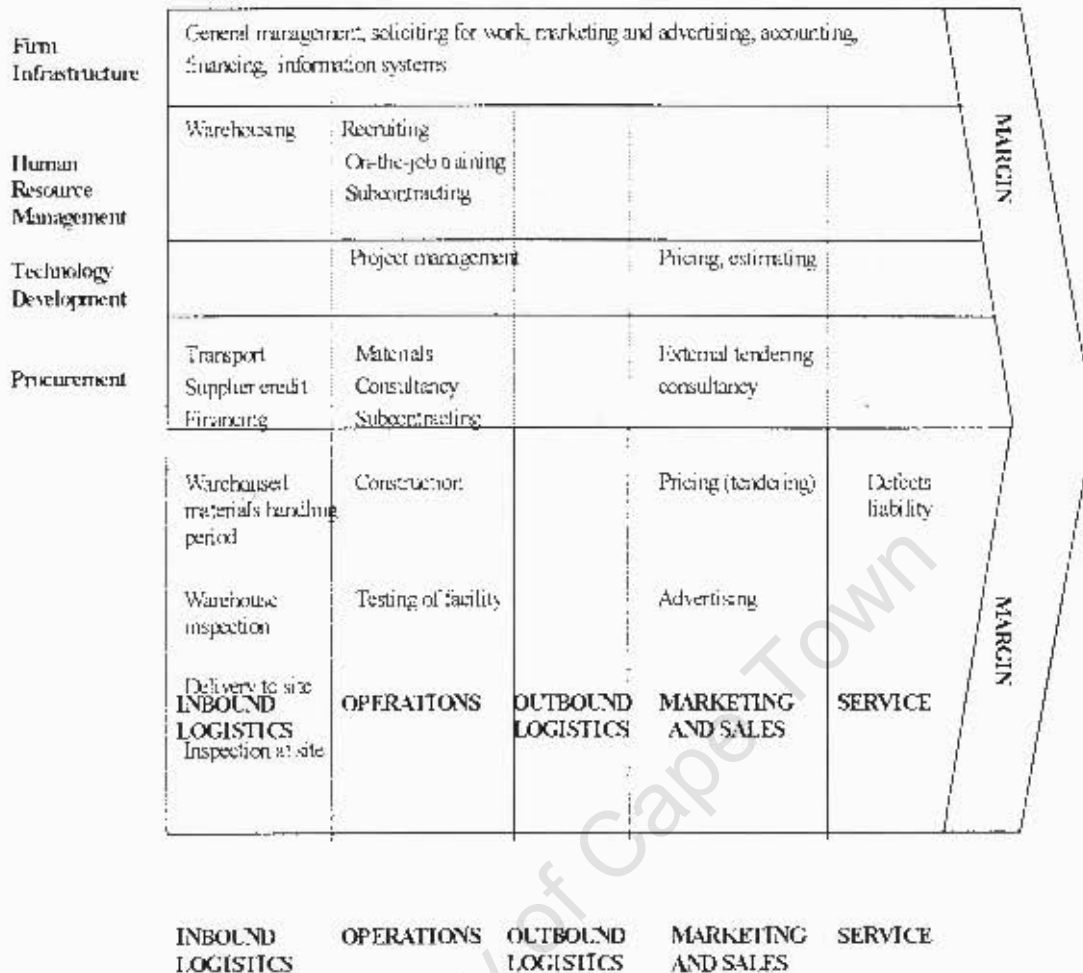


Fig. 4.5 The construction value chain under the traditional project delivery system

Adapted from: Porter (1985)

The main asset construction companies have is their personnel, so this would be the specific area in the search for competitive advantage. Knowledge management would then extract the competitive advantage for the benefit of the company. Companies search for two types of advantage: low-order advantage, for example through advantageous input prices; and high-order advantage such as those derived from knowledge-based and team-based efficiencies. Low-order advantages are easily eroded in times of severe competition and a company's best bet would be to emphasise its higher order advantages.

Strategic alternatives available to construction companies can be grouped into four categories: generic competitive alternatives as defined by Porter (1980), generic

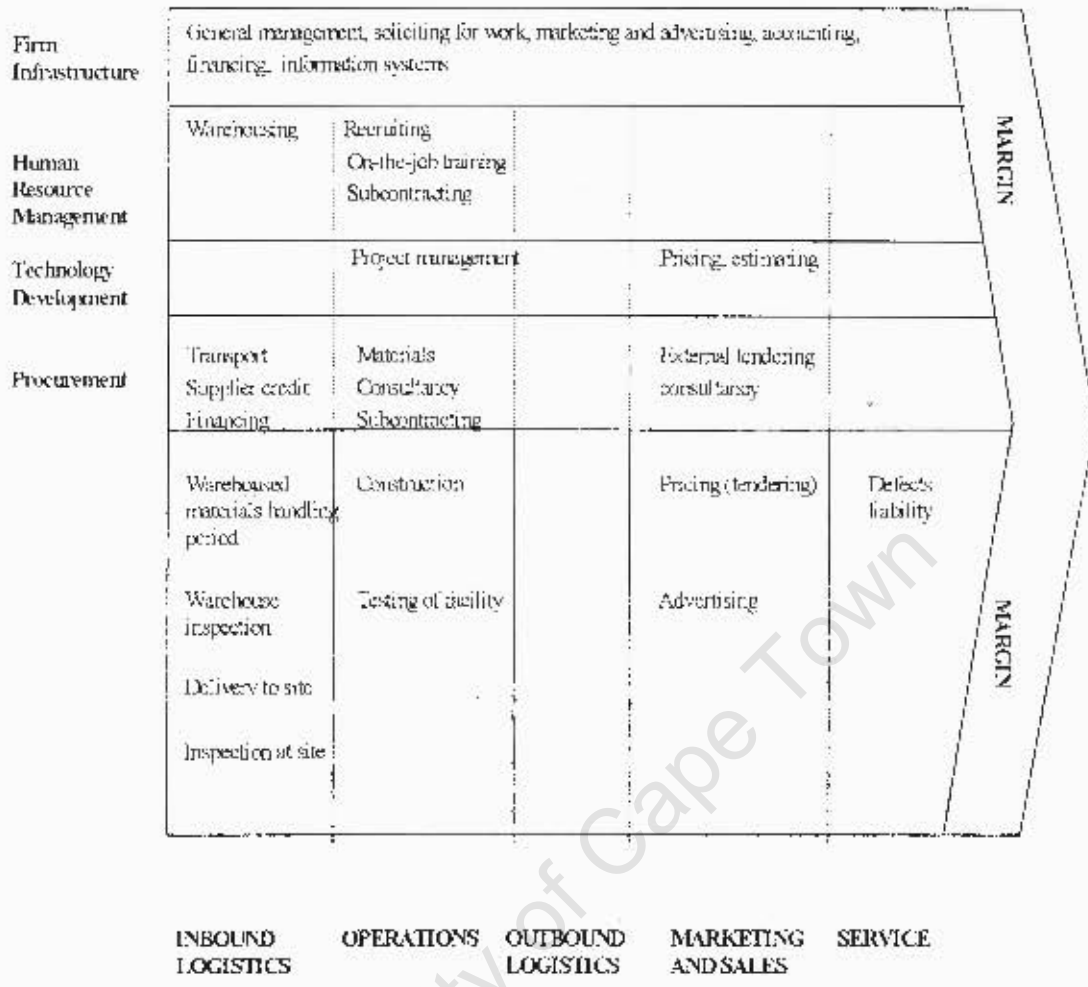


Fig. 4.5 The construction value chain under the traditional project delivery system

Adapted from: Porter (1985)

The main asset construction companies have is their personnel, so this would be the specific area in the search for competitive advantage. Knowledge management would then extract the competitive advantage for the benefit of the company. Companies search for two types of advantage: low-order advantage, for example through advantageous input prices; and high-order advantage such as those derived from knowledge-based and team-based efficiencies. Low-order advantages are easily eroded in times of severe competition and a company's best bet would be to emphasise its higher order advantages.

Strategic alternatives available to construction companies can be grouped into four categories: generic competitive alternatives as defined by Porter (1980), generic

directional alternatives, strategic variations and strategic mode. These are all summarised in Fig. 4.6.

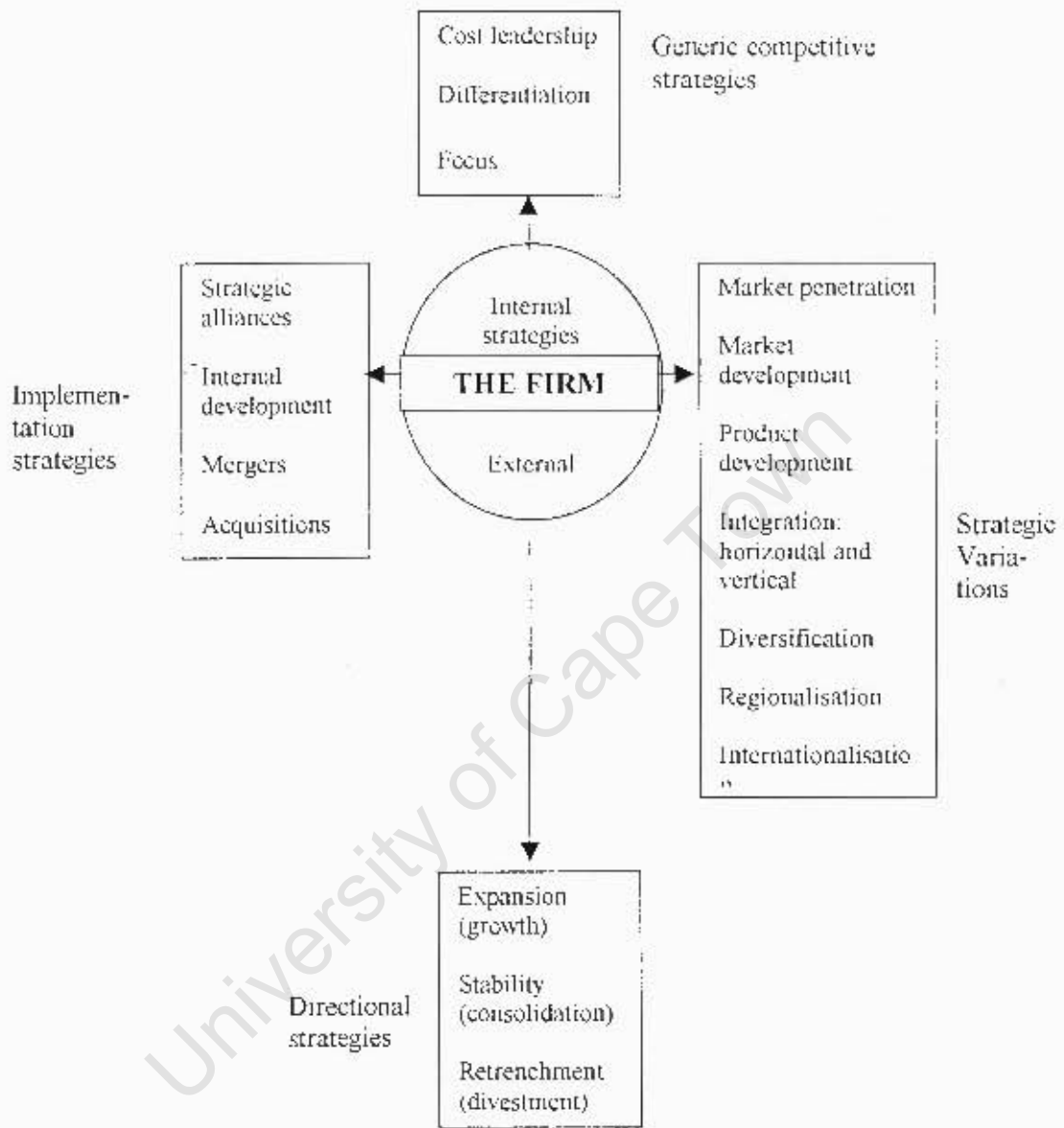


Fig. 4.6 The Strategic alternatives for a construction company

4.4.1 Generic competitive strategies

Cost leadership

While quality and service delivery may also be considerations, the central theme in a cost leadership strategy is low cost relative to competitors (Lin, 1995). Cost leadership finds expression in construction through aggressive pricing policies in tendering. It can also be achieved by economies of scale, the benefits of buying in bulk and the preferential credit terms that arise therefrom.

Another way of implementing cost leadership is by keeping a tight hold of costs along the company's supply chain, controlling overheads and minimising costs in such areas as research and development, advertising and customer service. It is however usually achieved by paring margins to the bare minimum, usually in the hope of recouping costs in the course of the contract (Cox and Townsend, 1998). This was identified as a source of problems by both the Latham and Egan reports especially as it tends to increase the incidence of claims. Lin (1995:82) identified several risks to this approach. One of them was an "inability to see required product or marketing change because of the attention placed on cost". The eroding of a firm's competitive advantage was also seen as easy because a cost leadership strategy is easily imitated by competitors. Furthermore, in tight markets it is difficult to maintain enough of a price differential to offset any competitor who adopts a differentiation strategy.

The main inputs of construction costs are labour, materials, overheads and professional fees. Cost leadership strategies have been widely used in construction industries globally, and the areas in which contractors concentrate to reduce costs are the two they have most control over, labour and overheads. This has resulted in, among others, a trend towards sub-contract and casual labour, low training and investment in a necessarily migrant workforce and a shift to hiring instead of owning plants (Uwakweh, 2000).

Differentiation

As a strategy in construction differentiation involves the concentration on attributes perceived as important to the client. While cost is not ignored the company provides a unique product or service that allows it to charge a premium price. Areas a firm can use to differentiate include technology, service package, price, quality, customer service and product design. The service package is worth explaining in more detail. To provide facilities that require large investment outlays, clients are increasingly turning to contractors who can also arrange for the financing of the project. More proactive contractors will even go the extra step and put in unsolicited bids where they have seen an opportunity.

The main risk associated with differentiation strategies is the correct identification of a differentiating factor that customers will pay for, given that differentiation gives rise to higher costs. As Drucker (1954) said, "What business thinks it produces is not of first importance -especially not to the future of the business and to its success. What the customer thinks he is buying, what he considers "value" is decisive". There is the possibility that the gap between the price and the customers perception of the value will lead to opting for a competitor (Lin, 1995).

Focus

A focus strategy may be either cost focus or a differentiation focus strategy. Both target specific segments of the construction industry and aim to serve them to the exclusion of others. The identification of clients with special needs in the industry is the basis of niche construction. This, however, requires regular workloads and sustained demand to maintain a firm, and so the particular niche must be carefully selected with this in mind. Breaking up the market into segments and having a business unit focus on each is an integral part of Dulaimi and Hammuda's (1999) model for a customer oriented organisation.

4.4.2 Generic directional strategies

Expansion (growth)

Expansion involves the development of additional markets, products, services or functions in an attempt to increase sales or market share. Growth may occur as a natural consequence of successful operational practice and strategies. In smaller construction companies the driving force towards growth is the advantage enjoyed by larger companies, those of economies of scale, access to credit and financial facilities and the ability to tender for larger and theoretically more profitable contracts. Larger companies also spread the risk better and have an easier time finding and retaining good staff. The main reason for growth strategies in larger companies, especially those where the ownership is divorced from management, is management's desire for achievement. Growth is linked to success and there is a snowball effect in growing companies attracting better management which desires more growth.

Expansion strategies are usually linked to favourable economic conditions. Hillebrandt & Cannon (1990) found that growth was one of the top priorities for a number of contractors in the UK but this changed to short-term survival in a recession.

Stability

While adopting a stability strategy a firm will serve its existing markets with similar products, services or functions as it has always done while keeping track of changes in the business environment. It concentrates on incremental improvements in company performance and seeks the streamlining of internal company operations. This is especially common after a period of change, but in the construction industry seems to be the norm rather than a consolidation phase. As has been noted this is due to the control of the processes defining construction by others rather than the actual producer. Blame for this is partly laid at the door of the consultants in the industry (Ball, 1988, Hindle, 1996). In addition, management in the industry are, by conditioning or nature, reactive rather than proactive and follow stability strategies sub-consciously. Do-nothing strategies are similar to stability strategies but current strategies are maintained

with only operational change being accounted for. Unlike stability strategies, environmental changes are ignored and no proactive steps taken.

Retrenchment (divestment)

A reduction in a company's activities by cutting down on the operations of loss-making divisions or activities can involve divestment, disinvestment, management buyouts or liquidation (Glueck, 1980). This has become the strategy of choice for turning around companies in the red, as the age of government bailouts seems to have come to an end. The increasing trend towards listing on stock markets gives shareholders more control over the running of construction companies and related conglomerates. Shareholders are more demanding of company performance than owners are and if the company does not meet profit objectives the pressure to restructure by retrenching may prove irresistible.

Retrenchment strategies can be of the cutback type where personnel, administrative and operational costs are reduced in an attempt to increase turnover and profits. They may also be of the divestment variety, with the company trying to eliminate certain lines of strategic businesses units. As an example, Murray and Roberts, the South African construction group, liquidated its struggling alloy wheel manufacturer, AWI Canada, after it occasioned losses of R210 million (Lloyd, 2001).

4.4.3 Strategic mode

Internal strategies

Construction companies mainly use their own resources to fund chosen strategies. Hillebrandt and Ball (1988) identified various reasons for this, including the unattractiveness of the industry to financiers and the family-owned nature of many companies (with the resulting reluctance to lose control over company operations).

External strategies

External strategies involve diversification. This has mainly been done through mergers and acquisition and is attributed to a desire for short-term financial gain,

senior management job protection, and market diversification. Companies can switch resources between different markets and the strategic flexibility of the companies is greatly increased.

Combination (joint development) strategies

These involve the pursuit of strategic objectives simultaneously through internal and external strategies. Subcontracting, licensing, technology sharing, franchising, consortia and joint ventures are all examples of combination strategies.

4.4.4 Strategic variations

Market penetration

In an attempt to gain market share construction companies commonly focus on sustaining and improving quality. Since they do not control the quality of their inputs in most cases, this can only be achieved by an improvement in supervision standards, supervisory staff and/or quality of workmanship. They may also work on improving productivity and increasing their marketing efforts towards the clients and surrogate clients (design team). Market share can also be bought by mergers and acquisitions and these are increasingly common in the upper echelon of contractors. Another method of market penetration is through the use of collaboration with joint ventures. In South Africa the requirements of the Reconstruction and Development Programme encourage the setting aside of work for previously disadvantaged communities. The desirability of combining the strengths of established companies with the socio-economic and political benefits of working with previously disadvantaged firms makes joint ventures attractive.

Market development

The common market development methods rely on extending the business area, targeting the export market and identifying new market segments and new products. The ease of movement between sectors in construction allows for flexibility in market development. Internationalisation and the trends towards allowing global

competition further makes market development a necessary strategy for the construction industry.

Product development

Opportunities for product development are limited in construction. Contractors need leeway to influence the nature of the product in order to encourage research and development and aid the process of innovation. This is possible in integrated delivery systems such as design and build. Instances of this are rare in the industry. In the United Kingdom, housebuilding companies do work to upgrade the quality of their products and the financial packaging that accompanies them.

Diversification

Construction companies have gone through considerable turmoil in the past few decades universally. One of their responses to the resulting challenges is diversification, which may be by acquiring existing firms in new areas of business or geographic regions. The diversification of an organisation requires strategic change (Uwakweh, 1996), involving possible changes in structure, core skills and know-how, technologies, etc.

Whether vertically or horizontally, purchasing other firms or spreading into new markets allows for a more expanded revenue base which is geared towards counteracting the perceived vagaries of the industry. It also helps avoid the danger of over-specialisation in one industry or sector of an industry, thus avoiding the losses a downturn in that sector results in for the firm. Horizontal mergers (Aveng, LTA Limited and Gricaker, Bovis and Lend Lease) increase the size of profits for the new company.

Construction firms will also diversify to acquire the expertise of others in different fields, to acquire a foothold in desirable markets and to acquire control of resources that offer a chance of competitive advantage, such as new materials, products and technologies. Hillebrandt (1996), however, found that most of the objectives of the

contractors were not met by diversification, largely because of poor planning and forecasting.

Regionalisation and Internationalisation

This may be an extension of a diversification strategy or a strategy in its own right. A focus on cultivating regional and international markets usually comes about after the local market has been explored thoroughly. It aims to give the company the benefits of a diversified project base and may be in response to a depressed local market. In addition, where the company has specialised in a narrow niche looking outward is the only way it may attain respectable levels of workloads. Should there be an increase in local construction activity international construction is usually then ignored (Barquin, 1994).

The effect of culture is critical in the pursuit of an internationalisation strategy (Langford, 2000), and the general pattern has countries with historical ties, for example former colonies and their colonial masters, accounting for the vast majority of construction export activity. For example, Odebrecht, a Brazilian company, is active in the African countries of Mozambique and Angola with whom they share a Portuguese colonial heritage. Increasing instances of developed country to developed country construction exports have been reported, driven by the freeing of global trade and the rise of trading blocks. Such efforts are constrained, however, by different procedures and markets, strong competition, similar technological strengths and the inability to open up bilateral credit lines to finance projects (Barquin, 1994).

Porter (1990) introduced the 'diamond framework' to determine the competitive advantage of firms in international markets, in which he identified four attributes of local environments that allowed firm's an international competitive advantage. Using Porter's framework, Oz (2001) identified sources of competitive advantage for Turkish firms in the international construction industry. Favourable factor conditions (for labour and capital), a dynamic home market providing an effective platform from which to branch out, good related and supporting industries (materials, design and consultancy) and strong firm rivalry and competition at home were some of the sources of competitive advantage. In addition, the role of the government in

supporting contractors and the ability to take advantage of chance events was also important. This agreed with Porter's framework.

