

https://dspace.org/

The use of artificial intelligence to improve the agility of tactical marketing plans in South Africa

Kalan, Mithun

2011-05-05
http://hdl.handle.net/10539/9655

Downloaded from a DSpace repository. https://dspace.org/

The use of artificial intelligence to improve the agility of tactical marketing plans in South Africa

Mithun Kalan

A research report submitted to the Faculty of Commerce, Law and Management, University of the Witwatersrand, in partial fulfilment of the requirements for the degree of Master of Business Administration

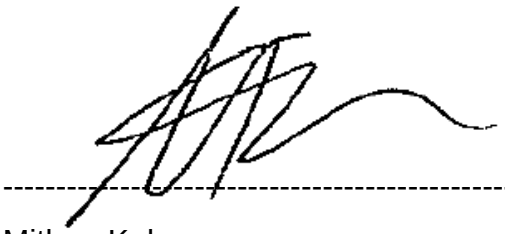
Johannesburg, 2010

ABSTRACT

The complexities of markets are increasing and the competition is becoming more intense between rivals within industries and sometimes across industries. Historically artificial intelligence technology has been implemented on strategic aspects of marketing with limited coverage of the tactical aspects. This study intends to explore the ability of artificial intelligence technology to improve the agility of tactical marketing plans in South Africa. In-depth semi-structured interviews were used to obtain the views of marketing professionals and technology professionals. The main findings were that there are many elements of the marketing mix that can be modelled by a computer. Once modelled, artificial intelligence technology can be used to understand the market dynamics and support decisions for the most appropriate course of action in the implementation of a marketing plan. The use of the technology will increase the speed of response and therefore improving the agility of tactical marketing plans.

DECLARATION

I, Mithun Kalan, declare that this research report is my own work except as indicated in the references and acknowledgements. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.



Mithun Kalan

Signed at Wits Business School on the 5th day of March 2010

ACKNOWLEDGEMENTS

I would like to thank the following people for their support:

- My supervisor Antony Soicher,
- Laurence Beder, who assisted me in identifying interviewees,
- My MBA syndicate who provided encouragement,
- The respondents who provided valuable insight into the marketing and technology fields,
- My family, friends, who supported me in this journey

TABLE OF CONTENTS

ABSTRACT II

DECLARATION III

ACKNOWLEDGEMENTS IV

LIST OF TABLES VIII

LIST OF FIGURES VIII

CHAPTER 1: INTRODUCTION 1

1.1 PURPOSE OF THE STUDY 1
1.2 CONTEXT OF THE STUDY 1
1.3 PROBLEM STATEMENT 3
1.3.1 MAIN PROBLEM 3
1.4 SIGNIFICANCE OF THE STUDY 3
1.5 DELIMITATIONS OF THE STUDY 4
1.6 DEFINITION OF TERMS 4
1.7 ASSUMPTIONS 4

CHAPTER 2: LITERATURE REVIEW 5

2.1. INTRODUCTION 5
2.2. BACKGROUND DISCUSSION 5
2.2.1. WHAT IS MARKETING 5
2.2.2. WHAT IS ARTIFICIAL INTELLIGENCE 6
2.2.3. A BRIEF HISTORY OF ARTIFICIAL INTELLIGENCE BY CLOCKSIN (2003) 7
2.3. IDENTIFICATION OF AREAS IN TACTICAL MARKETING PLANS WHERE ARTIFICIAL INTELLIGENCE CAN BE APPLIED TO IMPROVE ITS AGILITY 9
2.3.1. TACTICAL MARKETING AND AGILITY 9
2.3.1.1. WHAT IS TACTICAL MARKETING PLANNING 9
2.3.1.2. WHY TACTICAL MARKETING PLANNING REQUIRES AGILITY 17
2.3.2. ARTIFICIAL INTELLIGENCE AND AGILITY 20
2.3.2.1. ARTIFICIAL INTELLIGENCE AS AN ENABLER FOR AGILITY 20
2.3.3. RESEARCH QUESTION 29
2.4. CONCLUSION OF LITERATURE REVIEW 29
2.4.1. RESEARCH QUESTION 31
2.4.2. PROPOSITIONS 31