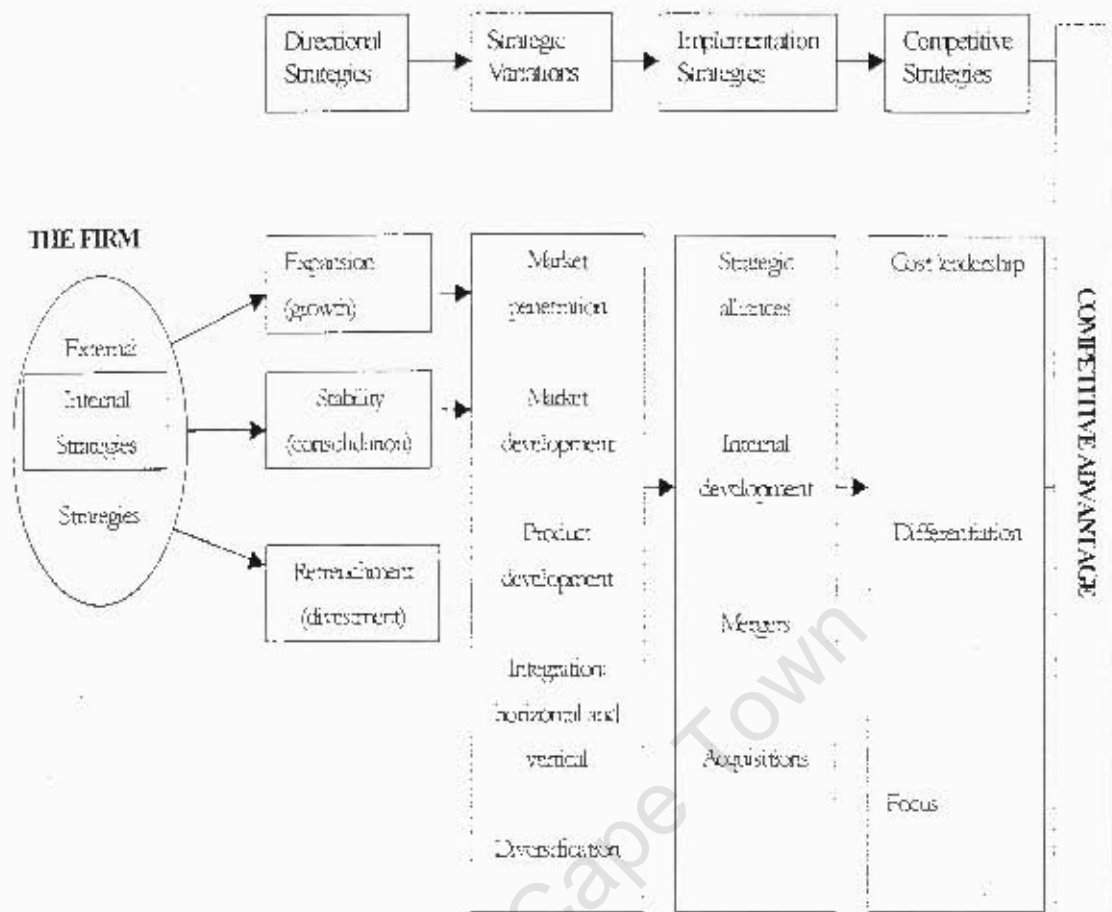
Regionalisation and internationalisation strategies can be achieved by opening local branch offices, setting up joint ventures with local companies, taking up equity positions in local companies or the outright purchase of local companies.

4.4.5 Combinations of strategies

Firms commonly use a combination of strategies, which Glueck (1976) referred to as grand strategies, in an attempt to fit their operations to different environments. Several strategies are applied to different parts of the firm or to the firm as a whole over a period of time. Stability, retrenchment and growth approaches may all be used in a firm over a shorter period than would probably be the case were it in another industry, due to the cyclic nature of demand in the construction industry. Raftery *et al.* (2001) showed that behaviour and attitudes in the construction industry changed at various points in the business cycle, and Pheng and Hua (2000) identified the strategic behaviour of firms in the economic downturn following the Asian financial crisis.

4.4.6 Summary of strategic paths

Fig. 4.7 reworks Fig. 4.6 to show the strategic paths a construction firm may take to arrive at competitive advantage via competitive strategies. The use of one path or strategy does not preclude the use of others: as has been noted this is the basis of grand strategies.



To summarise the strategic paths a company uses to achieve competitive advantage, the firm decides whether to use internal or external strategic mode first. This enables it to determine its directional strategy, whether to expand, consolidate or retrench. Using expansion or consolidation strategies opens up an array of strategic variations the firm can use to develop its competitive strategy, one or a combination of cost leadership, differentiation or focus strategies. The firm may or may not use an implementation strategy to help it arrive at its desired competitive strategy. The result of successful implementation of competitive strategy is competitive advantage.

Fig. 4.7 The Strategic Paths for a Construction Company

4.4.7 A matrix of strategies

The above strategies will not be applicable at all three levels of strategy, that is, at the corporate, business unit and operating unit (or functional) level. The generic competitive strategies of cost leadership, differentiation and focus can be used at the corporate and business levels, but not at the operating unit level where they would only be passed down from "above". Similarly, production strategies, like the decision to sub-contract work or sections of it out instead of doing it in the firm, are

operational level strategies, and ideally should not be the province of corporate or business level planners who should be preoccupied with a broader vision. A construction project can, however, be a major undertaking forming a sizeable part of the firm's revenues. The Kariba dam, for example, was of such impact to the contractor that problems arising from that contract caused the contractor's liquidation. Bidding strategies can then assume great importance to the construction company, and as Fine (1975:202) noted a workable strategy would be to "obtain work at any price confident in the management's understanding of the legal and contractual process enabling them to read the fine print to the firm's advantage". Table 4.1 organises the strategies into the levels at which they are commonly used.

Table 4.1 A Matrix of Strategies

| | Corporate Strategies | Business Strategies | Operational/Functional Strategies |
|--------------------------------|---|---|---|
| Generic Competitive Strategies | Cost leadership Differentiation Focus | Cost leadership Differentiation Focus | |
| Generic Directional Strategies | Expansion Stability (consolidation) Retrenchment (divestment) | | |
| Strategic Mode | Internal strategies External strategies | | |
| Strategic Variations | Market penetration Market development Product development Vertical integration Diversification Regionalisation and Internationalisation | Market penetration Market development Product development | |
| Grand Strategies | Combination of strategies | Combination of strategies | |
| Internal strategies | | | Bidding strategies, production strategies, estimating, plant purchases |
| Production strategies | | | Sub-contracting |

4.5 Project delivery systems as construction company strategies

This and previous chapters have looked in some detail at project delivery systems, strategy in general and strategy in the construction industry in particular. The next

sections draws on the preceding discussions to demonstrate how project delivery systems can be viewed as strategies leading to competitive advantage.

The decision to use a given delivery system rests with the customer of the building process, though numerous studies have shown the critical role of the consultant in influencing this decision (Masterman, 1999; Kamala, 2000; Bowen *et al.*; 1997). While the delivery system to be used is specified by the owner or, vicariously, the design team, the decision to tender using that specific delivery system still rests with the contractor. Fig. 4.8 illustrates the two-pronged nature of the selection of delivery systems, both customers and construction firms having their reasons for using a system and the market serving as the meeting point between the two. In this regard, the particular delivery system can be seen as a market for the construction firm.

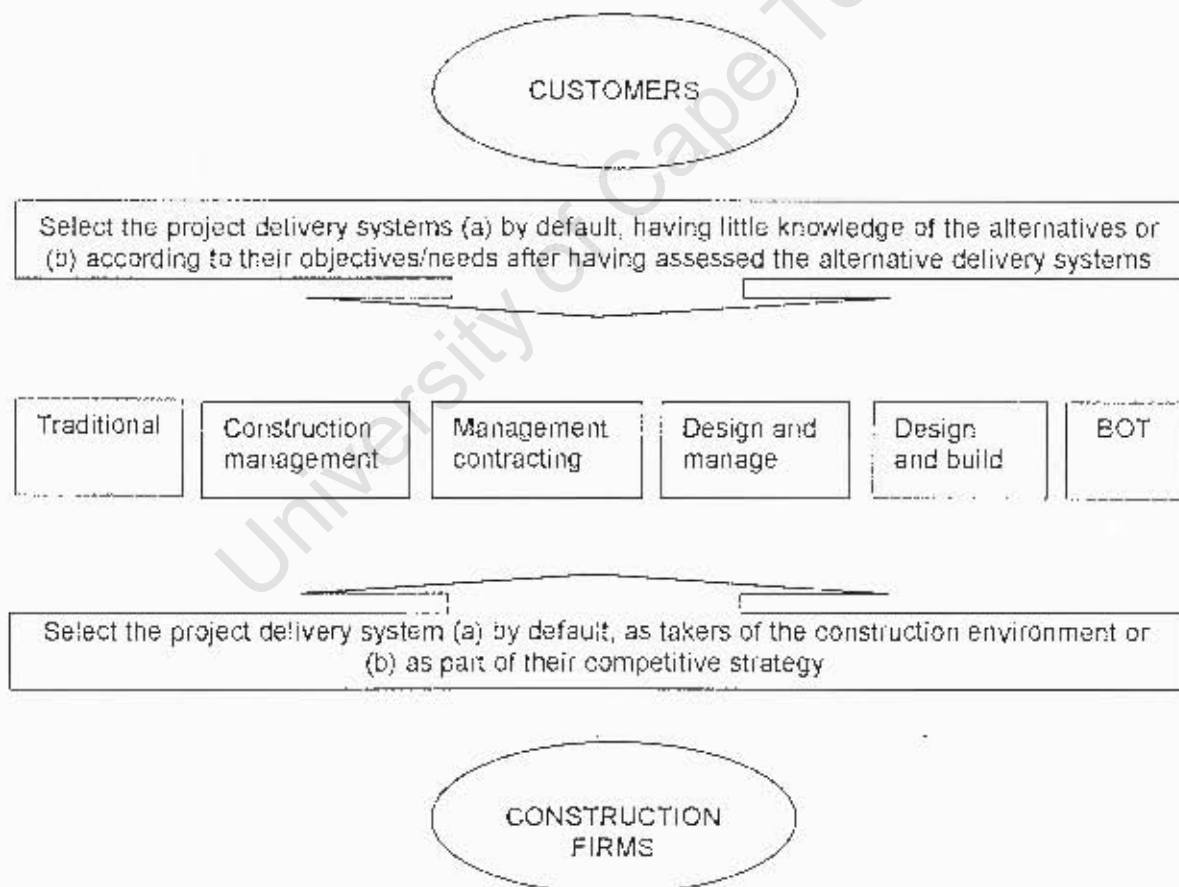


Fig. 4.8 Project delivery systems from customer and construction firm vantage points

The necessary project financing, financial management and design management skills required to undertake a design build contract, for instance, have the effect of causing specialisation in that particular delivery system by contractors. As firms build up expertise in to other systems they will prefer to specialise in them, as long as there are enough projects to provide adequate workloads. The experience and capacity to construct using a specific delivery method now becomes a strength using the SWOT analysis (Porter, 1980) if it delivers facilities according to customer requirements. Available literature has shown that this is indeed the case in many instances.

Having established the ability to deliver using particular systems as strength, contractors may then sell themselves using their ability to use that system, and its inherent advantages. Barton-Malow, in the US, increased the volume of its work from US\$ 73 million to over US\$ 700 million by emphasising the advantages of construction management as a project delivery system, and their expertise and ability to meet client requirements using the method. As Barton-Malow "began to get more construction management contracts the company began to see its future in this type of delivery system" (Friedman, 1984,68).

Looking at the whole project package (including the required facility and the framework or process prescribed by the customer) as a product, the trend towards alternative delivery systems has opened up the range of production options for contracting companies, which allows them to adopt a more proactive approach in the business of construction. No longer placid takers of the delivery system with decisions taken elsewhere, construction companies now find themselves operating under the same conditions as those in other industries where customers influence the type of product.

4.5.1 Project delivery systems as strategies

Delivery systems fall in to either the generic competitive strategies or the strategic variation categories of strategy.

As generic competitive strategies

Focus

Strategies of focus are geared towards identifying a specific market segment and serving the customers in that segment better than the competition. Because of construction's large number of sub-sectors this method has often been used by firms in the search for competitive advantage. As Ngowi *et al.* (2000) noted, "there are generic activities in each category (of construction), but involvement in a particular sub-sector only consolidates the competence of the firm in handling projects in that sub-sector". Focus can narrow down to very specific sub-sectors of the construction industry. Bechtel, for example, dominates the field of nuclear reactor construction globally, M.W. Kellogg is the world leader in construction for the ammonia production field and Lummus Crest in ethylene production technology (Ngowi *et al.*, 2000). South African holding company Aveng's stated strategy to become a globally competitive construction-related group relies on acquisitions in specific niche areas where adding specific skills rounds off their products and services and building world class capability in tightly defined niche markets (Aveng, 2000).

As a result of focus strategy, firms acquire such a base of skills as to offer complete services in the specific field of specialisation. Methods of project delivery that would suit such firms are design and build and its variants; develop and construct, build-operate-transfer, build-own-operate-transfer, build-own-manage, package deal, turnkey and develop and construct systems.

Using Lynch's (1997:201) definition of market segmentation as the "identification of specific groups or segments of customers who respond differently to other groups to competitive strategies" the various project delivery systems can be seen as separate markets for construction companies. Design and build, management contracting, construction management and design and manage attract different types of customers

and require different production skills (Masterman, 1992). A strategy that involves specialising in a project delivery system is a focus competitive strategy, with the system as the market.

Differentiation

Differentiation involves the creation of unique features in products or services that the firm uses to attract customers and can charge a premium for. Branding is the differentiation method of choice in consumer goods and manufacturing industries, but its application in construction is limited as the nature of the product does not lend itself to distinctions between producers. There is little evidence in the construction industry that contractors make any effort to differentiate themselves from their competition (Preece and Khalil, 2000). Only in housebuilding can branding be applied and that is supported by proprietary designs or building technologies. Using service and quality to establish a strategic position involves providing or specialising in such non-traditional services as site selection, feasibility study, design engineering, procurement of materials and equipment, commissioning, staff training and post-construction maintenance. Similar to focus strategies, differentiation requires a level of control over the process of construction that can best be provided by the design and build genera of project delivery systems. A company strategy that calls for differentiating products or services may therefore lead it to alternative project delivery systems.

As strategic variations

A market penetration strategy will result in the contracting firm maintaining its usual business practices, geographic areas of operation and type of client. This strategy allows the predominant project delivery system, usually the traditional in most economies, to entrench itself as the system most used by contractors. Market development and product development strategies try to break out of existing markets, which may have the effect of encouraging the delivery of projects using different methods. This is especially so since clients and their consultants have a large say in the success of market development strategies and there is a general shift in developed economies towards alternative project delivery systems. Developing markets and

products additionally require the creation and implementation of strategies and the acquiring of control over production resources. The paradigm shift this requires of the contractor is sufficient to move him from a taker of markets and conditions to an entrepreneurial creator of conditions. The move to control more of the supply chain (as per Cox and Thompson, (1998) steers firms towards a more integrated delivery system.

The same arguments can be extended to diversification, regionalisation and internationalisation -by moving into different markets a firm opens itself to new ideas and practices prevalent in those markets and seeks greater control over its markets.

4.6 Conclusion

This chapter looked at the nature and organisation of the construction industry, strategy as it pertains to construction and strategy as it pertains to project delivery systems. It has set the tone for the survey of the construction industry in South Africa, and will help define the questions that have to be answered in order to determine if construction companies use project delivery systems as strategy.

CHAPTER 5

THE RESEARCH METHODOLOGY

5.1 Introduction

This chapter starts with describing the factors that informed the choice of methodology. It then describes the reasons behind selecting the particular type of survey used and the factors taken into consideration when designing data collection methods. Finally the choice of the area covered and the actual execution of the survey are discussed.

5.2 Factors dictating choice of methodology

Research has been defined as the systematic observation of (social) life for the purpose of finding and understanding patterns among what is observed (Babbie, 1995). It is concerned with the inquiry into situations to provide the necessary knowledge for application in decision-making. Research can be considered to be a voyage of discovery, and what, if anything, is discovered depends upon the patterns and techniques of searching, the location and subject material investigated, and the analysis carried out (Fellows and Liu, 1997).

5.2.1 Qualitative or quantitative research?

Research can be classified as qualitative or quantitative, pure or applied, or conceptual or empirical (Holt, 1998). In the quantitative approach the study of related literature and theory yields precise aims and objectives with hypotheses to be tested in what may be termed a scientific and empirical approach. Conjecture and refutation may be adopted (Walker, 1997). A qualitative approach has an exploration of the study undertaken without prior formulations, the objective being to gain understanding and collect information and data such that theories may emerge. As can be seen, the qualitative approach is a precursor to quantitative approach and

Conceptual research is theoretical and aimed at developing a concept or idea. It is usually based on qualitative information. Empirical research has its basis in numerical data and experimentation, is objective and implies quantitative data.

This survey according to the aims and objectives laid out in Chapter 1 and the preceding sections was identified as a triangulated, conceptual research. It is an applied as opposed to pure research, because the results of the study can be to design effective project delivery system strategies for construction companies.

5.2.2 The data

The data dictates the research methodology. This basic rule, stated by Leedy (1985), implies that for every research a different methodology or combination of methodologies will be most effective. Leedy identified four principal data types, literary, normative survey, analytical survey and experimental data, and suggested four research methodologies to deal with these data types. These were:

- The historical method - suited to data of a literary or documentary nature,
- The descriptive survey - for normative survey, or observable, data,
- The analytical survey method – appropriate for quantitative data
- The experimental method – best used for data derived from experimental situations

These are general and broad methods; other suggested categories are action research, case and field study research, correlational research, descriptive survey, developmental research, causal-comparative method, historical research and the quasi-experimental and experimental methods.

To achieve the aims of this study it was seen best to use different types of data. quantitative data and literary or documentary data. Using a combination of methodologies was thus seen as ideal. Literary data was collected through a literature survey, but the main methodology of this research was the descriptive survey, as described by Leedy (1993).

5.2.3 Positivist or naturalistic research?

To clearly communicate the study, the researcher must have a clear understanding of the basis of epistemology used and allow that to direct the methods used. Epistemology can be either positivist, where knowledge is substantive and can be passed on from one person to another, or naturalist, where knowledge is assumed to be subjective and only understood with reference to individual's frame of mind. Naturalistic research drives towards a methodology where the researcher is involved as an active participant, whereas the objective approach of positivism directs the researcher to the identification of causal relationships.

Dainty, Bagillhole and Neale (2000) summed up the arguments for and against rationalist and interpretative methodologies in construction management research and suggested a grounded theory approach using qualitative software packages as a viable option. Green (1994) argued that research ignored the validity of naturalistic inquiry and reflected the positivism of functionalistic society. This means that research methodologies adopted tended to establish causal relationships from a distance rather than the active participation of the researcher in the study. Socio-technical problems, amongst which the problems facing the construction industry fall, do not have a single correct solution recognised and accepted by all affected. Furthermore, the perception and importance of problems will vary depending on the investigator, and different interpretations will be even more marked in construction with its divided and hierarchical structure and tradition of adversarial relationships. Emphasis on one or the other of the epistemological assumptions means that those aspects of a problem that either cannot be measured or are outside the range of perception of the researcher are ignored.

The difficulty in taking an active part in this research arose from time and cost limitations, the desire for secrecy by the participating companies and the slowdown in the local economy necessitating minimal staff on all projects. This research therefore assumed a positivist approach, with structured questionnaires followed by semi-structured interviews where the perceptions of the respondents were given weight. A technical systems approach, as opposed to a soft-systems approach, was used to compare project delivery, following McDermott (1999).

5.3 The methodology

5.3.1 Literature survey

A thorough literature survey was carried out in the fields of project delivery systems, strategy and strategy in construction. The field of literature narrowed down considerably when it came to linking project delivery systems to strategy in construction.

5.3.2 Structured questionnaire survey

Holt (1998) identified nine methodologies available for researchers in the built environment. These were: process observation, process measurement, open question survey, structured survey, unstructured interview, structured interview, symbolic experiments, physical experiments and mathematical models. Based on the previously discussed factors dictating choice of methodology, the best method for carrying out the survey was decided upon as a structured questionnaire. This has advantages of a wide geographic spread and minimum cost and time implications. Despite the desirability of structured interviews, they are expensive to administer over a wide area as they involve travelling and upkeep costs, and involve a large investment of time.

The designed questionnaire had all the three classes of data defined by Holt (1998), ordinal, nominal and interval. To encourage response to the questionnaires respondents were not required to identify themselves and were assured that the findings were to be used for research purposes only. However, as an incentive they were given the option to do so if they wished and were assured of a copy of the research findings on request.

A mix of open-ended and multiple choice questions were used and an effort was made to ensure a flow in the questions so as to shorten the apparent time taken in filling them in. As the questionnaire had over 30 questions they were renumbered with some broken down into sub-sections of others. This gives the impression of fewer questions, which in turn encourages responses.

Three types of questions were asked of the respondents: general information about the company; questions relating to company strategy and questions relating to the project delivery systems used by the company.

5.4 The sample

A list of contractors was compiled from the membership directory of the Master Builders Association (MBA) in the Western Cape and from the South African Federation of Civil Engineering Contractors (SAFCEC) membership list of all South Africa. The MBA claims its 137 construction company members (they also admit specialised construction companies, materials suppliers, manufacturers and consultants to their membership) handle 70% of the construction work in the Cape Peninsula and employ a similar percentage of the total building industry workforce. Approximately 50% of the civil engineering contractors in South Africa are members of SAFCEC and 60 of these list their region as the Western Cape. There was some overlap between the lists of the two organisations. The population of construction companies sampled was 167. The survey covered firms of all sizes including the small enterprises as they are considered to make significant economic contribution to the economy.

To ensure a maximum response, the member companies of the two organisations in the Western Cape were first surveyed by telephone. This was done to find out whether (i) they were still actively in the construction business and (ii) whether they were amenable to filling in and returning a questionnaire on strategy and project delivery systems in construction. They were promised results of the survey when complete. Out of the 166 contacted companies, 9 were out of business or in the process of closing down. Thirteen firms could not be contacted, either because the telephone lines were out of order, constantly diverted to answering machines or simply not being answered. Seventeen declined to take part in the survey, leaving 127 as the targeted companies for this survey. Significantly, all of the 9 largest companies in the Western Cape and in (South Africa) agreed to participate in the survey (See Table 5.3).

Considering that the largest 20 - 30% of the firms account for more than 80% of the output (DPW, 1998) the sample represents an estimated 50 - 60% of the formal construction activity in the region, which is substantial.

A trial run was undertaken using three contractors known to the researcher who kindly agreed to give feedback on the clarity, applicability and 'user-friendliness' of the questionnaire. Based on these results the questionnaire was reorganised and amended and the final questionnaires sent out to the respondents with an explanatory letter and stamped self-addressed envelope to encourage response.

5.5 The response

5.5.1 Total response

Out of the 127 questionnaires that were sent out, 31 were returned filled in, with 2 questionnaire returned marked "Return to sender" and 94 non-responses. This is a return percentage of 24.41 percent, which for a questionnaire survey is considered good. The better than usual response is attributed to the calling of respondents to ask for their co-operation before carrying out the survey.

5.5.2 Validity of response

Are the respondents representative of the population, or is there likely to be a difference between the types of firms responding and the non-respondents?

The possibility of respondents differing from non-respondents was minimised by using a randomly chosen sample representing a wide range of the population. However, the following groups will likely be under-represented:

- Informal contractors
- Emerging contractors.

These two groups have different organisational structures and do not necessarily operate in the same markets, and to best investigate strategy in such companies a study should be designed specifically for them.

The Western Cape is the second largest province in terms of economic activities, accounting for 26-28% of formal construction activity in 1999-2000 (BIFSA, 2001). The type of building work carried out here is similar to the other provinces (Bureau for Economic Research, 2001) and by implication the survey results will be characteristic of the situation in the rest of South Africa.

5.5.3 Analysis of responses

The data collected from the survey was both qualitative and quantitative in nature. In most cases where there were multiple variables being compared tables were used to present the data. Where quantitative data needed to be analysed the Mann-Whitney U and Wilcoxon tests were found most appropriate as they can be used on small sample sizes.

Statistical analyses were carried out using the Statistica software package.

CHAPTER 6

THE RESULTS OF THE SURVEY AND DATA ANALYSIS

6.1 Introduction

The results of the questionnaire survey are presented in this chapter and any relevant conclusions drawn. The results of hypotheses testing using the Mann-Whitney test are given. The chapter also summarises data from the literature review and the questionnaire survey and uses that data to determine the veracity of the hypotheses.

6.2 - Results of the survey

Question 1. What type of construction work does your firm chiefly undertake at present (i.e., civil engineering work, repair and maintenance, residential, housing schemes, etc.)?

Eight of the respondents undertook building as well as civil engineering work. Two stated they undertook civil works only. Twenty-one of the respondents were building contractors, undertaking a wide variety of projects including general contracting, residential construction, factories, schools, luxury housing, alterations and additions, small offices, hotel refurbishments and housing schemes.

Table 6.1 Type of construction work undertaken

| Type of work | No. of respondents | Percentage |
|--------------------------------------|--------------------|------------|
| Building works | 21 | 68 |
| Building and civil engineering works | 8 | 26 |
| Civil engineering works | 2 | 6 |

Question 2. What type of construction did your firm chiefly undertake in the past?

Twelve of the firms had changed the type of work they undertook in the past. One moved from civil works to industrial building and minor civil, two eliminated civil works from their portfolio of projects altogether, two moved from repair, renovation, minor building works to general construction, one included low cost housing in their new portfolio of project undertaken and two deleted it. Three firms moved from undertaking work in specific fields (industrial, commercial or residential fields) to general fields (building construction for two, large building projects for the third).

One firm indicated it did not have a specific construction type undertaken in the past but was at present carrying out industrial and commercial work. Nineteen firms undertook the same types of work in the past as in the present.

Table 6.2 Movement between market sectors

| Market sector | Entering sector | Exiting sector | No change |
|-------------------------|-----------------|----------------|-----------|
| Civil Engineering works | | 3 | 5 |
| Industrial | 2 | 1 | 3 |
| Repairs and Maintenance | | 2 | 1 |
| Low cost housing | 1 | 2 | |
| General building | 5 | 1 | 2 |
| Commercial | 1 | 1 | 4 |
| Residential | | 2 | 3 |
| Facilities management | 1 | | 2 |
| Open cast mining | 1 | | |
| <i>Total</i> | <i>11</i> | <i>12</i> | <i>20</i> |

Conclusion: The above table shows that there is considerable movement between market sectors. Construction companies are mobile between sectors, and have even diversified into mining. The reason given by the firm moving into mining was the availability and the need to make full use of heavy earth moving equipment and machinery.

Question 3. How long has your firm been in business?

The average time the firms had been in business was 42.7 years, with the oldest firm 110 years old and the youngest 7. The standard deviation was 32.9 years.

Conclusion: the firms responding to this survey were well established, given that conventional thought is that most companies fail in their first five years. There are three possible reasons for this:

- established companies have taken the time to join the associations from which the participants in this study were taken
- firms must have good 'track records' before these associations will accept them
- established companies find it easier to take time out to respond to requests for information.

Question 4. In which sectors do you mainly operate, public, private sectors or both?

Nineteen contractors worked in both public and private sectors while 12 worked in the private sector only. None did exclusively public sector work.

Question 5. What is the size of your firm, in terms of annual turnover?

Table 6.3 Size of firms

| Turnover in rands | No. of respondents | Percentage* |
|-------------------|--------------------|-------------|
| Up to 1 million | 0 | 0 |
| 1 – 10 million | 5 | 16 |
| 10 – 50 million | 6 | 19 |
| 50 – 200 million | 11 | 35 |
| Over 200 million | 9 | 29 |

*Because of rounding errors the total percentage is not equal to 100

Conclusion: the firms responding to this survey were on average large companies. This may be due to:

- large companies have taken the time to join the associations from which the participants in this study were taken
- large companies find it easier to take time out to respond to requests for information.

This also indicates that the findings will be representative of the construction industry.

Question 6. How would you characterise your profitability as a percentage of turnover?

Table 6.4 Profitability of firms as a percentage of turnover

| Profits as a percentage of turnover | No. of respondents | Percentage* |
|-------------------------------------|--------------------|-------------|
| High profit (over 5%) | 2 | 6 |
| Moderate profit (1 to 5%) | 21 | 69 |
| Break-even (1 to -1%) | 6 | 19 |
| Moderate loss (-1 to -5%) | 2 | 6 |
| High loss (over -5%) | 0 | 0 |

*Because of rounding errors the total percentage is not equal to 100

Sixty-nine per cent of the firms indicated they had declared moderate profits of 1 to 5%, and 19% broke even (1 to -1%). Only 6% declared either high profits (over 5%) or losses (over -5%). There was no relationship between size of firm and profitability.

Conclusion: the results are as expected as the construction industry has been described as an industry where profit margins are usually tight, with margins mostly in the 1 to 5% range.

Question 7a. How did you get work in the past and at present, through...

Table 6.5 Methods of getting work

| Methods of getting work | In the past | % | At present | % | % change |
|--|-------------|-----|------------|----|----------|
| Open competitive tenders | 31 | 100 | 25 | 81 | -19 |
| Invited competitive tenders | 31 | 100 | 27 | 87 | -13 |
| Negotiation | 29 | 94 | 29 | 94 | 0 |
| Property development | 19 | 61 | 17 | 55 | -6 |
| Self-instigated negotiation | 14 | 45 | 14 | 45 | 0 |
| Other: unsolicited proposals | 0 | 0 | 1 | 3 | 3 |
| Other: (build operate transfer, design build finance operate, private finance initiatives) | 0 | 0 | 3 | 9 | 9 |
| Other: having a special technology | 0 | 0 | 1 | 3 | 3 |

Eighty-one per cent of the respondents professed to use open competitive tenders, down from 100% in the past. Negotiation is presently the most commonly used selling practice, being used by 94% of the respondents. This figure is unchanged from the past. Other selling systems identified by the respondents themselves include unsolicited proposals (1 respondent – 3%); having a special technology (3%); build operate transfer (BOT) (3%); private finance initiatives (PFI) (3%); and design build finance operate (DBFO) (3%).

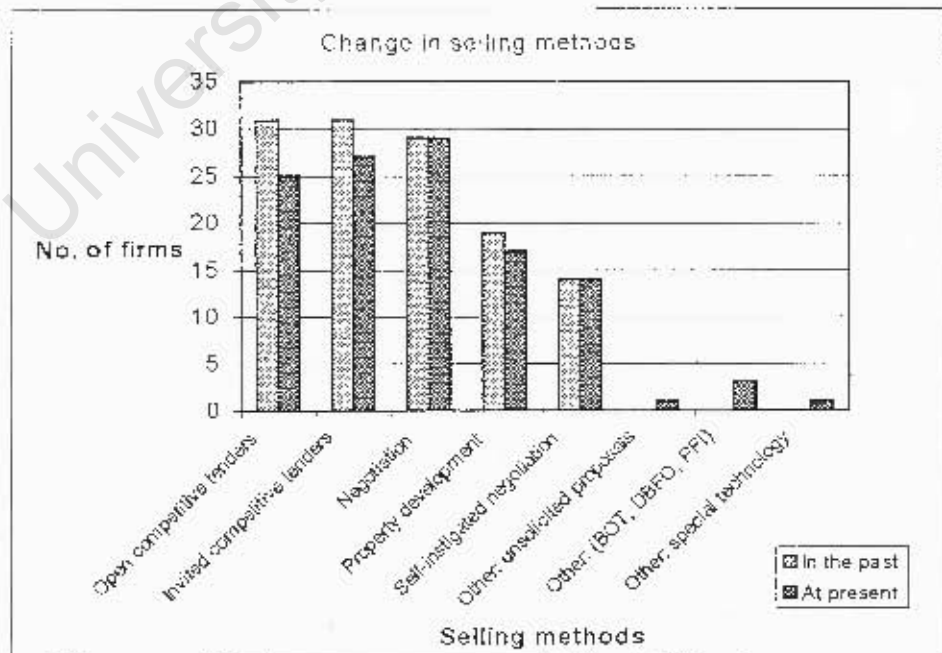


Figure 6.1 Changes in selling methods

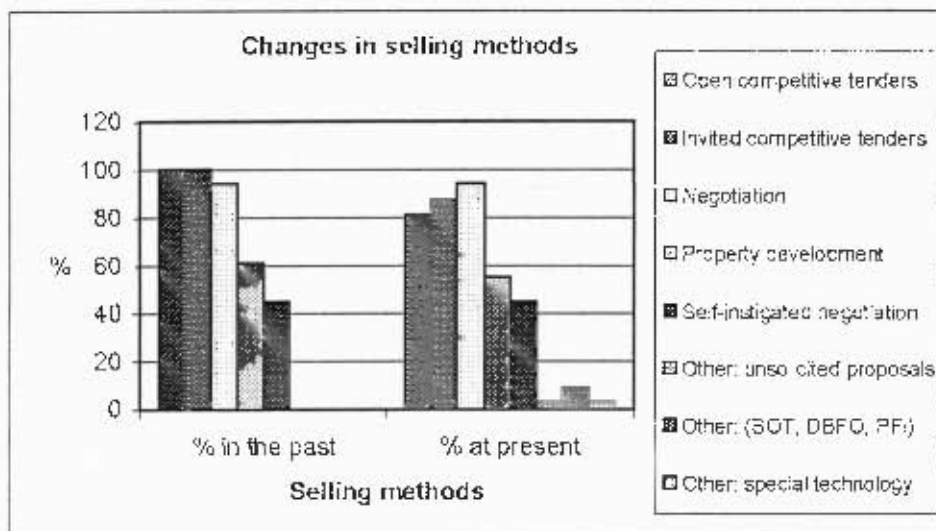


Figure 6.2 Changes in selling methods

Conclusion: there is a general shift from the more traditional tendering systems where the firms were 'takers' of the markets towards methods requiring initiative from the contractor. Open and invited tendering and negotiation require that firms wait to be offered a chance to compete, while self-instigated negotiation, property development and unsolicited proposals require the construction firm to take the initiative in sourcing work. BOT, PFI and DBFO also call for initiative from the firm. Using a special technology can fall in either of the two categories.

Question 7b. Which of these methods do you prefer?

Table 6.6 Preferred methods of getting work

| Preferred method | No. of respondents | % |
|------------------------------------|--------------------|----|
| Negotiation | 25 | 81 |
| Invited competitive tenders | 4 | 13 |
| Self-instigated negotiation | 4 | 13 |
| Property development | 3 | 9 |
| Other: unsolicited proposals | 1 | 3 |
| Other: having a special technology | 1 | 3 |
| Open competitive tenders | 0 | 0 |

*The percentages do not add up to 100 because some respondents indicated they preferred more than one method.

The preferred method for 81% of the respondents was negotiation. Open competitive tenders were the least popular method, having no proponents.

Conclusion: while most of the respondents preferred negotiation it was not the most commonly used method, indicating that they still did not have the discretion to use the type of method they would most like. The overwhelming preference is for methods that reduce competition and give the firms a measure of say in determining the nature and conditions of their work.

Question 7c. Why do you prefer this method?

1. Negotiation: those who preferred negotiation gave the following as reasons for their preference:

- (a) the contract is conducted in a more harmonious manner
- (b) more chance of achieving targeted profit
- (c) it gives the best deal to both parties
- (d) fairer price and no 'cowboy' contractors
- (e) up-front involvement, early identification of risk
- (f) closer contact with client, input into design, larger profits
- (g) offers opportunity to innovate and benefit therefrom
- (h) better relationship and consequently better overall delivery to requirements with associated high quality
- (i) competitive tenders drive prices (and presumably, profits) down

2. Those who preferred invited competitive tenders identified

- (a) competing against reputable companies
- (b) up-front involvement, early identification of risk
- (c) closer contact with client, input into design, larger profits than with competitive tenders
- (d) sensible margins
- (e) the contract is conducted in a more harmonious manner
- (f) more chance of achieving targeted profit

as their reasons for preference.

3. Self-instigated negotiation adherents cited their reasons as
 - (a) up-front involvement
 - (b) early identification of risk
 - (c) closer contact with client
 - (d) input into design
 - (e) larger profits
 - (f) sensible margins.

4. The advantages of property development were seen as:
 - (a) up-front involvement
 - (b) early identification of risk
 - (c) control of the project and prices

5. Having a special technology was advantageous because it was seen as resulting in "sensible margins".

6. Using BOT, PFI's and DBFO had the advantages to their exponents of avoidance of disputes and single point responsibility.

Conclusion: most of these demonstrate a trend toward the application of sound management and business principles. There is a renewed emphasis on customer satisfaction and the ensuring of better buyer-seller relationships. There is also a strong drive to escape the pressures of competition, which is seen as causing low margins.

Question 8. Is there someone in your firm with the specific responsibility of charting the firm's strategy (please give job title)?

Six of the firms (19%) did not have a person in charge of strategy, while 25 (81%) did. Of the 25, two named the management team, and three named the board of directors. Four gave the managing director, four the commercial director, two the procurement director, and two a combination of chief executive officer, managing director and special projects manager as the persons in charge of strategy. The area

director (2 respondents) and a combination of various executive officers were also named. The chief executive officer was responsible for strategy according to six of the respondents.

The larger the firm the more the likelihood that they will have a person specifically charged with strategy. Furthermore, the top level of management plays a larger role in strategy formulation in larger firms, as shown in Table 5.7

Table 6.7 Strategy formulators by firm size

| Strategist | Firm Size | | | | | Total |
|--|------------------|------------------|-----------------|----------------|-----------------|-------|
| | Over 200 million | 50 - 200 million | 10 - 50 million | 1 - 10 million | Up to 1 million | |
| Board of directors/Managing director/Chief executive | 7 | 7 | 4 | 0 | 0 | 18 |
| Commercial/ Procurement director/Senior management | 2 | 4 | 1 | 0 | 0 | 7 |
| No person | 0 | 0 | 1 | 5 | 0 | 6 |
| <i>Total</i> | 9 | 11 | 6 | 5 | 0 | |

Conclusion: the existence of a person specifically responsible for charting strategy shows the importance the firm attaches to strategic formulation and implementation. Such persons should ideally be in management positions, as can be seen from the responses. The indications are that large companies have strategy-making apparatus in place at the higher company levels, while the smaller firms formulate their strategy at the 'rock face'. Some possible causes in smaller firms are a lack of qualified personnel and resources and less of a perceived reason as there is less at risk (smaller firms will undertake smaller value projects) and less to gain.

Question 9. Does your firm have a mission statement, or a statement of strategic intent declaring its aspirations and desired direction? _____. If so, we would be grateful if you would attach a copy.

Eighteen respondents (58%) had a mission statement, which four attached or quoted, while 13 (42%) did not. According to one response, the mission statement could not be distributed, as it was a confidential document.

Conclusion: the existence of a mission statement is an indication that strategy formulation has occurred in the firm, and to a serious extent. In this case 58% of the companies can be said to have taken significant strategy formulation measures. Reinforcing the findings of the previous question, the larger the firm the more likely it is to have a mission statement and the greater the depth to which thinking about the firm's strategy can be said to have occurred.

Table 6.8 Existence of a mission statement by firm size

| Mission statement? | Firm Size | | | | | Total |
|--------------------|------------------|------------------|-----------------|----------------|-----------------|-------|
| | Over 200 million | 50 - 200 million | 10 - 50 million | 1 - 10 million | Up to 1 million | |
| Yes | 7 | 7 | 1 | 2 | 0 | 17 |
| No | 2 | 4 | 5 | 3 | 0 | 14 |
| <i>Total</i> | 9 | 11 | 6 | 5 | 0 | |

Question 10a. Does your firm have any formal written business strategy?

Seventeen (55%) had a formal written business strategy, while 14 (45%) did not. These corresponded exactly to those who did or did not have a mission statement.

Conclusion: All the firms that had a mission statement had a formal, written business strategy. The existence of formal written business strategy thus underscores the extent to which strategy formulation has occurred in the firm. The two companies

earning high (over 5%) profits both acknowledged they had a mission statement but both refused to divulge them, which may be significant!

Question 10b. Does your firm have any strategy specifically for seeking work?

Seventeen (55%) had a strategy for seeking work, while 14 (45%) did not. Out of the 17 respondents who had a formal, written business strategy (Question 10a) 13 (77%) also had a strategy in place specifically for seeking work.

Conclusion: These responses indicate that there is effort put in by the firms to develop strategies across the whole gamut of company activities.

Question 11. On a scale of one to ten, how important would you rate having a formal business strategy for a construction company (1 being not important, 10 being extremely important)?

Twelve rated having a formal business strategy as very important (10), two rated it not important at all (1) with the rest lying in between. The average rating of the respondents was 7.5, 64% of the respondents rate the importance between 6 to 10, and 36 % rate it between 1 and 5. Interestingly, five of the respondents (16%) who had formal strategies in place rated having a strategy as not important (a score of four or lower), and nine of the respondents (29%) who did not have formal strategies in place rated having a strategy as important (a score of 6 or higher).

Table 6.9 Importance of strategy

| Importance of strategy | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 |
|------------------------|----|-----|----|-----|---|----|----|-----|---|-----|
| Number of respondents | 10 | 2 | 6 | 2 | 0 | 4 | 3 | 2 | 0 | 2 |
| Percentage | 32 | 6.5 | 19 | 6.5 | 0 | 13 | 10 | 6.5 | 0 | 6.5 |

Conclusion: respondents perceive having a formal business strategy as important to a construction company.

Looking at the data in relation to company size, it can be seen that larger firms see having a formal strategy as more important than smaller firms do.

Table 6.10 Importance of strategy according to firm size

| Firm Size | Average rating |
|------------------|----------------|
| Over 200 million | 8.00 |
| 50 - 200 million | 7.67 |
| 10 - 50 million | 6.20 |
| 1 - 10 million | 6.67 |
| Up to 1 million | n/a |

Question 12a. Which, if any, sectors in construction have you decided to focus upon?

All respondents had identified areas in construction in which they had decided to focus upon. For 19 of them this coincided with the areas in which they were presently undertaking construction, while for 12, the areas of current business (Question 1) and sectors of focus were different. The industrial and commercial sector was the most often quoted, with 12 firms indicating it was their preferred focus area.

Table 6.11 Construction sectors focused on

| Sectors of focus | No. of respondents | **% |
|---|--------------------|-----|
| Industrial and commercial | 13 | 42 |
| Civil engineering work | 6 | 19 |
| Housing and luxury housing | 4 | 13 |
| Design and construct | 4 | 13 |
| Infrastructure, telecommunications, facilities management | 2 | 6 |
| Private finance initiatives (PFI's), Build Operate Transfer (BOT) | 2 | 6 |

Question 12b. Which, if any, sectors in construction have you decided not to enter?

30 respondents identified sectors in which they had decided not to enter while one did not. Low cost housing was the sector identified by most (11) as undesirable.

Table 6.12 Construction sectors avoided

| Sectors avoided | No. of respondents | *% |
|--------------------------------|--------------------|----|
| Low cost housing | 11 | 37 |
| Public sector | 8 | 26 |
| Open competitive bidding | 4 | 13 |
| Residential | 4 | 13 |
| Civil works | 2 | 7 |
| Reinforced concrete structures | 1 | 3 |

Conclusion: the high number of respondents who have identified sectors in construction where they will or will not operate suggests that the companies implement focus strategies, whether by design or by default. Low cost housing's unpopularity could be attributed to negative experiences of a number of companies in the early 1990's.

Question 13a. What would you consider to be your main competitive advantage that enables you to secure projects in your chosen sector?

Table 6.13 Sources of competitive advantage leading to the securing of work

| Competitive advantage | Type of strategy | No. of respondents | *% |
|---|--------------------------------|--------------------|----|
| Experienced and skilled human resources | Production | 12 | 40 |
| Quality of work or service | Production/ differentiation | 10 | 33 |
| Reliability and delivery on time | Production | 6 | 20 |
| Competitive price/low overheads | Cost leadership | 4 | 13 |
| Good plant and technology | Production/ differentiation | 4 | 13 |
| Networks with all stakeholders/relationships with clients | Marketing | 4 | 13 |
| Good management | Production | 2 | 7 |
| Putting client needs first | Marketing/ differentiation | 2 | 7 |
| In-house design | Focus/ differentiation | 2 | 7 |
| Experience with design and construct and with project financing | Focus/ differentiation | 2 | 7 |
| Integrity | Marketing/ production | 2 | 7 |

*The percentages do not add up to 100 because some respondents listed more than one main competitive advantage

Responses to this question were summarised and categorised for ease of analysis. The most common perceived sources of competitive advantage were the possession of 'Experienced and skilled human resources' and 'Quality of work or service'. 'Reliability and delivery on time', 'Competitive price/low overheads', 'Good plant and technology' and 'Networks with all stakeholders/relationships with clients' (relationship marketing) were also popular.

Conclusion: Production strategies that emphasise improving the product and client satisfaction with the product predominate. The firms attempt to outperform the competition through better products, differentiation, marketing, and focus strategies. To a minor degree cost leadership strategies are used.

Question 13b. What would you consider your main competitive advantage is that enables you carry out projects profitably?

Table 6.14 Sources of competitive advantage leading to profitability

| Competitive advantage | Type of strategy | No. of respondents | **% |
|--|--------------------------------|--------------------|-----|
| Experienced and skilled human resources | Production | 12 | 39 |
| Good organisation and site control | Production | 10 | 32 |
| Competitive price/Low overheads | Cost leadership | 8 | 25 |
| Strong balance sheet, low gearing | Cost leadership | 6 | 19 |
| Quality of work or service | Production/ differentiation | 4 | 13 |
| Specialisation | Focus | 2 | 6 |
| Effective communication | Marketing | 2 | 6 |
| Good plant and technology | Production/ focus | 2 | 6 |
| Reliability and delivery on time | Production/ differentiation | 2 | 6 |
| Putting client needs first | Differentiation | 2 | 6 |
| Good management | Production | 2 | 6 |
| Low property risk exposure | Cost leadership | 1 | 3 |
| Experience with design and construct and project financing | Focus | 1 | 3 |

*The percentages do not add up to 100 because many respondents listed more than one main competitive advantage

'Experienced and skilled human resources' and 'Good organisation and site control' are the dominant competitive strategies used to carry out projects profitably. Competitive price/Low overheads and 'Strong balance sheet, low gearing' were also rated highly

Conclusion: Production and cost leadership strategies are stressed in an attempt to increase profitability. This shows that the main influence on profitability is still seen as costs, lowering which will result in better profits. Differentiation, focus and marketing strategies are used to a lesser degree.