CHAPTER 3: RESEARCH METHODOLOGY 33

3.1 RESEARCH METHODOLOGY AND PARADIGM 33
3.2 RESEARCH DESIGN 34
3.3 POPULATION AND SAMPLE 36
3.3.1 POPULATION 36
3.3.2 SAMPLE AND SAMPLING METHOD 36
3.4 THE RESEARCH INSTRUMENT 38
3.5 PROCEDURE FOR DATA COLLECTION 38
3.6 DATA ANALYSIS AND INTERPRETATION 39
3.7 LIMITATIONS OF THE STUDY 39
3.8 VALIDITY AND RELIABILITY 39
3.8.1 EXTERNAL VALIDITY 40
3.8.2 INTERNAL VALIDITY 40
3.8.3 RELIABILITY 40

CHAPTER 4: PRESENTATION OF RESULTS 42

4.1 INTRODUCTION 42
4.2 DEMOGRAPHIC PROFILE OF RESPONDENTS 42
4.3 RESULTS PERTAINING TO PROPOSITION 1 43
4.4 RESULTS PERTAINING TO PROPOSITION 2 52
4.5 RESULTS PERTAINING TO PROPOSITION 3 66
4.8 SUMMARY OF THE RESULTS 74

CHAPTER 5: DISCUSSION OF THE RESULTS 75

5.1 INTRODUCTION 75
5.2 DEMOGRAPHIC PROFILE OF RESPONDENTS 75
5.3 DISCUSSION PERTAINING TO PROPOSITION 1 76
5.4 DISCUSSION PERTAINING TO PROPOSITION 2 84
5.5 DISCUSSION PERTAINING TO PROPOSITION 3 92
5.6 CONCLUSION 95

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS 97

6.1 INTRODUCTION 97
6.2 CONCLUSIONS OF THE STUDY 97
6.3 RECOMMENDATIONS 99
6.4 SUGGESTIONS FOR FURTHER RESEARCH 100

REFERENCES 101

APPENDIX A 108

APPENDIX B 109

LIST OF TABLES

Table 1: Profile of respondents 37

Table 2: Results pertaining to question 1 43

Table 3: Results pertaining to question 2 52

Table 4: Results pertaining to question 3 60

Table 5: Results pertaining to question 4 66

Table 6: Results pertaining to question 5 72

LIST OF FIGURES

Figure 1: Marketing orientation (Wong and Saunders 1993) 6

Figure 2: The role of management in tactics and strategy (McDonald 2005) ... 11

Figure 3: The role of tactics in marketing (Piercy and Giles 1990) 13

Figure 4: Porter's five forces (McDonald 2005) 81

Figure 5: Value chain (McDonald 2005) 84

Figure 6: Order lead time (Respondent) 86

CHAPTER 1: INTRODUCTION

“In the varied topography of professional practice, there is a high, hard ground which overlooks a swamp. On the high ground, manageable problems lend themselves to solution through the use of research-based theory and technique. In the swampy lowlands, problems are messy and confused and incapable of technical solution. The irony of the situation is that the problems of the high ground tend to be relatively unimportant to society at large, however great their technical interest may be, while in the swamp lie the problems of greatest human concern” - Schon (1987).

1.1 Purpose of the study

The purpose of this research is to identify areas of a tactical marketing plan that may benefit from the usage of artificial intelligence (AI) to make those plans more agile in response to rapidly changing market conditions. Existing implementations of AI are examined in relation to existing problems of tactical marketing plans.

1.2 Context of the study

“Marketing Planning remains one of the last bastions of ignorance in the field of marketing. The benefits of marketing planning are well documented and agreed yet, so complicated is the process of marketing planning, and so confusing are the interrelationships between the tools and techniques of marketing planning, that very few companies enjoy these benefits” - McDonald and Wilson (1990).

In general, most companies are facing this difficulty of planning (Duan and Burrell 1995) and success will only come from sound planning (Duan and Burrell 1995).

There are two aspects of marketing planning: strategic and tactical (Kotler and Keller 2006). The strategic plan outlines the abstract aspects of the value

proposition and the targeted segments. The tactical plan details the practical aspects of how the product will be marketed.

Recent successes in tactical planning with AI come from:

- Landa-Silva, Marikar and Le (2009) where stock items in retail stores can be appropriately positioned using AI technology. This is an example of promotional tactical planning.

- Lindamood, Heatherly, Kantarcioglu and Thuraisingham (2009) where an experimental AI model was built to crawl the Facebook network in a region in North America and gather publicly accessible information about users to infer private information. The AI model made use of a 'learning' algorithm. The implications of this technology can be used to adjust product specifications to almost exactly what customers want and promote it in a way that will maximise the likelihood of purchase.