Question 14. Have you used any of the following strategies at some point in your firm's history? If so, please indicate when this was?

Table 6.15 Number of respondents ranked according to strategy used in the past

| Strategy | No. of respondents |
|--|--------------------|
| Producing medium price, higher-than-average quality work | 9 |
| Producing at a lower cost relative to competitors | 9 |
| Offering unique construction services | 8 |
| Developing new markets, clients or services | 7 |
| Producing high quality, high cost work | 7 |
| Focusing on a specific market, client or sector | 6 |
| Strategic alliances/ Joint ventures | 5 |
| Horizontal integration: acquiring firms of similar size, markets or services | 5 |
| Entering regional or international markets | 4 |
| Diversifying into other industries | 3 |
| Vertical integration: acquiring firms up or down the supply chain | 3 |
| Securing work at low margins then exploiting contract loopholes | 2 |
| Mergers | 1 |
| Retrenchment or divestment | 1 |
| Producing low price, ordinary quality work | 1 |
| Any other (please specify) | 0 |

Table 6.16 Number of respondents ranked according to strategy used at present

| Strategy | No. of respondents |
|--|--------------------|
| Focusing on a specific market, client or sector | 11 |
| Offering unique construction services | 10 |
| Producing medium price, higher-than-average quality work | 10 |
| Producing at a lower cost relative to competitors | 10 |
| Developing new markets, clients or services | 8 |
| Strategic alliances/ Joint ventures | 7 |
| Entering regional or international markets | 7 |
| Producing high quality, high cost work | 6 |
| Horizontal integration: acquiring firms of similar size, markets or services | 3 |
| Mergers | 3 |
| Diversifying into other industries | 2 |
| Securing work at low margins then exploiting contract loopholes | 2 |
| Retrenchment or divestment | 2 |
| Vertical integration: acquiring firms up or down the supply chain | 1 |
| Producing low price, ordinary quality work | 0 |
| Any other (please specify) | 0 |

Table 6.17 Number of respondents ranked according to preferred future strategy

| Strategy | No. of respondents intending to use strategy in future |
|--|--|
| Offering unique construction services | 11 |
| Producing medium price, higher-than-average quality work | 10 |
| Developing new markets, clients or services | 10 |
| Producing at a lower cost relative to competitors | 9 |
| Focusing on a specific market, client or sector | 8 |
| Entering regional or international markets | 8 |
| Producing high quality, high cost work | 7 |
| Strategic alliances/ Joint ventures | 7 |
| Horizontal integration: acquiring firms of similar size, markets or services | 4 |
| Diversifying into other industries | 2 |
| Vertical integration: acquiring firms up or down the supply chain | 2 |
| Mergers | 1 |
| Retrenchment or divestment | 1 |
| Securing work at low margins then exploiting contract loopholes | 0 |
| Producing low price, ordinary quality work | 0 |
| Any other (please specify) | 0 |

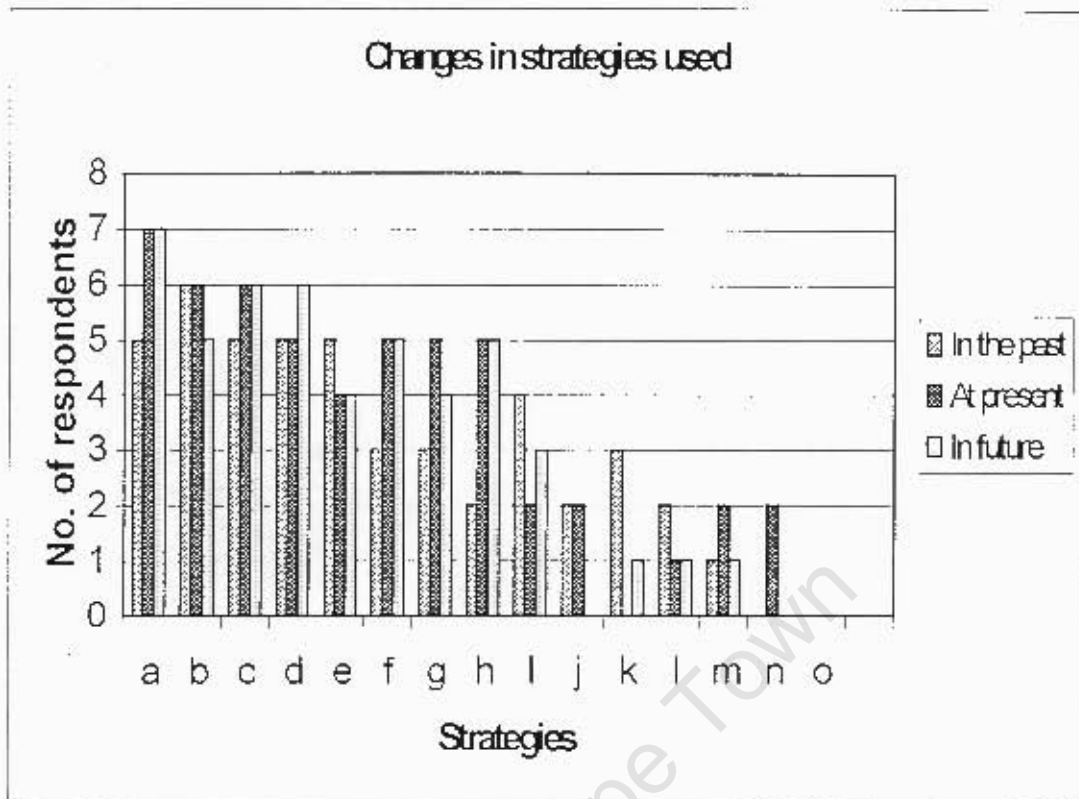
The most popular strategies overall can be seen to be

- Offering unique construction services
- Producing at a lower cost relative to competitors
- Producing medium price, higher-than-average quality work
- Developing new markets, clients or services

The least popular strategies were

- Producing low price, ordinary quality work
- Retrenchment or divestment
- Securing work at low margins then exploiting contract loopholes
- Mergers

The data is processed further in Figure 5.6, which shows how the strategies used have changed with time. *Offering unique construction services*, *'producing medium price'*, *'higher-than-average quality work'*, *'strategic alliances/joint ventures'* and *'entering regional or international markets'* are all strategies that have increased from past to present and are expected to be used to the same degree in future. Though their use has not yet declined at present less of *'producing at a lower cost relative to competitors'* will be used in future and more of *'developing new markets, clients or services'*. *'Producing high quality, high cost work'* and *'diversifying into other industries'* have both declined from the past.



- a Offering unique construction services
- b Producing at a lower cost relative to competitors
- c Producing medium price, higher-than-average quality work
- d Developing new markets, clients or services
- e Producing high quality, high cost work
- f Strategic alliances/ Joint ventures
- g Focusing on a specific market, client or sector
- h Entering regional or international markets
- i Horizontal integration: acquiring firms of similar size, markets or services
- j Securing work at low margins then exploiting contract loopholes
- k Vertical integration: acquiring firms up or down the supply chain
- l Diversifying into other industries
- m Retrenchment or divestment
- n Mergers
- o Producing low price, ordinary quality work

Figure 6.3 Changes in strategies used

Conclusion: strategies that call for product differentiation and the development of new markets are most popular at the present and firms intend to use these more in future.

Question 15. Please rank your primary indicator of business success, from 1 (highest) to 5 (lowest)

Respondents answered the question in two different ways. Twenty-seven ranked the indicators from 1 (highest) to 5 (lowest) giving each a unique rating while four others rated them such that the rating was general and each indicator could have the same rating. As the first group had more respondents and answered in the way originally intended, their version was the one analysed.

Profit before tax was the most popular indicator of business success, followed by net turnover, customer satisfaction, cash flows, work volume and others in that order.

Other indicators were identified as employee retention rate, share price movement, productivity improvement, repeat business, dividend per share and order backlog, all by one respondent each.

Table 6.18 Primary indicators of business success

| | Average rating | Number of respondents ranking indicator highest | Number of respondents ranking indicator second highest |
|-----------------------|----------------|---|--|
| Profit before tax | 2.0 | 14 | 10 |
| Customer satisfaction | 2.2 | 12 | 4 |
| Cash flows | 2.8 | 3 | 10 |
| Net turnover | 3.7 | 0 | 4 |
| Work volume | 4.2 | 0 | 0 |
| Other | 5.6 | 2 | 3 |

The indicators of success were the same over the range of company sizes as seen in Table 6.19, which shows the most popular indicator for the category of company.

Table 6.19 Primary indicators of business success according to company size

| Up to 1 million | 1 – 10 million | 10 – 50 million | 50 – 200 million | Over 200 million |
|-----------------|-----------------------|-----------------------|-----------------------|-----------------------|
| n/a | Profit before tax | Profit before tax | Profit before tax | Profit before tax |
| n/a | Customer satisfaction | Net turnover | Net turnover | Net turnover |
| n/a | Net turnover | Customer satisfaction | Customer satisfaction | Customer satisfaction |
| n/a | Work volume | Cash flows | Cash flows | Cash flows |
| n/a | Cash flows | Work volume | Work volume | Other |
| n/a | Other | Other | Other | Work volume |

Question 16. How would you rate your knowledge of the following project delivery systems (Ranked as 1 = don't know, 5 = very knowledgeable)

The number of respondents is given below indicating the level of knowledge they had about a particular delivery system.

Table 6.20 Knowledge of project delivery systems

| Project delivery system | Level of knowledge on delivery systems | | | | | | % with good to very good | % with poor to very poor |
|-------------------------|--|----------|------------------|----------|---------------|-----|--------------------------|--------------------------|
| | Very good (5) | Good (4) | Satisfactory (3) | Poor (2) | Very poor (1) | | | |
| Traditional | 31 | 0 | 0 | 0 | 0 | 100 | 0 | |
| Design and build | 18 | 9 | 4 | 0 | 0 | 87 | 0 | |
| Management contracting | 7 | 11 | 9 | 4 | 0 | 58 | 13 | |
| Construction management | 11 | 9 | 7 | 4 | 0 | 65 | 13 | |
| Design and manage | 7 | 7 | 7 | 9 | 2 | 45 | 35 | |
| Build-operate-transfer | 9 | 2 | 4 | 7 | 9 | 35 | 52 | |
| Partnering | 9 | 9 | 4 | 2 | 7 | 58 | 29 | |

All respondents claimed to have very good knowledge about the traditional project delivery system, which is to be expected. A correspondence analysis of the data shows very good knowledge of the traditional and design and build methods; good and satisfactory values for design and manage and construction management; poor knowledge of management contracting and partnering and very poor knowledge of

build-operate-transfer. These also correspond to the most recent delivery systems developed, which may account for the poor knowledge of them.

In general, the larger the company the better its knowledge of all systems. This is illustrated in Table 6.21, which compares knowledge of delivery systems with the size of firms.

Table 6.21 Knowledge of delivery systems by turnover

| | Up to 1 million | 1 – 10 million | 10 – 50 million | 50 – 200 million | Over 200 million | Average rating |
|-------------------------|-----------------|----------------|-----------------|------------------|------------------|----------------|
| Traditional | - | 4.67 | 5 | 5 | 5 | 4.94 |
| Design and build | - | 4.33 | 4.4 | 4 | 4.5 | 4.35 |
| Management contracting | - | 2.67 | 4.2 | 3.33 | 4.17 | 3.76 |
| Construction management | - | 2.67 | 4 | 3.67 | 4.5 | 3.88 |
| Design and manage | - | 2.67 | 2.8 | 2 | 4.17 | 3.12 |
| Build-operate-transfer | - | 1.67 | 1.4 | 2 | 4.5 | 2.65 |
| Partnering | - | 1.33 | 2.6 | 3.67 | 4.33 | 3.18 |
| Average rating | - | 2.86 | 3.49 | 3.38 | 4.45 | 3.7 |

Knowledge of systems is rated from very good (5) through to very poor (1). To give some idea of the respondents' degree of knowledge of delivery systems, the rankings were averaged for comparison purposes, though they are strictly speaking ordinal data and not interval data. The higher the average rating the better the knowledge reported. Firms in the over 200 million category consistently reported higher ratings (better knowledge) of all systems than the rest of the categories. Only the 10 – 50 million category broke the pattern, claiming better knowledge of most systems than the 50 – 200 million.

Question 17. Have you had the occasion to deliver a project using any of these project delivery systems? If so, please indicate which ones, and roughly what percentage of your workload they have accounted for in the past and at present?

All systems had been used by at least one contractor in the past or at present. Of the 31 surveyed companies, two did not list the changes in the project delivery systems they had used or the percentages they gave were inconsistent, not adding up to 100, and so were eliminated. The average percentages of workload that particular project delivery systems accounted for in the past and at present are given below in tabular and chart form.

Table 6.22 Project delivery systems used in the past and at present

| Project delivery system | % in the past | % at present | Average decline | Standard deviation |
|-------------------------|---------------|--------------|-----------------|--------------------|
| Traditional | 72 | 60 | 12 | 31 |
| Design and build | 22 | 33 | 10 | 30 |
| Management contracting | 3 | 2 | -1 | 6 |
| Construction management | 2 | 3 | 1 | 4 |
| Design and manage | 2 | 0 | -2 | 3 |
| Build-operate-transfer | 2 | 3 | 2 | 6 |
| Partnering | 0 | 2 | 2 | 3 |

The traditional project delivery system shows an average decline of 12 percent, management contracting declined by one percent and design and manage by 2 percent, while design and build, construction management, build-operate-transfer and partnering all show increases of ten, one, two and two per cent respectively

The Wilcoxon Signed Rank Test can also be used to test whether the use of each project delivery system has changed over time. The test is used as an alternative to the parametric t-test due to the small sample sizes and the apparent non-normality of the data. It tests the medians of the samples and not the mean.

The following hypothesis was tested, for each project delivery system:

H_0 : The median of the past use of the system (a percentage) is equal to the median of the present use of the same system.

A significance level of $p = 0.10$ was used. A significance level (p -value) less than 0.10 leads to a rejection of the null hypothesis stated above and an acceptance of the alternative: that the median past use percentage differs from the median present use percentage i.e. there has been a significant change (increase or decrease) in the use of that particular delivery system. The results are as follows:

Table 6.23 Project delivery systems used in the past and at present - p-levels

| Project Delivery System | P-Level |
|--|----------|
| Design and build past & Design and build present | 0.050621 |
| Traditional past & Traditional present | 0.130675 |
| Construction management past & Construction management present | 0.345238 |
| Design and manage past & Design and manage present | 0.361317 |
| Management contracting past & Management contracting present | 0.892739 |
| Build-operate-transfer past & Build-operate-transfer present | * |
| Partnering past & Partnering present | * |

* P-value = 0. Only three respondents indicated any use of the delivery system, and all recorded an increase in use from past to present, resulting in a very strong, but weakly justifiable, conclusion of significant difference.

Design and build shows significant increase in use, while the use of the traditional project delivery system has decreased but not significantly.

Comparing the percentages of firms using particular delivery systems by size shows that the largest category of companies were the most likely to use alternative delivery in the past, and that tendency continues in the present. Again, companies in the 10 - 50 million turnover bracket are more progressive (and were in the past too) than those in the 50 - 200, million bracket.

Table 6.24 Percentage of firms using particular delivery systems in the past

| | Traditional | Design and build | Management contracting | Construction management | Design and manage | Build-operate-transfer | Partnering |
|------------------|-------------|------------------|------------------------|-------------------------|-------------------|------------------------|------------|
| Up to 1 million | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 – 10 million | 100 | 40 | 40 | 40 | 0 | 40 | 0 |
| 10 – 50 million | 100 | 66.7 | 33.3 | 33.3 | 16.7 | 0 | 0 |
| 50 – 200 million | 100 | 63.4 | 36.4 | 0 | 0 | 0 | 0 |
| Over 200 million | 88.9 | 88.9 | 33.3 | 33.3 | 44.4 | 33.3 | 0 |

Table 6.25 Percentage of firms using particular delivery systems at present

| | Traditional | Design and build | Management contracting | Construction management | Design and manage | Build-operate-transfer | Partnering |
|------------------|-------------|------------------|------------------------|-------------------------|-------------------|------------------------|------------|
| Up to 1 million | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| 1 – 10 million | 100 | 40 | 60 | 40 | 0 | 40 | 33.3 |
| 10 – 50 million | 83.3 | 66.7 | 50 | 50 | 0 | 0 | 0 |
| 50 – 200 million | 100 | 36.4 | 27.5 | 27.3 | 0 | 0 | 0 |
| Over 200 million | 100 | 100 | 55.6 | 66.7 | 33.3 | 66.7 | 55.6 |

At this point, those who had not used any delivery systems other than the traditional were given the option of not completing the questionnaire as the rest of the questions required exposure to alternative delivery. Six respondents (19%) did not complete the rest of the questionnaire -- and the 25 remaining respondents (81%) formed the new sample.

Question 18. If you have used different project delivery systems from those in the past, what new skills did you need?

There were 23 responses to this question, which ranged from closer co-ordination between consultants and contractors, project management, risk evaluation, legal and project finance, long term property finance, planning and negotiation skills to thinking more about the customer. Ten out of the 19 respondents thought they needed new skills, nine did not.

Table 6.26 Skills required for new delivery systems

| Skills | No of respondents |
|--|-------------------|
| Closer co-ordination between consultants and contractors | 4 |
| Risk evaluation | 3 |
| Project management | 2 |
| Thinking more about the customer | 2 |
| Legal and project finance | 1 |
| Long term property finance | 1 |
| Planning and negotiation skills | 1 |
| None | 9 |

Conclusion: This demonstrates that skills are being taken up by more than half of those who turn to new project delivery systems. The skills in demand are management skills (closer co-ordination between consultants and contractors, project management, planning and negotiation skills) and professional skills (risk evaluation, legal and project finance, long term property finance). 'Thinking more about the customer' picks up a thread running through this study, that of the need for closer contact between the client and the customer.

Question 19. Do you see a trend towards the use of other project delivery systems apart from the traditional? If so, what is the most significant cause of this trend, in your opinion?

Five of the respondents (20%) left this question blank. Of the remainder, 16 (62%) thought there was a trend towards the use of other project delivery systems and four

(15%) did not. The generic reasons for changes in delivery systems are given below (the number of respondents suggesting the reason is in brackets alongside).

Table 6.27 Reasons for changes in delivery systems

| Yes - reasons | No - reasons |
|--|---|
| Increase in the use of design and build, BOT and turnkey projects due to their cost effectiveness and speedy delivery (5) | Industry or traditional delivery is efficient as it is (3) |
| The need for public-private partnerships with government to deliver infrastructure (5) | The professionals will not let go of the power but the number in time will change (1) |
| Stopping the claims mentality (4) | |
| Down-sizing (2) | |
| Private sectors' ability to structure and leverage finance (2) | |
| The customer's need for cost certainty (2) | |
| Desirability of management contracting (1) | |
| Inefficiencies amongst many of the professionals (1) | |
| Tying a building agreement into a development opportunity (1) | |

Conclusion: Some of the reasons suggested identified areas in which contractors could influence change in delivery (the need for public-private partnerships with government to deliver infrastructure, private sectors' ability to structure and leverage finance, tying a building agreement into a development opportunity). Stopping the claims mentality, the customer's need for cost certainty and the increase in the use of design and build, BOT and turnkey projects due to their cost effectiveness and speedy delivery work towards improving customer satisfaction.

Question 20. What is the most significant effect of this trend, in your opinion?

Four (16%) respondents left this question blank. Of the 21 (84%) who replied the following are their opinions.

Table 6.28 Significant effect of changes in delivery systems

| Effects of trend | No. of respondents |
|---|--------------------|
| Less adversarial structure | 4 |
| Restructuring of the construction business | 3 |
| Increased delivery of infrastructure | 3 |
| Better industry image | 3 |
| Improved buildability when contractor is brought on board early | 2 |
| Easier project communications | 2 |
| Contractors acquire development skills | 1 |
| Increased risk and expenditure | 1 |

The reasons advanced can be divided into three broad groups:

- changes in relationships in the industry (less adversarial structure, better industry image, easier project communications);
- changes in outputs (increased delivery of infrastructure, improved buildability when contractor is brought on board early, increased risk and expenditure) and
- changes in strategies (restructuring of the construction business, contractors acquire development skills).

Question 21. Would you like to see project delivery systems other than the traditional used more, and why?

One (15%) respondent left this question blank, and according to another one, their firm was "too small for that to be an issue". All the 23 (85%) who answered said they would like to see alternative project delivery systems used, and gave the following as their reasons.

Table 6.29 Reasons for using project delivery systems other than the traditional

| Reasons | No of respondents |
|---|-------------------|
| Better profit opportunity for contractors | 6 |
| More opportunities to find work | 4 |
| Offer more opportunity to innovate | 3 |
| More harmonious contractual relationships | 3 |
| Better client satisfaction | 2 |
| More efficient delivery systems | 2 |
| Involvement in negotiation | 1 |
| Integrate design and production | 1 |
| Better products | 1 |

These responses, taken in conjunction with those for the previous question, indicate that construction firms see their industry as having deficiencies and that they need to develop in a business sense. It also shows that the contractors had already set out on this path.

Question 22. How would you rank them regarding their ability to generate profits for the firm?

Table 6.30 Project delivery systems ranked according to ability to generate profits

| Project delivery system | Ability of delivery system to generate profits | | | | | | |
|-------------------------|--|----------|-------------|----------|---------------|------------------------|------------------------|
| | Very good (5) | Good (4) | Average (3) | Poor (2) | Very poor (1) | %age good to very good | %age poor to very poor |
| Traditional | 0 | 2 | 5 | 2 | 6 | 14 | 52 |
| Design and build | 11 | 4 | 1 | 0 | 0 | 94 | 0 |
| Management contracting | 1 | 3 | 3 | 0 | 0 | 60 | 0 |
| Construction management | 0 | 3 | 3 | 1 | 0 | 40 | 20 |
| Design and manage | 1 | 5 | 2 | 1 | 0 | 56 | 19 |
| Build-operate-transfer | 3 | 5 | 3 | 1 | 0 | 57 | 13 |
| Partnering | 1 | 2 | 4 | 3 | 0 | 33 | 26 |

A correspondence analysis of the responses indicates that design and build is rated very good by the respondents, build-operate-transfer and design and manage are seen as good for profits, construction management and partnering is rated average and traditional delivery poor.

The responses were consistent; when tested against question 17 the majority of those who had rated a delivery system bad had reduced their usage of it, and those rating a system good had used it more. Table 6.31 shows the number of firms who liked a delivery system with regard to its profit generation but were using it less (test 1), and those who did not like a delivery system but still continued to use it (test 2).

Table 6.31 Number of firms showing variance between delivery system preference and usage

| | | Traditional | Design and build | Management contracting | Construction management | Design and manage | Build-operate-transfer | Partnering |
|--------|--|-------------|------------------|------------------------|-------------------------|-------------------|------------------------|------------|
| Test 1 | Delivery system rated good but usage decreased | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| Test 2 | Delivery system rated poor but usage increased | 0 | 0 | 0 | 0 | 0 | 0 | 1 |

This shows that the majority of construction firms were delivering using the system they preferred.

Question 23. How would you rank them regarding the financial risk they expose the firm to?

Table 6.32 Project delivery systems ranked according to financial risk

| Project delivery system | Very high (5) | High (4) | Average (3) | Low (2) | Very low (1) | %age high to very high | %age low to very low |
|-------------------------|---------------|----------|-------------|---------|--------------|------------------------|----------------------|
| Traditional | 2 | 0 | 14 | 2 | 5 | 10 | 30 |
| Design and build | 7 | 7 | 7 | 2 | 0 | 60 | 10 |
| Management contracting | 3 | 7 | 13 | 0 | 0 | 43 | 0 |
| Construction management | 3 | 7 | 7 | 7 | 0 | 43 | 29 |
| Design and manage | 3 | 3 | 16 | 0 | 0 | 29 | 0 |
| Build-operate-transfer | 0 | 6 | 12 | 6 | 0 | 25 | 25 |
| Partnering | 3 | 3 | 12 | 6 | 0 | 25 | 25 |

A correspondence analysis shows that management contracting, design and manage and design and build are seen as exposing the construction company to little financial risk, build-operate-transfer, construction management and partnering rate good to average as to risk exposure and traditional delivery rated as high risk.

Theory dictates that the risk in design and build devolves to the contractor in contrast to the findings of this survey. In explanation, a respondent indicated that design and build gives the contractor leeway to control inputs, process organisation and programmes in such a way as to negate their concept of risk, which he equated to uncertainty.

Question 24. Do you think alternative project delivery systems have advantages over the traditional system? Give the most important, if any.

Eighteen (62%) answered the question while seven (38%) left it blank. Those who answered the question all (100%) indicated they saw alternative project delivery systems as having advantages over the traditional system. The quoted reasons were as follows:

Table 6.33 Advantages of alternative project delivery systems over the traditional

| Reasons | Number of respondents |
|---|-----------------------|
| Better communication between all parties | 4 |
| More efficient delivery systems | 3 |
| Greater participation of the construction team in the development phase | 3 |
| Better consultant performance | 2 |
| contractors expertise can be used | 2 |
| Better value and quality at a market related price | 2 |
| Cost effectiveness | 1 |
| More co-operation and less conflict | 1 |

Question 25. In your opinion, can the use of particular project delivery systems be a construction company strategy?

For 20 (80%) respondent the answer to the above question was yes while five (20%) were of the opinion that they could not. The respondents who did not see project delivery systems as strategies saw them as technical rather than business issues and

did not see how the two were connected. Those who did quoted examples of companies (Neil Muller Construction, Granbuild) as pioneers who had succeeded by having delivery as a cornerstone of their strategy. In addition, if a given system could generate or kick-start a project then it could be used as a strategy. Two respondents identified partnering as the method of the future.

6.3 Testing the hypotheses

The following hypotheses were tested in the research.

6.3.1 Hypothesis 1

Changes in project delivery systems have resulted in changes in the competitive strategies of construction companies.

Key variables

Changes in project delivery systems (question 17), changes in the competitive strategies (question 14)

Hypothesis testing using the Mann-Whitney test

The Mann-Whitney test was performed on each of the 15 strategies in question 14. For each strategy, respondents were divided into two groups according to whether they changed their use of the particular strategy in question i.e., either stopped or started using it, or whether they continued in their same usage pattern i.e., continued to use or not to use. The sizes of the groupings are given for each strategy below:

Table 6.34 Results of the Mann-Whitney test on question 14

| Strategy | 0: No change | 1: Change |
|--------------|--------------|-----------|
| 1 | 30 | 1 |
| 2 | 27 | 4 |
| 3 | 30 | 1 |
| 4 | 19 | 12 |
| 5 | 27 | 4 |
| 6 | 27 | 4 |
| 7 | 23 | 8 |
| 8 | 25 | 6 |
| 9 | 23 | 8 |
| 10 | 23 | 8 |
| 11 | 21 | 10 |
| 12 | 23 | 8 |
| 13 | 19 | 12 |
| 14 | 27 | 4 |
| 15 | 29 | 2 |
| Total | 8 | 23 |

Strategies

1. Producing at a lower cost relative to competitors
2. Securing work at low margins then exploiting contract loopholes
3. Producing low price, ordinary quality work
4. Producing medium price, higher-than-average quality work
5. Producing high quality, high cost work
6. Offering unique construction services
7. Focusing on a specific market, client or sector
8. Developing new markets, clients or services
9. Horizontal integration: acquiring firms of similar size, markets or services
10. Vertical integration: acquiring firms up or down the supply chain
11. Diversifying into other industries
12. Entering regional or international markets
13. Strategic alliances/ Joint ventures
14. Mergers
15. Retrenchment or divestment

The 'total' row aggregates all the 15 strategies into one, in effect indicating those companies that have changed *any* of the 15 strategies and those companies who have changed *none*.

For each group, the mean difference in usage of each project delivery system was calculated. The Mann-Whitney Test was then used to test the following null hypothesis, for each project delivery system:

H_0 : The mean difference in the usage of the particular project delivery system in question is the same between the two population groups, that is, those that have changed their use of a strategy and those that have not.

If hypothesis 1 is true and changes in strategy are accompanied by changes in the way projects are delivered, then one would expect the mean differences to be different.

A significance level of $p = 0.05$ was used, such that one rejects the null hypothesis and concludes that the mean differences are different between the two groups, and therefore that a change in that strategy would cause a change in the usage of the particular project delivery system in question. The results are given below for strategy 2 ('Securing work at low margins then exploiting contract loopholes'):

Table 6.35 Results of the Mann-Whitney test on strategy 2

| Variable is Strategy 2 (Q14) | p-level |
|--------------------------------|-----------|
| <i>Traditional</i> | 0.6355795 |
| Design & Build | 0.0478734 |
| Management Contracting | 0.0068218 |
| Construction Management | 0.0119982 |
| <i>Design & Manage</i> | 0.074745 |
| Build-Operate-Transfer | 0.0369544 |
| Partnering | 0.0427954 |

Significant p-values are italicised. The results here indicate those who changed their use of 'Securing work at low margins then exploiting contract loopholes' corresponded to those with significantly different changes in the use of the following project delivery system: Management Construction, Construction Management, Design & Build, Build-Operate-Transfer and Partnering. This change may be either way, that is, an increase in the strategy's usage may be accompanied by an increase or decrease in the delivery system's usage.

A summary of all Mann-Whitney tests performed on each of the 15 strategies is indicated below. For each project delivery system, a value of one is assigned where a significant p-value was present.

Table 6.36 Results of the Mann-Whitney test on all strategies

| Project delivery system | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | Sum 1-15 |
|-------------------------|---|---|---|---|---|---|---|---|---|----|----|----|----|----|----|----------|
| Traditional | | | | 1 | | | | | | | | | | | | 1 |
| Design and Build | | 1 | | | | | 1 | | 1 | 1 | 1 | 1 | 1 | 1 | | 8 |
| Management Contracting | | 1 | | | | | | | 1 | | | 1 | | | | 3 |
| Construction Management | | 1 | | | | | | | 1 | 1 | | 1 | | | | 4 |
| Design and Manage | | | | 1 | | | | | 1 | 1 | | 1 | | | | 4 |
| Build-Operate-Transfer | | 1 | | | | | | | | | | | | 1 | | 2 |
| Partnering | | 1 | | | | | | | | | 1 | | | | | 2 |

The results show that shifts to using design and build, construction management, design and manage and, to a lesser extent, the management contracting project delivery systems resulted in changes in the competitive strategies of companies. Those delivery systems least influencing change in strategies are the traditional and, to a greater extent, build-operate-transfer and partnering systems.

Summary of the questionnaire survey

The responses from the survey also indicate that contractors are moving away from traditional relationships and systems towards a market-oriented approach with closer client relationships and sound management and business practices (question 7a, 7b and 7c). This trend is accompanied by a shift towards greater use of strategy and strategic thinking in the construction organisation. Twenty-three of the firms had moved to change their strategies in one way or another while only eight had not. Furthermore, their preference for the alternative project delivery systems vis-à-vis the traditional can be seen from their responses to question 22 and 23, where the traditional system was seen to be the lowest rated on the criteria of profitability and risk. Profits are the construction companies prime concern (question 15), which may account for the clear preference for alternative delivery that contractors show (question 24).

A key determinant as to whether management set strategy formally and what kinds of strategies were adopted was firm size. It also influenced mission statement, knowledge and use of delivery systems and their advantages and disadvantages.

Summary of the literature review

Chapter 3 defined strategy and its components and the crucial role strategy plays in refining competitive advantage. Competitive advantage determines the success or failure of a firm according to its set objectives. The importance of strategy to a firm can be determined by the depth to which formulation and implementation is undertaken. The existence of mission statements is one good example of this. Models of strategy have been used to explain the behaviour of the industry. Strategy has thus been shown impact upon the construction industry with all its unique characteristics.

Findings from chapter 2 showed that the construction industry in general and project delivery systems in particular are rapidly changing to meet the challenges of the new industry. Much of the move towards the use of alternative project delivery systems has been client-driven, but construction firms are also driving the use of project delivery systems in an attempt to get away from the competition and to provide service that meets client needs more effectively.

Based on the literature in chapter 4, it can be seen that despite the unique nature of the construction industry, constructing firms have started adopting business principles and practices found in other industries. Differences in the way the product is sold and marketed selling and marketed mean that some rethinking of the way construction is done is necessary before such changes become widespread. This is already the case in developed economies, particularly the UK. The different structure of the industry in countries that did not inherit the British systems results in different delivery system mixes being used. Contractors are defining their focus areas and markets in an attempt to increase profitability, as the examples have shown, led by the pioneering firms.

The adoption of project delivery systems as a competitive strategy falls under a differentiation focus approach, while for the most part construction companies concentrate on competing on cost. This is partly a result of the traditional structure of the industry, which forces them to compete primarily on price. The firms desire to differentiate their services and the strategies they intend to use most in future are offering unique construction services, producing higher-than-average quality work at a

reasonable price and developing new markets, clients or services. These are all best done under the aegis of alternative delivery systems.

Based on the findings of this survey, Hypothesis 1 is therefore supported.

6.3.2 Hypothesis 2

Changes in project delivery systems have resulted in a shift to more direct selling practices between construction companies and their customers.

Key variables

Changes in project delivery systems (question 17), changes in the selling practices (question 7a)

Hypotheses testing using the Mann-Whitney test

The Mann-Whitney test is performed on each of the 7 strategies in question 14. The same process is applied as in the test of hypothesis 1. For each strategy, respondents are divided into two groups according to whether they changed their use of the particular strategy in question i.e. either stopped or started using it, or whether they continued in their same usage pattern i.e. continued to use or continued to not use. The sizes of the groupings are given for each strategy below:

Table 6.37 Sizes of the groupings

| | No change | Change |
|-----------------------------|-----------|--------|
| Open competitive tenders | 13 | 3 |
| Invited competitive tenders | 14 | 2 |
| Negotiation | 12 | 4 |
| Self-instigated negotiation | 14 | 2 |
| Property development | 9 | 7 |
| Total | 8 | 6 |

Again, the same process of applying Mann-Whitney tests of the mean changes in delivery system usage between the two groups was performed on each acquisition strategy. Only the final summary is tabulated here:

Table 6.38 Summary of Mann-Whitney tests

| | Open competitive tenders | Invited competitive tenders | Negotiation | Self-instigated negotiation | Property development | TOTAL |
|-------------------------|--------------------------|-----------------------------|-------------|-----------------------------|----------------------|-------|
| Traditional | | | 1 | | | 1 |
| Design & build | | | 1 | | | 1 |
| Management construction | | | 1 | | | 1 |
| Construction management | | | | | 1 | 1 |
| Design & manage | | | | | 1 | 1 |
| Build-operate-transfer | | | | | | 0 |
| Partnering | | | | | | 0 |

The results here indicate little to support hypothesis 2. Changes in the traditional project delivery system have resulted in changes in negotiation (according to the survey results an increase in the use of negotiation). Similarly, increases in design and build and management construction have been accompanied by an increase in negotiation. Construction management and design and manage have both been gone together with an increase in the use of property development. No project delivery system is influenced by more than one acquisition system, however and there is little else to suggest a connection between the two. Based on this sample, there is no evidence to support hypothesis 2 and it is therefore rejected.

6.3.3 Hypotheses 3

Construction companies use project delivery systems as strategies to achieve competitive advantage.

Key variables

Strategies used to achieve competitive advantage (question 13a, 13b); strategies used in the firm's history (question 14), project delivery systems used (question 17).

Formal strategy is seen as increasingly important to construction companies and each company can be seen to implement strategies somewhat, as indicated by the appointment of senior management to be in charge of strategy. Strategies used range from focus, differentiation, cost leadership and marketing strategies to production strategies. Construction is heading towards better business practice emphasising the relationship between the buyer and the seller. The responses also show a realisation of the need to get away from the competition. There is a definite shift towards project delivery systems requiring strategic input. These are forming the basis for pioneering firms to compete, evidenced in the literature and firms responses. Contractors see alternative systems as opening up new markets and allowing them to deliver in previously difficult to access markets (e.g. public-private partnerships to deliver infrastructure). Further, they have the perceived desirability of improving the relationships between client, consultant and construction firm and can improve customer satisfaction.

Hypothesis 3 is therefore supported.

CHAPTER 7

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

This thesis was based on the premise that construction companies seek competitive advantage through strategy and that project delivery systems could be used as such strategies to achieve this advantage. The literature review provided insights on delivery systems and strategies used in the construction industry. Further information was sought through the use of a questionnaire survey, and hypotheses were tested that would show whether the premise of the survey was justified. On the basis of the survey some conclusions are reached and recommendations suggested herein.

7.2 Conclusions

This study has indicated that changes in project delivery systems resulted in changes in the competitive strategies of construction companies. This is more marked in some systems, design and build, construction management, design and manage and management contracting, than in others. This is as would be expected from the literature review. What is surprising, however, is that build-operate-transfer (BOT) did not seem to correspond to any significant changes in strategy, given the radical shift in business perspectives required from the contractor. Partnering was also not significantly influenced by strategy. According to general perception, it simply involves longer and closer relationships between parties in construction and not a change in those relationships. The traditional system also had little effect on strategy but this was expected from the literature review.

Results from the testing of the hypotheses show that changes in project delivery systems have not resulted in a shift to more direct selling practices between construction companies and their customers. Construction companies and in

particular those larger companies that are market leaders use project delivery systems as strategies to achieve competitive advantage, primarily by using special sets of skills to compete in areas that others cannot (focused differentiation

7.3 Summary of findings

A diverse group of companies was interviewed, undertaking a wide range of construction activities in both building and civil engineering industry sub-sectors. They were generally large, well-established and earning profits, though lower than in other industries.

All companies that did civil engineering work contracted with the public sector, which is as expected given it is the biggest client for civil engineering works.

There is a definite shift away from the open competitive method of tendering, and indeed it is unpopular with the respondents who blame it for minimising profits and causing disputes in the contract as contractors try to recoup costs. Contractor still try and work within the framework of the traditional, relationships, and more direct selling methods like self-instigated negotiation, property development and unsolicited proposals are not widely used.

Construction companies desire earlier involvement and closer contact with clients, but they are driven to this more by the desire to increase profits and drive up margins than loftier ideals of better product quality or delivery. In this regard up-front involvement in the project and early identification of risk were seen as especially helpful. This can be further be seen from the importance attached to profit before tax an indicator of business success, followed by customer satisfaction.

The responses indicate that construction companies think it important to formulate implement strategies, but to a lesser degree than is found in the literature. For instance, all the companies had a focus area of operation. This was not always derived from a formal strategic evaluation, but in some instances by default. A wide variety of strategies was used by the companies The most popular strategies overall

were those relating to securing advantages based on cost, followed by those based on differentiating the services offered on the basis of quality.

Project delivery systems were seen as a method of achieving focused differentiation and thus competitive advantage. This was more likely for larger companies than smaller companies, whose competitive advantages had more to do with production efficiencies than any other cause.

Contractors have very good knowledge about the traditional project delivery system and design and build but are largely ignorant about partnering, design and manage and build-operate-transfer. While the use of these delivery systems is becoming more common in the industry, they are not used enough for companies to become familiar with them and to set aside competing using the traditional method which is for most of them their bread and butter. The fact that the respondents felt they needed few skills to implement new project delivery systems shows that there are few organisational barriers to using them, for example skills and manpower limitations.

There was a generally enthusiastic response to the introduction of alternative project delivery systems but the respondents appeared to think it was out of their hands as to which system to use. A less adversarial structure, restructuring of the construction business and a better industry image were seen as the more significant effect of changes in delivery systems. Better profit and innovate opportunities for contractors, more harmonious contractual relationships and the chance of better workloads are some of the more important perceived advantages of using alternative project delivery systems. Alternative project delivery systems are seen as providing better profit-making opportunities and less risk than the traditional project delivery system, and design and build is especially highly rated.

In the respondents' opinion project delivery systems could be used as a construction company strategy, but only a minority of the companies had actually done so.

7.4 Questions arising from the methodology, data

Were the right companies chosen for research on the questions?

While the majority of construction firms are defenders of existing status quo and adopt reactive stances to changes in the industry, there are firms that have taken proactive attitudes to change their market situation and, by extension, that of the industry. The literature suggests that these are the types of companies that change industries. In that case, a survey of such companies may give better indications as to the direction of the industry.

Was the sample representative enough to enable inferences to be drawn?

The sample had the disadvantage due to study limitations, of being small. Because of this, directions and inferences were sought and not conclusive statements of fact. In addition, the informal sector was not tracked. This sector may possibly respond differently to such a study.

Is South Africa's construction industry representative of the industry universally?

There are no indications in any literature that South Africa's industry differs significantly from others especially those in the commonwealth that have been under British influence. Conclusions reached here should be as universally applicable.

7.5 Recommendations

7.5.1 It is recommended that construction companies adopt more rigorous strategic formulation, implementation and review measures to take full advantages of changes in the industry and shifts in the balance of power between the players in the construction contract. This will help them explore all of the available opportunities in the economy and help in their provision of products and services. This will also help open up opportunities for the construction companies regionally and globally.

- 7.5.2 Construction companies should also improve on their knowledge of project delivery systems so as to help them better cater for client needs.
- 7.5.3 Alternative project delivery systems should be used more often by clients, consultants and construction companies as in a number of areas they prove superior to the traditional system in service provision.
- 7.5.4 The perception of construction as being a 'unique industry' should give way to the use of tools techniques and attitudes that have developed in other industries and give customer satisfaction.
- 7.5.5 As an area for further study, continuous appraisal of the firms should be undertaken to see if there are observable trends in the strategies and project delivery systems used as economic situations change. A follow-up survey of this nature would be useful in tracking changes in the industry and how companies are coping, and would give indication as to which strategies are successful in creating value both for the construction companies and for the clients of the industry.
- 7.5.6 Informal contractors and emerging contractors have not been part of this study, and it would be grounds for a similar study specifically designed with strategy, delivery and the informal/emerging contractors in mind.
- 7.5.7 A further interesting area of study would how each specific project delivery system influences the strategies in construction companies who construct using it. Does it give the company the leeway to finally decide how it gets to produce construction, or does the company still have to rely on the clients and consultants in the industry to decide how it will produce? What effects do these project delivery systems have on profits, quality and characteristics of products, value chains in the industry, and the industry in general? Will construction finally catch up with the other innovative industries or will it still lag behind in provision of customer satisfaction? This thesis hopes to have highlighted some of the issues that would help answer these questions.

REFERENCES

- Adams, I. and Bradford, A. (1997) *Catching the Wave: How to Stay Afloat in Uncertain Times*, [Online], Available: <http://www.smps.org/narc/articles-html/catchingwave.htm> [Sept. 10, 2000]
- Allen, S., Coetzec, G., Dlungwana, S., Goode, R., Merrifield, A. and Smith K, (1999) *A New Agenda for Construction Industry Performance Improvement*, in CIB W55 & W65 Joint Triennial Symposium Customer Satisfaction: A Focus For Research & Practice, Editors: Bowen, P. & Hindle, R., CIB, Cape Town
- Alli, N. (2001) Alternative Routes to Financing of Infrastructure, Lecture Notes, Construction Management Programme, Stellenbosch University, June 28th 2001
- Anderson, R. (1973) Consumer Dissatisfaction: The Effect of Disconfirmed Expectancy on Perceived Project Performance, *Journal of Marketing Research*, Vol. 10, pp 38 - 44
- Angeles, N. H. and Walker, D. (2000) Build-Own-Operate-Transfer (BOOT) schemes: A Project Delivery System for the New Millennium, *The Building Economist*, March 2000, AIQS, pp 4-8
- Anon., (2001) Morrison buys Britain's first off-the-peg offices, *Construction Manager*, May 2001, p 8
- Ansoff, H. I. (1965) *Corporate Strategy: An Analytic Approach to Business Policy for Growth and Expansion*, New York: McGraw-Hill
- Ansoff, I. (1979) The Changing Face of the Strategic Problem, in *Strategic Management: A Review of Business Policy and Planning*, eds. D. F. Schendel and C. W. Hofer, Boston: Little, Brown and Co.
- Arditi, D., Koksai, A., and Kale, S. (2000) Business failures in the construction industry, *Engineering Construction & Architectural Management*, Vol. 7 No. 2, pp 120-132, Blackwell Science Ltd
- Austen, A. D and Neale, R. H (1984) *Managing Construction Projects: A Guide To Processes and Procedures*, Geneva: International Labour Office
- Aveng (2000) *Aveng Focuses on Consolidation*, [Online], Available: <http://www.barney.co.za/news/mar01/aveng20.htm> [2001, March 25]
- Babbie, E (1995) *The Practice of Social Research*, seventh edition, Wadsworth, Belmont, California
- Bahae, M. S. (1992) Strategy-Comprehensiveness Fit and Performance, *Australian Journal of Management*, Vol. 17, No. 2, December 1992, The University of New South Wales
- Ball, M. (1988) *Rebuilding Construction: Economic Change and the British Construction Industry*, London: Routledge
- Ball, M., Farshchi, M., and Grilli, M. (2000) Competition and the Persistence of Profits in the UK Construction Industry, *Construction Management and Economics*, Vol. 187, pp 733 – 745
- Barlow, J. and Gann, D. (1999) *Searching for Customer-Focus In UK Housebuilding*, CIB W55 & W65 Joint Triennial Symposium Customer Satisfaction: A focus for research & practice, Cape Town : 5-10 September 1999
- Barquin, G. (1994) *Strategies of the Major Spanish Construction Companies for Improving Their Domestic and International Competitiveness*, Unpublished MSc. Thesis: Massachusetts Institute of Technology

- Bennett, J. (2000) *Construction - The Third Way*, Oxford: Butterworth-Heinemann
- Bennett, J. and Jayes, S. (1995) *Trusting the Team: The Best Practice Guide to Partnering in Construction*, Reading: Centre for Strategic Studies in Construction
- Bouma, N (1997) *Marketing Strategies of Construction Companies through a Major Recession*: unpublished undergraduate thesis, University of Cape Town
- Bowen, P. A., Pearl, R. G. and Edwards, P. J. (1999) Client Briefing Processes and Procurement Method Selection: A South African Study, *Engineering, Construction and Architectural Management*, vol. 6 no. 2, pp 91-104
- Boyd, H. W. and Levy S. J. (1963) New Dimensions in Consumer Analysis, *Harvard Business Review*, Vol. 41, pp 129-140.
- Bresnen, M. (1990) *Organising Construction: Project Organisation and Matrix Management*, London: Routledge
- Bresnen, M. and Marshall, N. (1999) *Achieving Customer Satisfaction? Client-Contractor Collaboration In The UK Construction Industry*, CIB W55 & W65 Joint Triennial Symposium, Cape Town: CIB
- Bresnen, M. and Marshall, N. (2000) Partnering In Construction: A Critical Review Of Issues, Problems And Dilemmas, *Construction Management and Economics*, Vol. 18, pp 229-337
- Briscoe, G. (1988) *The Economics of the Construction Industry*, London: Mitchell
- Brown, S. (1996) *Strategic Manufacturing for Competitive Advantage: Transforming Operations from Shop Floor to Strategy*, London: Prentice Hall
- Burke, R (1999) *Project Management: Planning and Control Techniques*, 3rd edition, Stratford-upon-Avon: Promatec
- Chandler, A. D. (1966) *Strategy And Structure: Chapters in the History of the Industrial Enterprise*, Cambridge, Massachusetts: MIT
- Cheah, C., Kuschinsky N. and Miller, J. (2001) Application of Portfolio Planning to Urban Settings, CIB World Building Congress, April 2001, Wellington, New Zealand
- Chinowsky, P. (2001) Strategic Management in Engineering Organisations. *Journal of Management in Engineering*, Vol. 17, No. 2, pp 60 - 68
- Churchman, C. W (1982), *Thought and Wisdom*, Seaside, California, Intersystems Publications
- CIB (Construction Industry Board) (1997) *Partnering in the Team: A Report by Working Group 12 of the Construction Industry Board*, London: Thomas Telford
- Claiborne, C. B. and Ozanne, J. L. (1990) The Meaning of Custom-Made Homes: Home as a Metaphor For Living, *Advances in Consumer Research*, Volume 17, 1990, pp 367-374
- Construction Clients' Forum (1997) *Solving the Problems of Small and Occasional Clients of the Construction Industry*, Final Report, DoE, London
- Cowell, D. W (1984) *The Marketing of Services*, London: Heinemann
- Cox, A. (1997) *Business Success*, Bath: Earlsgate Press
- Cox, A., and Thompson, I. (1998) *Contracting for Business Success*, London: Thomas Telford
- Cox, A., and Townsend, M. (1998), *Strategic Procurement in Construction*, London: Thomas Telford
- Construction Round Table (CRT) (1995) *Thinking about Building*, London: Business Round Table Ltd.

- Cronje, G., du Toit, G., Motlatla, M. (1987) *Introduction to Business Management*, Oxford: Oxford University Press
- Crowley, I. (1996) *Discordant Bids Within Competitive Procurement*, North meets South: Developing Ideas, Proceedings of the CIB W92 Procurement Systems Symposium, University of Natal, Durban, 1996
- Dainty, A., Bagifhole, B. and Neale, R. (2000) Computer Aided Analysis of Qualitative Data in Construction Management Research, *Building Research and Information*, Vol. 28 No. 4, pp 226 - 233
- Davies, A. (1995) *The Strategic Role of Marketing*, London: McGraw-Hill
- Deloitte and Touche (2000) *Insights in Construction: Fourth Report on the Nation's Leading Contractors* [Online]. Available: http://www.agc.org/News_&_Bulletins/press_releases/01_press_releases.asp 14 May 2001
- DETR (The Department of the Environment, Transport and the Regions) (1998) *Rethinking Construction: The Report of the Construction Task Force to the Deputy Prime Minister, John Prescott, on the scope for improving the quality and efficiency of UK Construction*, p 4
- Dixit, A. and Nalebuff, B. (1991) *Thinking Strategically: The Competitive Edge in Business, Politics and Everyday Life*, New York: W.W. Norton and Co.
- Doyle, P. and Bridgewater, S. (1998) *Innovation in Marketing*, Oxford: Butterworth-Heinemann
- Department of Public Works (DPW) (1998) *Creating an Enabling Environment for Reconstruction, Growth and Development in the Construction Industry (White Paper)*, Pretoria
- Department of Public Works and Services (DPWS) (1998) *Construct New South Wales*, Sydney: Construction Policy Steering Committee
- Drucker, P. (1954) *The Practice of Management*, New York: Harper & Row
- Drucker, P. (1995) *Managing in a Time of Great Change*, Oxford: Butterworth-Heinemann
- Edum-Fotwe, F. T., Price, A. and Thorpe, A. (1996) Analysing Construction Contractors' Strategic Intent from Mission Statements, in *The Organisation and Management of Construction: Shaping Theory and Practice* (Volume One), Eds. Langford, D. A. and Retik, A, London: E. and F. N. Spon
- Edwards, P. and Bowen, P. (1996) *Building Procurement in the New South Africa: A Communication Imperative*, North meets South: Proceedings of the CIB W92 Procurement Systems Symposium, Durban
- Fellows, R. F., and Liu, A. (1997) *Research Methods for Construction*, Oxford: Blackwell Science
- Fine, B. (1975) Tendering Strategy, in *Aspects of the Economics of Construction*, ed. Turin, D. A. and Reid, D. A. G., London: George Godwin
- Fisher, N. (1986), *Marketing for the Construction Industry*, London: Longman
- Franks, J. (1990) *Building Procurement Systems*, 2nd Edition, Ascot: Chartered Institute of Building
- Friedman, W. (1984) *Construction Marketing and Strategic Planning*, New York: McGraw-Hill
- Gann, D. (1996) Construction as a Manufacturing Process? Similarities and Differences Between Industrialised Housing and Car Production in Japan, *Construction Management and Economics*, Vol. 14, pp. 437-450

- Gitomer, J. H. (1998) *Customer Satisfaction is Worthless, Customer Loyalty is Priceless: How to make customers love you, keep them coming back and tell everyone they know*, Austin, Texas: Bard Press
- Glueck, W. F. (1976) *Business Policy: Strategy, Formation and Management Action*, New York: McGraw-Hill
- Glueck, W. F. (1980) *Business Policy and Strategic Management*, New York: McGraw-Hill
- Grant, J. H. and King, W. R. (1979) Strategy Formulation: Analytical and Normative Models, in *Strategic Management: A Review Of Business Policy And Planning*, Editors: Schendel, D. F. and Hofer, C. W. Little, Boston: Brown and Co.
- Green, S. (1994) "Public Sector Procurement Methods Used In The Construction Industry In Turkey", in S. M. Rowlinson (ed.) *East meets West: Proceedings of the CIB W692 Procurement Systems Symposium*, University of Hong Kong, Hong Kong, CIB Publication 175, 89-99
- Hamilton, (1968) in Singer, C., Holmyard F. J. and Hall A. R. (eds.) (1968) *A History of Technology*, Oxford: Clarendon Press
- Hammer, M. and Champy, J. (1995) *Reengineering the Corporation: A Manifesto for Business Revolution*, London: Nicholas Brealey
- Hamnuda, I. and Dulaimi, M. (1999) *A Framework For Customer-Oriented Organisation In UK: A Comparative Study*, in CIB W55 & W65 Joint Triennial Symposium Customer Satisfaction: A Focus For Research & Practice, Editors: Bowen, P. & Hindle, R., CIB, Cape Town
- Hancher, D. E. (1989) *Partnering: Meeting the Challenges of the Future, Interim Report of the Task Force on Partnering*, Construction Industry Institute, University of Texas: CII
- Hax A. C. (ed.) (1987) *Planning Strategies That Work*, New York: Oxford University Press
- Holt, G. (1998) *A Guide to Successful Dissertation Study for Students of the Built Environment*, Wolverhampton: Built Environment Research Unit
- Henderson, B. D. (1991) The Origin of Strategy, in *Strategy: Seeking and Securing Competitive Advantage*, edited by Montgomery, C.A. and Porter, M. E., Boston: Harvard Business School
- Hillebrandt, P. (1984) *Analysis of the British Construction Industry*, Basingstoke: Macmillan
- Hillebrandt, P. (1996) Long Term Success or Failure of Contractors Strategy of Diversification, in *The Organisation and Management of Construction: Shaping Theory and Practice (Volume One)*, Eds. Langford, D. A. and Retik, A, London: E. and F. N. Spon
- Hillebrandt, P. and Cannon, J. (1990) *The Modern Construction Firm*, Macmillan: Basingstoke
- Hillebrandt, P., Cannon, J. and Lansley, P. (1995) *The Construction Company In and Out of Recession*, Basingstoke: Macmillan
- Hindle, R. D. (1991) *The Business Cycle, Demand for Construction and Appropriate Selling Methods for Contractors*, unpublished Masters thesis, University of Cape Town
- Hindle, R. D. (1996) Do We Need The "Professions"? ProjectPro, Vol. 6 No. 2
- Hindle, R. D. (1997:a) *Two Construction Industry Characteristics That Are Hindering Its Development*, Proceedings of the First International Conference on Construction Industry Development: Building the Future Together, School

- of Building and Real Estate, National University of Singapore, 9 - 11th December, 1997
- Hindle, R. D. (1997:b) *What are We Referring to When We Speak of a Construction Industry? Defining Construction*, Proceedings of the First International Conference on Construction Industry Development: Building the Future Together, School of Building and Real Estate, National University of Singapore, 9 - 11th December, 1997
- Hindle, R. D. (1998). What is wrong with the construction industry? *The Civil and Building Engineering Contractor*, June 1998, pp 10-12
- Hindle, R. D (2000:a) *An Analysis of the Change in Demand Patterns in South Africa and its Impact on Construction Firms and Contractors*, unpublished newsletter
- Hindle, R. D (2000:b) *Construction Industry Development through Intervention: A Right And A Wrong Way?* 2nd International Conference of the CIB Task Group 29, November 2000, Gaborone, Botswana
- Hindle, R. D. and Rwelamila, P. (1993). *Change In Building Procurement System and Its Effect On Quality In Building Construction*. Arcom, 9th Annual Conference, September 1993, Oxford: UK
- Hindle, R. D. and Rwelamila, P. (2000) *The Built Environment Professions Bill and the New Profession of Project and Construction Management: A Cause To Celebrate or a Reason To Cry?*, unpublished article
- Ibbs, C. W.; Back, W. E.; Kim, J. J.; Wall, D. E.; DeLaGRaza, J. M.; Hassanein, M. A.; Schraa, S. M. and Twardock, R. K. (1986) *Determining The Impact Of Various Construction Contract Types And Clauses On Project Performance Vol. 1: Analysis and Recommendations*, A Report Of The Construction Industry Institute
- ISC (Implementation and Steering Committee) (1997) *Securing our Industry's Future: Report of the Steering Committee on Security of Payment in the Building and Construction Industry*, Queensland
- Janssens, D. E. L., (1993) *Design-Build Explained*, Basingstoke: Macmillan
- Jefferies, M. C., Cook, M. J. and Rowlinson, S. (2001) *The Boot Approach for Stadium Australia: Reflecting on the Critical Factors For Success*, CIB World Building Congress, April 2001, Wellington, New Zealand
- Jenson, M. C. (1998) *Foundations of Organisation Strategy*, Cambridge, Massachusetts: Harvard University Press
- Johnson, G. and Scholes, K. (1999) *Exploring Corporate Strategy*, fifth edition, Prentice Hall: Harlow, Essex
- Kepner, C. H., and Tregoe, B. B. (1965) *The Rational Manager: A Systematic Approach to Problem Solving and Decision Making*, New York: McGraw-Hill
- Konchar, M., and Sanvido, V. (1998) *Project Delivery Systems: CM At Risk, Design-Build, Design-Bid-Build*, CII Source Document, Design Build Research Team No. 133
- Koskela, L. (1992), *Application of the New Production Philosophy to Construction*, Stanford
- Kotter, J. (1990) *What Leaders Really Do*, *Harvard Business Review*, May-June, pp 103-111
- Lai, A. W. (1995) *Consumer Values, Product Benefits and Customer Value: A Consumption Behaviour Approach*, *Advances in Consumer Research*, Volume 22, 1995, pp 381-388

- Langford, D. (2000) *The Influence of Culture on the Internationalisation of Construction*, 2nd International Conference of the CIB Task Group 29, November 2000, Gaborone, Botswana, 15 - 17th November
- Langford, D. and Male, S. (1991) *Strategic Management in Construction*, Aldershot: Gower
- Lau, L. W. C., (2000) The Coasian Market Firm Dichotomy and Sub-contracting in the Construction Industry, *Construction Management and Economics*, Vol. 18, pp 355-362
- Lavender, S. (1996) *Management for the Construction Industry*, Harlow: Longman
- Leedy, P. (1993) *Practical Research: Planning and Design*, 5th Edition, New York: Macmillan
- Levin, R. I. And DesJardins, R. B. (1970) *Theory of Games and Strategies*, Scranton, Pennsylvania: International Textbook Co.
- Levine, D. K. (1995), *What is Game Theory?* [Online], Available: <http://levine.sscnet.ucla.edu/general/whatis.htm> [Feb. 23, 2001]
- Lin, M. (1995) *Processes and Effective Analytical Tools for Strategic Planning in the Construction Industry*, Unpublished MSc. Thesis: Massachusetts Institute of Technology
- Linder, M. (1994) *Projecting Capital: A History of The International Construction Industry*, Westport: Greenwood Press
- Linstone, H. (1984), *Multiple Perspectives for Decision Making, Bridging The Gap Between Analysis and Action*, Amsterdam, Elsevier Science Publishing
- Lloyd, T. (2001) *Pointing Out the Asteroids on His Way to Mars*, Financial Mail, 16 February
- Love, P. and Smith, J. (2001) Adapting to clients' needs in construction - a dialogue, *Facilities*, Vol. 19 Issue 1/2
- Lynch, R (1997) *Corporate Strategy*, London: Pitman
- Male, S. (1991:a) Strategic Management in Construction, in *Competitive Advantage in Construction*, eds. Male, S. and Stocks, R. Oxford: Butterworth-Heinemann
- Male, S. (1991:b) Strategic Management and Competitive Advantage, in *Competitive Advantage in Construction*, eds. Male, S. and Stocks, R. Oxford: Butterworth-Heinemann
- Male, S. and Stocks, R. (1991) *Competitive Advantage in Construction*, Oxford: Butterworth-Heinemann
- Masterman, J. W. E. (1992) *An Introduction to Building Procurement Systems*, Cornwall: E. & F. N. Spon
- Masterman, J. W. E. (1994) *A Study of the Bases upon Which Clients of the Construction Industry Choose Their Building Procurement Systems*, unpublished PhD thesis, University of Manchester
- Matthews, J. (1999) Applying Partnering in the Supply Chain, in Rowlinson, S and McDermott, P (eds.) *Procurement Systems: A Guide To Best Practice In Construction*. London: E &FN Spon
- McDermott, P. (1999) Strategic and Emergent Issues in Construction Procurement, in S. Rowlinson and P. McDermott, (eds.) *Procurement Systems: A Guide To Best Practice*, London: E. & F. N. Spon
- McNealy, R. M (1994) *Making Customer Satisfaction Happen: A Strategy for Delighting Customers*, London: Chapman & Hall
- Miles, R. E. and Snow, C. C. (1978) *Organisational Strategy, Structure and Process*, New York: McGraw-Hill

- Mintzberg, H. (1991) *Crafting Strategy*, in *Strategy: Seeking and Securing Competitive Advantage*, (eds.) C.A. Montgomery and M. E. Porter Boston: Harvard Business School
- Mintzberg, H., Ahlstrand, B. and Lampel, J. (1998) *Strategy Safari: A Guided Tour Through the Wilds of Strategic Management*, Hertfordshire: Prentice Hall
- Montgomery, C.A. and Porter, M. E. (eds.) (1991) *Strategy: Seeking and Securing Competitive Advantage*, Boston: Harvard Business School
- Mooki, K. (1996) *Types and Extent of Use of Procurement Systems in South Africa*, unpublished BSc Thesis, University of Cape Town
- Moore, A. B. (1984), *Marketing Management in Construction: A Guide for Contractors*, Surrey: Butterworth
- Morledge, R. (1999), *Marketing – A Solution to Construction Market Failure?*, *International Journal for Construction Marketing*, Volume 1, Number 2, 1999
- Mustapha, F. H., Naoum, S. G. and Aygun, T. (1994) *Public Sector Procurement Methods Used In The Construction Industry In Turkey*, in S. M. Rowlinson (ed.) *East meets West: Proceedings of the CIB W092 Procurement Systems Symposium*, University of Hong Kong, Hong Kong: CIB Publication 175, 229-234
- National Economic Development Office (1985) *Thinking About Building: A Successful Business Customer's Guide to Using the Construction Industry*, London: National Economic Development Office
- Ngowi A. B., Iwisi D. S. and Rwelamila, P. D. (2000) *Creating and Sustaining a Construction Market Position*, *International Journal for Construction Marketing*, Volume 1, Issue 1, 2000
- Nkado, R. N. (1996) *Joint Ventures in the South African Building Industry: Anticipations and Experiences*, *Future Build*, 1996
- Nonaka, I. (1998) *Toward Middle-Up-Down Management: Accelerating Information Creation*, *Sloan Management Review*, Spring 1998, pp 9-18
- Ofori, G. (1991) *Programmes for Improving the Performance of Contracting Firms in Developing Countries: A Review of Approaches and Appropriate Options*, *Construction Management and Economics*, Vol. 9, pp 19 – 38
- Ofori G., and Chan, S. L. (2000) *Growth Paths of Construction Enterprises in Singapore, 1980-98*, *Engineering Construction & Architectural Management*, Vol. 7 No. 3, pp 307-321
- Ofori, G. Hindle, R and Hugo, J. (1996) *Improving the Construction Industry of South Africa: A Strategy*, *Habitat International*, Vol. 20, No. 2, pp 203 - 220
- Olsen, I. S. (2001) *The Co-operation of the Future in the Melting Pot*, CIB World Building Congress, April 2001, Wellington, New Zealand
- Oluwoye, J. and Lenard, D. (1999) *Construction Innovation: An Overview of Innovative Construction Methods*, CIB W55 & W65 Joint Triennial Symposium, *Customer Satisfaction: A Focus For Research & Practice*, Editors: Bowen, P. & Hindle, R., CIB, Cape Town
- Oz, O. (2001) *Sources of Competitive Advantage of Turkish Construction Companies in International Markets*, *Construction Management and Economics*, Vol. 19, pp 135 - 144
- Pearce, P. (1999) *Marketing Construction*, *Construction Papers*, Special Edition, Ascot; Chartered Institute of Building
- Pheng, L. and Hua, L. (2001) *The Strategic Responses of Construction Firms to the Asian Financial Crisis in 1997-1998*, *International Journal for Construction*

- Marketing, Vol. 1 Issue 2, [Online], available
<http://www.brookes.ac.uk/other/econmark/IJCM/>, 20th May 2000
- Poggiolini, D. (2000) Construction Industry Needs to Adapt to the New Economy, *Engineering News*, October 13 – 19, 2000
- Porter, M (1980) *Competitive Strategy: Techniques for Analysing Industries and Competitors*, New York: Macmillan
- Porter, M (1985) *Competitive Advantage: Creating and Sustaining Superior Performance*, New York: Macmillan
- Precece, C. and Khalil, I. (2000) Preliminary Research into Internal Marketing as a Strategic Business Philosophy in Construction Contracting, *Journal of Construction Research*, Vol. pp 9 - 17
- Procter, C. J. (1997) *Satisfaction and Service Quality in the Quantity Surveying Profession*, unpublished Masters thesis, University of Cape Town.
- Quinn, J. B. (1987) Managing Strategic Change, in *Planning Strategies That Work*, ed. A. G. Hax, New York: Oxford University Press, pp 18 – 39
- Raftery, J., Ceste, J. and Hui, S. (2001) Are Risk Attitudes Robust? Qualitative Evidence Before and After a Business Cycle Inflection, *Construction Management and Economics*, Vol. 19, pp 155-164
- Ramsay, W. (1989) in Hillebrandt, P. M. and Cannon, J (1989) *The Management of Construction Firms: Aspects of Theory*, Macmillan: London
- Rowe, A., Mason, R. and Dickel, K. (1985) *Strategic Management and Business Policy: A Methodological Approach*, 2nd Edition, Reading, Massachusetts: Addison-Wesley
- Rowlinson, S (1999:a) A Definition of Procurement Systems, in Rowlinson, S and McDermott, P (eds.) *Procurement Systems: A Guide to Best Practice in Construction*, London: E &FN Spon
- Rowlinson, S (1999:b) Selection Criteria, in Rowlinson, S and McDermott, P (eds) (1999) *Procurement Systems: A Guide To Best Practice In Construction*, London: E &FN Spon
- Rwelamila, P. M. D. (1996) *Quality Management in the Public Building Construction Process*, unpublished PhD. Thesis, University of Cape Town
- Rwelamila, P. (1997) More questions on the construction "professions", *ProjectPro*, May 1997, pp 13-14
- Saalman, H. (1968) *Medieval Cities*, London: Studio Vista
- Sanvido, V and Kochnar, M (1999) *Selecting Project Delivery Systems*, Pennsylvania: The Project Delivery Institute
- Sanvido, V. E. and Mace, B. K. (1999) Global Delivery of Semiconductor Fabrication Facilities, CIB W55 & W65 Joint Triennial Symposium: Customer Satisfaction: A Focus For Research & Practice: Cape Town: 5-10 September 1999
- Satoh, A. and Morton, R. (1995) *Building in Britain: Origins of a Modern Industry*, Cambridge: Scholar Press
- Sawczuk, B. (1996) *Risk Avoidance for the Building Team*, London: E. & F. N. Spon
- Schendel, D. E. and Hofer, C. W. (eds.) (1979) *Strategic Management: A Review Of Business Policy And Planning*, Little, Boston: Brown and Co.
- Sebestyen, G (1998) *Construction - Craft to Industry*, London: E & FN Spon
- 2nd CIB-IG 29 International Conference on Construction in Developing Countries, 2000
- Shand, P. M. (1954) *Building: The Evolution of and Industry*, Token Construction Company Ltd.

- Sherrard, A. C. (1986) *Corporate Strategy: A South African Framework for Synthesising Formulation, Implementation and Computer-Based Information Systems*, Unpublished MBA Technical Report, University of Cape Town
- Singer, C. Holmyard, E. J. and Hall A. R. (eds.) (1968) *A History of Technology*, Oxford: Clarendon Press
- Singh, S. (1990) Selection of Appropriate Project Delivery System for Building Construction Projects, in *Managing Projects*, eds. Ireland, V. and Uher, T. CIB: Sydney
- Sloan, A. P. (1963) *My Years with General Motors*, New York: Doubleday
- Smith, A. (1976) *An Inquiry into the Nature and Causes of the Wealth of Nations*, Oxford: Clarendon
- Smyth, H. (1999) *Performance Audits And Client Satisfaction*, in CIB W55 & W65 Joint Triennial Symposium Customer Satisfaction: A Focus For Research & Practice, Editors: Bowen, P. & Hindle, R., CIB, Cape Town
- Smyth, H. (2000) *Marketing and Selling Construction Services*, Oxford: Blackwell Science
- Snyman, G. J. J. (1999) *Macroeconomic Data for the South African Construction Industry: Historical Development and New Directions for Research*, CIB Task Group 31 Workshop, Cape Town
- Srivastava, P. (1994) *Strategic Management: Concepts and Practices*, Cincinnati: Southwestern Publishing Co.
- Steiner, G. A. (1979) Contingency Theories of Strategy and Strategic Management, in *Strategic Management: A Review of Business Policy and Planning*, eds. D. E. Schendel and C. W. Hofer, Boston: Little, Brown and Co.
- Stocks, R. (1991) Strategic Marketing Management, in *Competitive Advantage in Construction*, eds. Male, S. and Stocks, R. Oxford: Butterworth-Heinemann
- Stokes, F. H. (1977) Practical Problems in Corporate Planning, in *Corporate Strategy and Planning*, eds. B. Taylor and J. R. Sparks, London: Heinemann
- Stumpf, I. (2000) Competitive Pressures on Middle-Market Contractors in the UK, *Engineering Construction & Architectural Management*, Vol. 7 No. (2), 159-168, Blackwell Science Ltd
- Taylor, R. G., Norval, G. H. M., Hindle, B., Rwelamila, P. D., McDermott, P., (1999) From Conventionally Oriented To Developmentally Oriented Procurement Systems: Experiences From South Africa, in Rowlinson, S and McDermott, P. (eds.) *Procurement Systems: A Guide To Best Practice In Construction*, London: E & FN Spon
- The Oxford English Dictionary (1989), 2nd edition, Oxford University Press, London
- Tookey, J. E., Murray, M., Hardcastle, C., Langford, D. (2001) Construction Procurement Routes: Re-Defining the Contours of Construction Procurement, *Engineering Construction & Architectural Management*, Vol. 8 (1), pp 20-30, Blackwell Science Ltd
- Tulacz G. (1999) A \$3.2-Trillion World Market, *Engineering News-Record*, [Online] Available <http://www.enr.com/new/feature61801.asp&pid=7.1>, 7th June, 2000
- Uwakweh, B. A (1996) A Framework for Managing Strategic Change in the Construction Industry, in *The Organisation and Management of Construction: Shaping Theory and Practice* (Volume One), Eds. Langford, D. A. and Retik, A. London: E. and F. N. Spon

- Uwakweh, B. (1999) *Framework for Analysing Construction Human Resource Needs in Developing Countries*, CIB W55 & W65 Joint Triennial Symposium, Customer Satisfaction: A Focus For Research & Practice, Cape Town: September 1999
- Walker, A. (1996) *Project Management in Construction*, Oxford: Blackwell Science
- Walker, D. (1997) Choosing an Appropriate Research Methodology, *Construction Management and Economics*, Vol. 15, pp 149-159, 1997
- Walker, P (1995) *An Outline of the History of Game Theory*, [Online], Available: <http://william-king.www.drexel.edu/top/class/histf.html> [Feb. 23, 2001]
- Wang, G. and Yang, J. (2000) Business Development Strategy and Australian Construction Industry, *International Journal of Construction Marketing*, Volume 2, Number 1
- Wells, J (1986) *The Construction Industry in Developing Countries: Alternative Strategies for Development*, Kent: Billing and Sons
- Wheelan, T. and Hunger, J. (1989) *Strategic Management and Business Policy*, Reading, Massachusetts: Addison-Wesley
- Whittington, R. (1993) *What and Strategy and Does It Matter?* London: Routledge
- Woodward, J. F. (1997) *Construction Project Management: Getting it Right First Time*, London: Thomas Telford

APPENDIX A: QUESTIONNAIRE USED FOR COMPANY INTERVIEWS

A SURVEY OF THE ROLE OF PROJECT DELIVERY SYSTEMS IN CONSTRUCTION COMPANY STRATEGY

QUESTIONNAIRE

In completing this questionnaire you will be contributing to research and your time is much appreciated. The information collected will be treated in confidence and will be used solely in connection with research to establish the role of project delivery systems in construction company strategy.

Would you like to receive the results of this survey?

Yes

No

If so, please give your name and address:

NOTES TO EXPLAIN THE TERMS USED IN THIS QUESTIONNAIRE:

"Project delivery systems" means the organisational arrangement used to design and construct a building or civil engineering project. It is used interchangeably with, though in preference to, building procurement systems.

"Traditional project delivery system": the arrangement by which the client commissions independent consultants to fully design a project after which contractors are invited to tender. The successful tenderer contracts with the client and carries out the work under the supervision of the consultants.

"Design and build": the contracting company is solely responsible for the design and construction of the project.

"Management contracting": the contracting company is employed early in the design stage to provide construction management experience, and later employs and manages the contractors who carry out the actual work. In return, the management contractor is paid a fee plus the actual cost of construction.

"Construction management": the construction manager manages the contractors who carry out the actual work in conjunction with the consultants, but in this instance the contract is between the works contractors and the client, not the construction manager and the client.

"Design and manage": the design and manager is a contracted to design the works and supervise the construction but the actual work is carried out by works contractors.

"Build-operate-transfer": similar to design and build but the contractor operates the facility after construction for a specific period of time before turning it over to the client. The contractor is expected to reimburse himself by fees from operating the facility.

"Partnering": a long-term commitment between the contractor and the client aimed at achieving construction objectives by minimising the boundaries between the two organisations.

A. Company Background - Questions seek to classify your firm in terms of construction activities & size

1) What type of construction work does your firm chiefly undertake at present (i.e., civil engineering work, labour sub-contracting, repair and maintenance, residential, housing schemes, etc.)?

2) What type of construction did your firm chiefly undertake in the past?

3) How long has your firm been in business? _____

4) In which sectors do you mainly operate?

Public Private Both

5) What is the size of your firm in terms of annual turnover?

Up to 1 million 1 – 10 million 10 – 50 million 50 – 200 million Over 200 million

6) How would you characterise your profitability as a percentage of turnover?

| | | | | |
|--------------------------|------------------------------|--------------------------|------------------------------|--------------------------|
| High profit (over 5%) | Moderate profit (1 to 5%) | Break-even (1 to -1%) | Moderate loss (-1 to -5%) | High loss (over -5%) |
| <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

B. Strategy - These questions relate to your firm's strategies

7) (a) How did you get work in the past and at present, through

| | In the past | At present |
|-----------------------------|--------------------------|--------------------------|
| Open competitive tenders | <input type="checkbox"/> | <input type="checkbox"/> |
| Invited competitive tenders | <input type="checkbox"/> | <input type="checkbox"/> |
| Negotiation | <input type="checkbox"/> | <input type="checkbox"/> |
| Self-instigated negotiation | <input type="checkbox"/> | <input type="checkbox"/> |
| Property development | <input type="checkbox"/> | <input type="checkbox"/> |
| Other (specify) _____ | <input type="checkbox"/> | <input type="checkbox"/> |

(b) Which of these methods do you prefer?

(c) Why do you prefer it?

8) Is there someone in your firm with the specific responsibility of charting the firm's strategy (please give job title)? _____

9) Does your firm have a mission statement, or a statement of strategic intent declaring its aspirations and desired direction? _____. If so, we would be grateful if you would attach a copy.

- 10) (a) Does your firm have any formal written business strategy?

- (b) Does your firm have any strategy specifically for seeking work?

- 11) On a scale of one to ten, how important would you rate having a formal business strategy for a construction company (one being not important, 10 being extremely important)? _____
- 12) (a) Which, if any, sectors in construction have you decided to focus upon?

- (b) Which, if any, sectors in construction have you decided not to enter?

- 13) (a) What would you consider to be your main competitive advantage that enables you to secure projects in your chosen sector?

- (b) What would you consider your main competitive advantage is that enables you carry out projects profitably?

- 14) Have you used, or do you intend to use, one or more of the following strategies in the past, present, or in future? If so, please indicate when this was?

| Strategy | In the past | At present | In future |
|--|--------------------------|--------------------------|--------------------------|
| Producing at a lower cost relative to competitors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Securing work at low margins then exploiting contract loopholes | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Producing low price, ordinary quality work | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Producing medium price, higher-than-average quality work | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Producing high quality, high cost work | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Offering unique construction services | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Focusing on a specific market, client or sector | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Developing new markets, clients or services | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Horizontal integration: acquiring firms of similar size, markets or services | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Vertical integration: acquiring firms up or down the supply chain | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Diversifying into other industries | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Entering regional or international markets | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Strategic alliances/ Joint ventures | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Mergers | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Retrenchment or divestment | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other (please specify) _____ | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

15) Please rank your primary indicator of business success from 1 (highest) to 6 (lowest)

| | | | |
|-------------------|-------|-----------------------|-------|
| Profit before tax | _____ | Cash flows | _____ |
| Net turnover | _____ | Customer satisfaction | _____ |
| Work volume | _____ | Other | _____ |

C. Project delivery systems

The following questions relate to your firm's use of project delivery systems as defined in the cover notes

16) How would you rate your knowledge of the following project delivery systems

| Project delivery system | Rank (1 = don't know, 5 = very knowledgeable) |
|-------------------------|---|
| Traditional | _____ |
| Design and build | _____ |
| Management contracting | _____ |
| Construction management | _____ |
| Design and manage | _____ |
| Build-operate-transfer | _____ |
| Partnering | _____ |

17) Have you had the occasion to deliver a project using any of these project delivery systems? If so, please indicate which ones, and roughly what percentage of your workload they have accounted for in the past and at present.

| Project delivery system | % in the past | % at present |
|-------------------------|---------------|--------------|
| Traditional | _____ | _____ |
| Design and build | _____ | _____ |
| Management contracting | _____ | _____ |
| Construction management | _____ | _____ |
| Design and manage | _____ | _____ |
| Build-operate-transfer | _____ | _____ |
| Partnering | _____ | _____ |

If you have not used any delivery systems other than the traditional, you need not complete the rest of the questionnaire – please return it to me it is valuable to us as it is

18) If you have used different project delivery systems from those in the past, what new skills did you need?

19) Do you see a trend towards the use of other project delivery systems apart from the traditional? If so, what is the most significant cause of this trend, in your opinion?

20) What is the most significant effect of this trend, in your opinion?

21) Would you like to see project delivery systems other than the traditional used more, and why?

22) How would you rank them regarding their ability to generate profits for the firm?

| Project delivery system | Rank (1 = very poor, 5 = very good) |
|--------------------------------|--|
| Traditional | _____ |
| Design and build | _____ |
| Management contracting | _____ |
| Construction management | _____ |
| Design and manage | _____ |
| Build-operate-transfer | _____ |
| Partnering | _____ |

23) How would you rank them regarding the financial risk they expose the firm to?

| Project delivery system | Rank (1 = very high, 5 = very low) |
|--------------------------------|---|
| Traditional | _____ |
| Design and build | _____ |
| Management contracting | _____ |
| Construction management | _____ |
| Design and manage | _____ |
| Build-operate-transfer | _____ |
| Partnering | _____ |

24) Do you think alternative project delivery systems have advantages over the traditional system? Give the most important, if any.

25) In your opinion, can the use of particular project delivery systems be a construction company strategy?

APPENDIX B – COVERING LETTER TO CONSTRUCTION COMPANIES NOT CONTACTED

24th June 2001

«Company»
«Address1»
«Address2»
«Postal_Code»
«City»

Attention: «Contact»

Dear Sir

RE: RESEARCH INTO CONSTRUCTION INDUSTRY BUSINESS STRATEGIES AND PROJECT DELIVERY SYSTEMS

I write to request your participation in a research project that is designed to discover how business is changing in the construction contracting business.

The results of the survey will be useful to participants in the construction industry in general and yourselves in particular as they will help identify current trends and optimal practice in South African construction.

In this regard, I would greatly appreciate it if you would agree to participate by answering a few questions that are offered in the attached questionnaire. The information collected in the survey will be treated in the strictest confidence and will not be given out to any other party whatsoever. I have attached a stamped self-addressed envelope for your convenience, and would be glad to furnish you with the results of the survey if you so desire.

I look forward to hearing from you.

Thanking you in anticipation.

Yours faithfully,

George Mbutia

Enclosure (1)

APPENDIX C – COVERING LETTER TO CONTACTED CONSTRUCTION COMPANIES

24th June 2001

«Company»
«Address1»
«Address2»
«Postal_Code»
«City»

Attention: «Contact»

Dear Sir

RESEARCH QUESTIONNAIRE - STRATEGY AND PROJECT DELIVERY SYSTEMS IN CONSTRUCTION

Thank you so much for agreeing to help with this research project.

I have attached the short questionnaire and it should not take more than ten minutes of your time to complete. The results of the survey will be useful to participants in the construction industry in general and yourselves in particular as they will help identify current trends and practices that help construction companies to survive in these testing times.

The information collected in the survey will be treated in the strictest confidence and no participant will be identified in the resultant findings. I have attached a stamped self-addressed envelope for your convenience, and would be glad to furnish you with the results of the survey if you so desire.

I look forward to hearing from you.

Thanking you in anticipation.

Yours faithfully,

George Mbutia

Enclosure (1)

APPENDIX D - CORRESPONDENCE ANALYSIS OF THE DATA

Question 16

Correspondence Analysis of a Two-Way Table

Number of variables (columns of the table): 5
 Number of valid cases (rows of the table): 7

Eigenvalues: .2900 .1717 .0554 .0022
 Total chi square=113.209 df=24 p=0.000

STAT. Eigenvalues and Inertia for all Dimensions (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Total Inertia=.51931 Chi²=113.21 df=24 p=0.0000

| Number of Dims. | Singular Values | Eigen-Values | Perc. of Inertia | Cumulative Percent | Chi Squares |
|-----------------|-----------------|--------------|------------------|--------------------|-------------|
| 1 | .538545* | .290031* | 55.84951* | 55.8495* | 63.22671* |
| 2 | .414353* | .171689* | 33.06107* | 88.9106* | 37.42812* |
| 3 | .235337 | .055303 | 10.66487 | 99.5754 | 12.07360 |
| 4 | .046955 | .002205 | .42455 | 100.0000 | .48063 |

STAT. Row Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Row Relative Name Inertia | Row Number | Coordn. Dim. 1 | Coordn. Dim. 2 | Mass | Quality |
|---------------------------|------------|----------------|----------------|---------|---------|
| TRAD .375028 | 1 | -1.12705 | .271701 | .142202 | .982702 |
| D&B .080382 | 2 | -.42462 | -.255704 | .142202 | .836972 |
| MC .101158 | 3 | .28015 | -.533351 | .142202 | .982479 |
| CM .040112 | 4 | .05747 | -.375076 | .142202 | .982926 |
| D&M .097216 | 5 | .44299 | -.130541 | .146789 | .620125 |
| BOT .211140 | 6 | .46794 | .734798 | .142202 | .984222 |
| PART .094965 | 7 | .28964 | .292384 | .142202 | .488402 |

STAT. Row Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Row Name | Inertia Dim.1 | Cosine ² Dim.1 | Inertia Dim.2 | Cosine ² Dim.2 |
|----------|---------------|---------------------------|---------------|---------------------------|
| TRAD | .623687 | .928801 | .061143 | .053901 |
| D&B | .088404 | .614231 | .054155 | .222740 |
| MC | .038480 | .212448 | .235608 | .770031 |
| CM | .001620 | .022550 | .116520 | .960376 |
| D&M | .099319 | .570577 | .014569 | .049548 |
| BOT | .107360 | .283983 | .447198 | .700239 |
| PART | .041131 | .241897 | .070806 | .246505 |

STAT. Column Coordinates and Contributions to Inertia (16ca.sta)
CORRESP. Input Table (Rows x Columns): 7 x 5
ANALYSIS Standardization: Row and column profiles

| Column Relative Name Inertia | Column Number | Coordin. Dim.1 | Coordin. Dim.2 | Mass | Quality |
|------------------------------|---------------|----------------|----------------|---------|---------|
| V_GOOD .311176 | 1 | .607400 | .112580 | .422018 | .996595 |
| GOOD .133942 | 2 | .253670 | -.429103 | .215596 | .770172 |
| SATISFY .090996 | 3 | .390278 | -.362256 | .160550 | .963360 |
| POOR .160885 | 4 | .656486 | .055377 | .119266 | .625622 |
| V_POOR .303001 | 5 | .734996 | 1.126091 | .082569 | .948895 |

STATISTICAL: Correspondence Analysis
13:36 PAGE 1

08-24-01

STAT. Column Coordinates and Contributions to Inertia (16ca.sta)
CORRESP. Input Table (Rows x Columns): 7 x 5
ANALYSIS Standardization: Row and column profiles

| Column Name | Inertia Dim.1 | Cosine ² Dim.1 | Inertia Dim.2 | Cosine ² Dim.2 |
|-------------|---------------|---------------------------|---------------|---------------------------|
| V_GOOD | .536830 | .963495 | .031154 | .033100 |
| GOOD | .047834 | .199452 | .231219 | .570720 |
| SATISFY | .084317 | .517502 | .122716 | .445857 |
| POOR | .177225 | .615217 | .005064 | .010405 |
| V_POOR | .153795 | .283477 | .609848 | .665418 |

STAT. Observed minus Expected Frequencies (16ca.sta)
CORRESP. Input Table (Rows x Columns): 7 x 5
ANALYSIS Total Inertia=.51931 Chi²=113.21 df=24 p=0.0000

| | V_GOOD | GOOD | SATISFY | POOR | V_POOR |
|------|----------|----------|----------|----------|----------|
| TRAD | 17.91743 | -6.68349 | -4.97706 | -3.69725 | -2.55963 |
| D&B | 4.91743 | 2.31651 | -1.97706 | -3.69725 | -2.55963 |

| MC | CM | D&M | SOI | PART | Total |
|----------|----------|----------|----------|----------|----------|
| -6.08257 | 2.31651 | -6.50459 | -4.08257 | -4.08257 | 24.53909 |
| 4.31651 | 2.31651 | 1.0092 | -4.68349 | 2.31651 | 6.68349 |
| 4.02294 | 2.02294 | 1.86239 | -0.97706 | -0.97706 | 4.97706 |
| 3.0275 | 3.0275 | 5.18349 | 3.30275 | -1.67725 | 3.69725 |
| -2.55963 | -2.55963 | -6.1220 | 6.44037 | 4.14037 | 2.55963 |
| 1.84835 | 1.84835 | 1.84835 | 1.84835 | 1.84835 | 1.84835 |
| 2.82801 | 2.78781 | 2.82801 | 2.82801 | 2.82801 | 2.82801 |
| .53152 | .90291 | .82223 | .02479 | .02479 | .53152 |
| 3.13298 | .00148 | .67512 | 4.04007 | .15609 | 3.13298 |
| 1.27401 | 3.28198 | 1.27401 | 1.27401 | 1.27401 | 1.27401 |
| 1.27401 | .80291 | .80291 | .80291 | .80291 | 1.27401 |
| 10.7509 | 10.7509 | 10.7509 | 10.7509 | 10.7509 | 10.7509 |
| 35.22798 | 15.16348 | 10.30756 | 18.21363 | 34.30242 | 35.22798 |

STAT.
CORRESP.
ANALYSIS

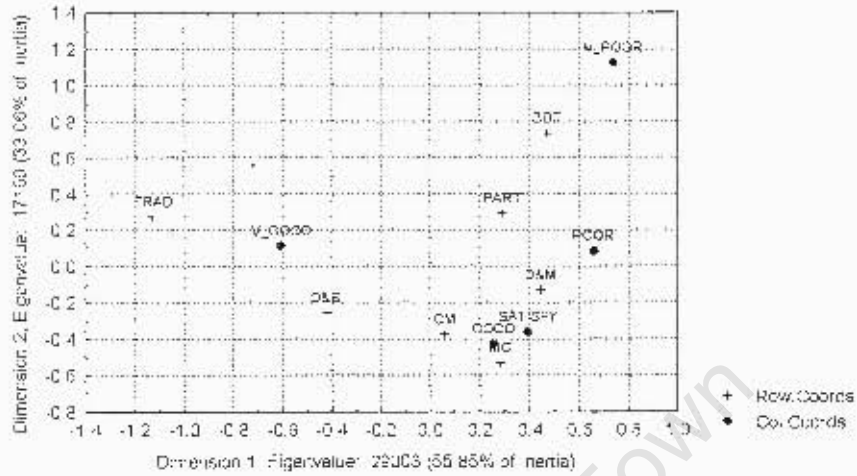
Contributions to Chi-Square (Ecclesia)
Input Table (Rows x Columns): 7 x 5
Total Inertia=.51931 Chi²=113.21 df=24 p=0.0000

V_GOOD
GOOD
SATISF
POOR
V_POOR

Total

TRAD
42.4569
D&S
9.0999
MC
11.4520
CM
4.5411
D&M
11.0097
SOI
23.9029
PART
10.7509
Total
113.2091

2D Plot of Row and Column Coordinates; Dimension 1 x 2
 Input Table (Rows x Columns): 7 x 5
 Standardization: Row and column profiles

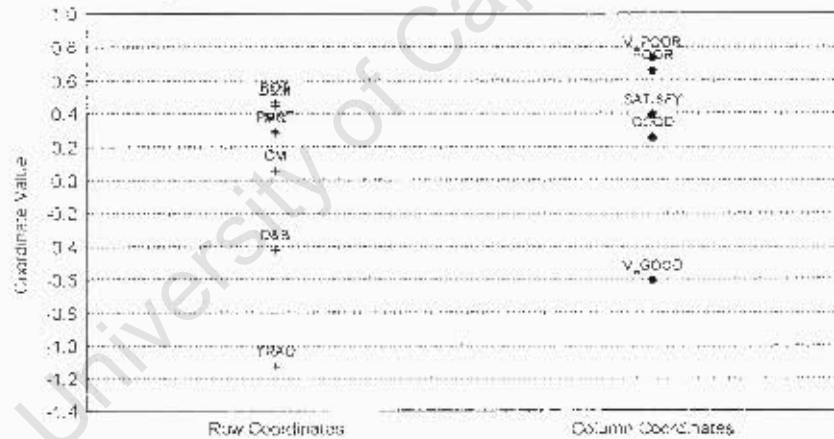


1D Plot of Row and Column Coordinates for Dimension 1

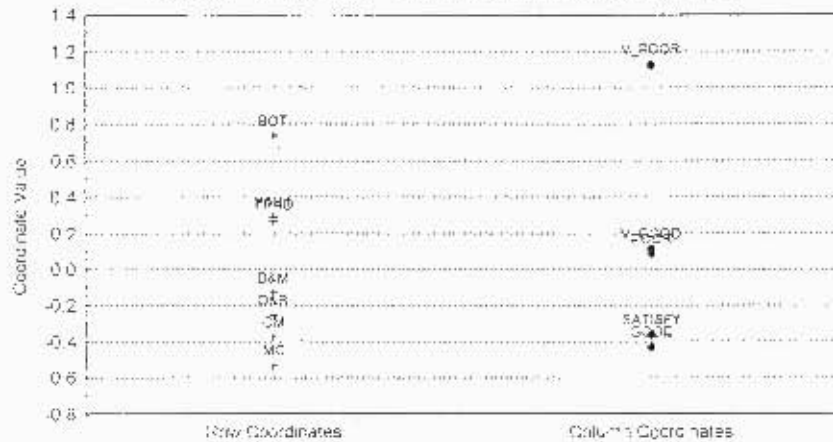
Input Table (Rows x Columns): 7 x 5

Standardization: Row and column profiles

Eigenvalue: 29003 (55.850% of inertia) Contribution to Chi-square: 63.227



13 Plot of Row and Column Coordinates for Dimension 2
 Input Table (Rows x Columns): 7 x 5
 Standardization: Row and column profiles
 Eigenvalue: 17.159 (33.051% of Inertia) Contribution to Chi-square: 37.428



Question 22

data file: 16CA.STA [7 cases with 5 variables]

STATISTICA: Correspondence Analysis
 13:44 PAGE 3

08-24-01

VARIABLE SPECIFICATIONS:

| No | Name | Format | MD Code | Long Label |
|----|---------|--------|---------|------------|
| 1 | V_GOOD | 3.3 | -9999 | |
| 2 | GOOD | 3.3 | -9999 | |
| 3 | AVERAGE | 3.3 | -9999 | |
| 4 | POOR | 3.3 | -9999 | |
| 5 | V_POOR | 3.3 | 9999 | |

The input data file specifies a table of frequencies or other measures of correspondence.

Correspondence Analysis of a Two-Way Table

Number of variables (columns of the table): 5
 Number of valid cases (rows of the table): 7

Eigenvalues: .4925 .2309 .0571 .0063
 Total chi-square=56.6474 df=24 p=.0002

Correspondence Analysis of a Two-Way Table

Number of variables (columns of the table): 5
 Number of valid cases (rows of the table): 7

Eigenvalues: .4925 .2309 .0571 .0063
 Total chi-square=56.6474 df=24 p=.0002

STAT. Eigenvalues and Inertia for all Dimensions (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5

ANALYSIS Total Inertia=.75677 Chi'=56.647 df=24 p=.00019

| Number of Dims. | Singular Values | Eigen Values | Perc. of Inertia | Cumulative Percent | Chi Squares |
|-----------------|-----------------|--------------|------------------|--------------------|-------------|
| 1 | .701774* | .492487* | 62.59609* | 62.5961* | 35.45908* |
| 2 | .480525* | .230904* | 29.34835* | 91.9444* | 16.62509* |
| 3 | .238875 | .057061 | 7.25261 | 99.1971 | 4.10842 |
| 4 | .079482 | .006317 | .80294 | 100.0000 | .45485 |

STAT. Row Coordinates and Contributions to Inertia (16ca.sta)
 CORRSP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Row Relative Name Inertia | Row Number | Coordin. Dim.1 | Coordin. Dim.2 | Mass | Quality |
|---------------------------|------------|----------------|----------------|---------|---------|
| TRAD .403801 | 1 | -.10515 | .550709 | .206333 | .999792 |
| D&B .350302 | 2 | .98692 | -.513746 | .222222 | .998156 |
| MC .046635 | 3 | .10317 | .360272 | .097222 | .372128 |
| CM .058651 | 4 | -.19160 | .632405 | .097222 | .919966 |
| D&M .026100 | 5 | .07119 | .399017 | .097222 | .777795 |
| BOT .018315 | 6 | .28479 | .142025 | .138889 | .976160 |
| PART .096196 | 7 | -.19406 | .531846 | .138889 | .588192 |

STAT. Row Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Row Name | Inertia Dim.1 | Cosine ² Dim.1 | Inertia Dim.2 | Cosine ² Dim.2 |
|----------|---------------|---------------------------|---------------|---------------------------|
| TRAC | .515551 | .900913 | .273635 | .198878 |
| D&B | .439497 | .795345 | .254011 | .212811 |
| MC | .902101 | .928204 | .654551 | .343924 |
| CM | .907247 | .977348 | .189393 | .842618 |
| D&M | .991990 | .923995 | .067037 | .753801 |
| BOT | .022972 | .781737 | .912133 | .194423 |
| PART | .910621 | .869112 | .179149 | .519091 |

STAT. Column Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Column Relative Name | Column Number | Coordin. Dim.1 | Coordin. Dim.2 | Mass | Quality |
|----------------------|---------------|----------------|----------------|---------|---------|
| V_GOOD | 1 | .97993 | -.48158 | .236111 | .909362 |
| .361442 | | | | | |
| GOOD | 2 | .35332 | .26101 | .277778 | .596317 |
| .055178 | | | | | |
| AVERAGE | 3 | -.31102 | .30346 | .291667 | .927448 |
| .075475 | | | | | |
| POOR | 4 | -.46912 | .43379 | .111111 | .545675 |
| .195414 | | | | | |
| V_POOR | 5 | -1.57479 | -1.14606 | .083333 | .993258 |
| .402489 | | | | | |

STAT. Column Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Column Name | Inertia Dim.1 | Cosine ² Dim.1 | Inertia Dim.2 | Cosine ² Dim.2 |
|-------------|---------------|---------------------------|---------------|---------------------------|
| V_GOOD | .460375 | .797322 | .237150 | .192561 |
| GOOD | .913258 | .150405 | .081957 | .435912 |
| AVERAGE | .957290 | .475157 | .116322 | .452311 |
| POOR | .049440 | .293579 | .090548 | .252095 |
| V_POOR | .419634 | .652674 | .474023 | .345644 |

STAT. Observed minus Expected Frequencies (16ca.sta)

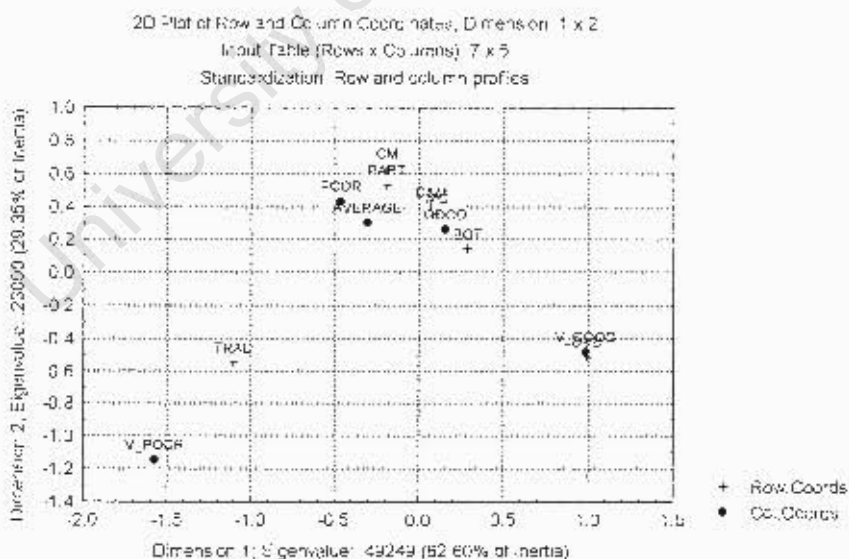
CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Total Inertia=.78677 Chi²=56.647 df=24 p=.00019

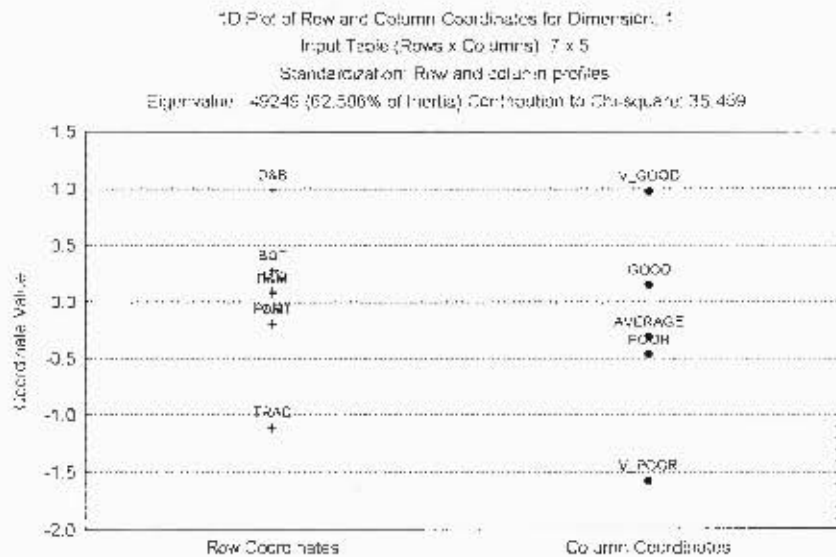
| | V_GOOD | GOOD | AVERAGE | FOOR | V_FOOR |
|------|----------|----------|----------|----------|----------|
| TRAD | -3.54167 | -2.16667 | .62500 | .33333 | 4.75000 |
| D&B | 7.22222 | -.44444 | -3.66667 | -1.77778 | -1.33333 |
| MC | -.65278 | 1.05556 | .95833 | -.77778 | -.58333 |
| CM | -1.65278 | 1.05556 | .95833 | .22222 | -.58333 |
| D&M | -.65278 | 1.05556 | -.04167 | .22222 | -.58333 |
| BOT | .63889 | .22222 | .08333 | -.11111 | -.83333 |
| PART | -1.36111 | -.77778 | 1.08333 | 1.88889 | -.83333 |

University of Cape Town

STAT. Contributions to Chi-Square (16ca.sta)
 CORRRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Total Inertia=.79677 Chi²=56.647 df=24 p=.00019

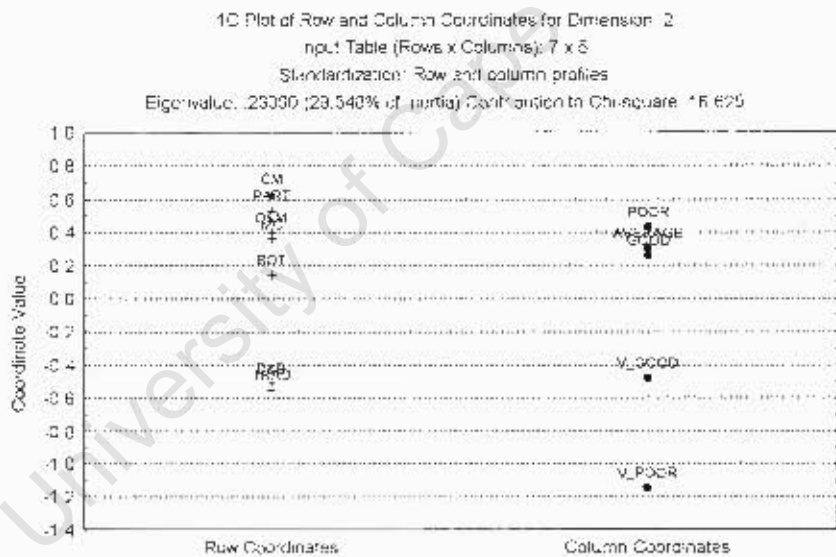
| | V_GOOD | GOOD | AVERAGE | POOR | V_POOR |
|----------|----------|----------|----------|----------|----------|
| Total | | | | | |
| TRAD | 3.54167 | 1.126667 | .099286 | .066667 | 19.05000 |
| 22.87429 | | | | | |
| O&B | 13.80719 | .044444 | 2.890952 | 1.777778 | 1.333333 |
| 19.84370 | | | | | |
| MC | .25792 | .573016 | .449830 | .777778 | .583333 |
| 2.64178 | | | | | |
| CM | 1.65278 | .573016 | .449830 | .063492 | .583333 |
| 3.32245 | | | | | |
| D&M | .25782 | .573016 | .000830 | .063492 | .583333 |
| 1.47851 | | | | | |
| BOT | .17288 | .017778 | .002381 | .011111 | .833333 |
| 1.03748 | | | | | |
| PART | .78464 | .217778 | .402381 | 3.211111 | .833333 |
| 5.44924 | | | | | |
| Total | 20.47479 | 3.125714 | 4.275510 | 5.971429 | 22.80000 |
| 56.64744 | | | | | |





STATISTICA: Correspondence Analysis
 13:44 PAGE 6

09-24-01



Question 23

data file: 16CA.STA : 7 cases with 5 variables :

VARIABLE SPECIFICATIONS:

| No | Name | Format | MD Code | Long Label |
|----|---------|--------|---------|------------|
| 1 | V_GOOD | 8,3 | -9999 | |
| 2 | GOOD | 8,3 | -9999 | |
| 3 | AVERAGE | 8,3 | -9999 | |
| 4 | POOR | 8,3 | -9999 | |
| 5 | V_POOR | 8,3 | -9999 | |

The input data file specifies a table of frequencies or other measures of correspondence

Correspondence Analysis of a Two-Way Table

Number of variables (columns of the table): 5
 Number of valid cases (rows of the table): 7

Eigenvalues: .2426 .1092 .0624 .0205
 Total chi-square=70.8581 df=24 p=0.000

STAT. Observed Table (Frequencies) (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Total Inertia=.43471 Chi²=70.858 df=24 p=.00000

| Total | V_GOOD | GOOD | AVERAGE | POOR | V_POOR |
|-------|--------|------|---------|------|--------|
| TRAD | 2 | 0 | 14 | 2 | 5 |
| 23 | | | | | |
| D&B | 7 | 7 | 7 | 2 | 0 |
| 23 | | | | | |
| MC | 3 | 7 | 13 | 0 | 0 |
| 23 | | | | | |
| CM | 3 | 7 | 7 | 7 | 0 |
| 24 | | | | | |
| D&M | 3 | 3 | 16 | 0 | 0 |
| 22 | | | | | |
| BOT | 0 | 6 | 12 | 6 | 0 |
| 24 | | | | | |
| PART | 3 | 3 | 12 | 6 | 0 |
| 24 | | | | | |

STAT. Observed Table (Frequencies) (l6ca.sta)
CORRESP. Input Table (Rows x Columns): 7 x 5
ANALYSIS Total Inertia=.4347; Chi²=70.358 df=24 p=.00000

| Total | V_GOOD | GOOD | AVERAGE | FCOR | V_FCCR |
|-------|--------|------|---------|------|--------|
| 163 | 21 | 33 | 81 | 23 | 5 |

Correspondence Analysis of a Two-Way Table

Number of variables (columns of the table): 5
Number of valid cases (rows of the table): 7

Eigenvalues: .2426 .1052 .0624 .0205
Total chi-square=70.3581 df=24 p=0.000

STAT. Eigenvalues and Inertia for all Dimensions (l6ca.sta)
CORRESP. Input Table (Rows x Columns): 7 x 5
ANALYSIS Total Inertia=.4347; Chi²=70.358 df=24 p=.00000

| Number of Dims. | Singular Values | Eigen-Values | Perc. of Inertia | Cumulative Percent | Chi Squares |
|-----------------|-----------------|--------------|------------------|--------------------|-------------|
| 1 | .492561* | .242616* | 55.3107* | 55.3107* | 39.5464* |
| 2 | .330395* | .109161* | 25.11100* | 80.9217* | 17.79317* |
| 3 | .249775 | .062389 | 14.35150 | 95.2732 | 10.16919 |
| 4 | .143343 | .020519 | 4.72676 | 100.0000 | 3.34929 |

STAT. Row Coordinates and Contributions to Inertia (l6ca.sta)
CORRESP. Input Table (Rows x Columns): 7 x 5
ANALYSIS Standardization: Row and column profiles

| Row Relative Name Inertia | Row Number | Coordi. Dim.1 | Coordi. Dim.2 | Mass | Quality |
|---------------------------|------------|---------------|---------------|---------|---------|
| TRAD | 1 | -1.16993 | .101022 | .141104 | .985993 |
| .453949 | | | | | |
| D&R | 2 | .33950 | -.303338 | .141104 | .505027 |
| .135195 | | | | | |
| MC | 3 | .14333 | -.393794 | .141104 | .775049 |
| .075456 | | | | | |
| CM | 4 | .37795 | .371327 | .147239 | .890142 |
| .106876 | | | | | |
| D&M | 5 | -.06235 | -.423912 | .134969 | .610817 |
| .093319 | | | | | |
| BOT | 6 | .20392 | .356276 | .147239 | .661531 |

.086280
 PART 7 .13179 .241639 .147239 .524356
 .048936

STAT. Row Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Row Name | Inertia Dim.1 | Cosine ² Dim.1 | Inertia Dim.2 | Cosine ² Dim.2 |
|----------|---------------|---------------------------|---------------|---------------------------|
| TRAD | .796044 | .978698 | .013192 | .007297 |
| D&B | .067035 | .276750 | .122894 | .228278 |
| MC | .012292 | .090915 | .205576 | .584133 |
| CM | .086691 | .452639 | .186182 | .437443 |
| S&M | .002163 | .012934 | .222188 | .597883 |
| BOT | .025235 | .163235 | .171211 | .498296 |
| PART | .010541 | .126219 | .078757 | .404137 |

STATISTICAL Correspondence Analysis
 13:46 PAGE 8

08-24-01

STAT. Column Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Column Relative Name Inertia | Column Number | Coordin. Dim.1 | Coordin. Dim.2 | Mass | Quality |
|------------------------------|---------------|----------------|----------------|---------|---------|
| V_GOOD .125888 | 1 | .17546 | -.372563 | .128834 | .399253 |
| GOOD .132839 | 2 | .45966 | -.069559 | .202484 | .757727 |
| AVERAGE .097311 | 3 | -.16131 | -.109682 | .496933 | .447004 |
| POOR .214444 | 4 | .26473 | .759770 | .141104 | .973827 |
| V_POOR .429518 | 5 | -2.37519 | .305762 | .030675 | .942182 |

STAT. Column Coordinates and Contributions to Inertia (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Standardization: Row and column profiles

| Column Name | Inertia Dim.1 | Cosine ² Dim.1 | Inertia Dim.2 | Cosine ² Dim.2 |
|-------------|---------------|---------------------------|---------------|---------------------------|
| V_GOOD | .016349 | .072481 | .163819 | .326773 |
| GOOD | .176315 | .740763 | .008974 | .016963 |
| AVERAGE | .053299 | .305684 | .054765 | .141320 |
| POOR | .040758 | .106076 | .746171 | .873752 |
| V_POOR | .713280 | .926823 | .026271 | .015359 |

STAT. Observed minus Expected Frequencies (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Total Inertia=.43471 Chi²=70.858 df=24 p=.00000

| | V_GOOD | GOOD | AVERAGE | POOR | V_POOR |
|------|----------|----------|----------|----------|----------|
| TRAD | -.96319 | -4.65644 | 2.57055 | -1.24540 | 4.294479 |
| D&B | 4.03681 | 2.34356 | -4.42945 | -1.24540 | -.705521 |
| MC | .03681 | 2.34356 | 1.57055 | -3.24540 | -.705521 |
| CM | -.09202 | 2.14110 | -4.92638 | 3.61350 | -.736196 |
| D&M | .16564 | -1.45399 | 5.06748 | -3.10429 | -.674847 |
| BCI | -3.09202 | 1.14110 | .07362 | 2.61350 | -.735196 |
| PAK | -.09202 | -1.85890 | .07362 | 2.61350 | -.735196 |

STAT. Contributions to Chi Square (16ca.sta)
 CORRESP. Input Table (Rows x Columns): 7 x 5
 ANALYSIS Total Inertia=.43471 Chi²=70.858 df=24 p=.00000

| | V_GOOD | GOOD | AVERAGE | POOR | V_POOR |
|----------|----------|----------|----------|----------|----------|
| Total | | | | | |
| TRAD | .313087 | 4.656442 | .578133 | .47791 | 26.14030 |
| 32.16588 | | | | | |
| D&B | 5.499422 | 1.179495 | 1.716619 | .47791 | .70552 |
| 9.57897 | | | | | |
| MC | .000457 | 1.179498 | .215814 | 3.24540 | .70552 |
| 5.34669 | | | | | |
| CM | .002739 | .943492 | 2.034919 | 3.85571 | .73620 |
| 7.57305 | | | | | |
| D&M | .009681 | .474649 | 2.348901 | 3.10429 | .67485 |
| 6.61237 | | | | | |
| BCI | 3.092025 | .267987 | .000454 | 2.01694 | .73620 |
| 6.11360 | | | | | |
| PAK | .002739 | .711168 | .000454 | 2.01694 | .73620 |
| 3.46750 | | | | | |
| Total | 8.920149 | 9.412734 | 6.895296 | 15.19510 | 30.43470 |
| 70.85896 | | | | | |

STATISTICA: Correspondence Analysis
 13:46 PAGE 9

08-24-01