- Guinn and Hubal (2004) where a computer was used to interact with humans at various information kiosks so that humans could have their queries about the venues answered. This computer made use of natural language processing AI technology.

As computer hardware prices fall and software sophistication increases (Widman and Loparo 1990) artificial intelligence algorithms permit systems to reason about complex models (Widman and Loparo 1990). We are now reaching a stage where computers are able to process vast amounts of calculations at an affordable price (Clocksin 2003).

The context of the study is that the current environment for marketing planning is changing rapidly and the problems are becoming more complex (Simkin 2002). AI technology has also advanced a great deal in recent years (Ramaswami 2009).

1.3 Problem statement

1.3.1 *Main problem*

The main problem is to identify areas in tactical marketing plans where artificial intelligence can be applied to improve its agility.

1.4 Significance of the study

The study may be of value to technology professionals in the field of artificial intelligence because it will enable them to identify areas in the field of marketing that require greater agility (Poulsen 1993; McDonald 2005; Kotler and Keller 2006). This agility can be delivered by means of artificial intelligence technology (Fordyce, Norden and Sullivan 1986; Pawson 1995; Braunscheidel and Suresh 2009).

The existing knowledge base contains literature that describes the benefit of AI technology in the field of strategic marketing planning (McDonald and Wilson 1990) but does not delve into the area of tactical planning. The existing literature also demonstrates the ability of AI technology to deliver agile processes in tactical fields in manufacturing (Dalziel et al. 1996; Clocksin 2003; de Silva 2003) and not in the tactics of marketing planning. The gap in the literature is that there is no understanding of what areas of tactical marketing plans require greater agility delivered through AI technology.

Additionally, no literature has been found that states that AI technology is better suited to pricing and product composition and not suited to promotional activity. In other words, no literature has been found that identifies which of these tactical aspects require greater agility that can be met with artificial intelligence technology.

1.5 Delimitations of the study

The study is limited to the concept of AI and does not detail the specifics of AI algorithms.

This study does not attempt to match a particular AI algorithm to a specific marketing problem.

1.6 Definition of terms

The marketing concept is a philosophy recognising that the best way to achieve organisational goals is to satisfy wants and needs of consumers more efficiently and effectively than competitors (Drucker 1973; McDonald 2005; Kotler and Keller 2006).

Artificial intelligence (AI) is the science of designing machines that can simulate human intelligence (Ramaswami 2009).

Agility is the ability to efficiently change operating states in response to uncertain and changing market conditions (Poulsen 1993).

The marketing plan is the central instrument for directing and coordinating the marketing effort. The marketing plan operates on two levels: strategic and tactical (McDonald 2005; Kotler and Keller 2006).

The tactical marketing plan specify the marketing tactics, including the product features, promotion, merchandising, pricing, sales channels and service (McDonald 2005; Kotler and Keller 2006)

1.7 Assumptions

The research assumes that the marketing and technology respondents have enough knowledge in their field of expertise to clearly articulate their experience and knowledge in tactical marketing and artificial intelligence, respectively.

CHAPTER 2: LITERATURE REVIEW

2.1. Introduction

The following literature review describes the role that tactical marketing planning fulfils in marketing and in a business (Kotler and Keller 2006). The literature review then identifies the need for greater agility (McDonald and Wilson 1990; Poulsen 1993; Kotler and Keller 2006) in tactical planning and how artificial intelligence technologies can deliver the agility (Dalziel et al. 1996; Clocksin 2003). This chapter outlines the literature used to derive the propositions against which the research will be conducted.

2.2. Background discussion

2.2.1. What is marketing

In 1776, when Adam Smith said that consumption is the sole end and purpose of production, he was describing what in recent years has become known as the marketing concept (McDonald 2005).

Drucker (1973) states that the aim of marketing is to know and understand the customer so well that the product or service fits him and sells itself.

Marketing deals with identifying and meeting human and social needs (Kotler and Keller 2006). One of the definitions of marketing is “meeting needs profitability”. Simkin (2002) and Brown (2005) from the American Marketing Association has a formal definition: Marketing: it is an organisational function and a set of processes for creating, communicating and delivering value to customers and for managing customer relationships in ways that will benefit the organisation and its stakeholders. The central idea of marketing (McDonald 2005) is of matching between a company’s capabilities and the wants of customers in order to achieve the objectives of both parties.

Drucker (1973), Wong and Saunders (1993) extend this by stating that the principal role of marketing is to spell out the several value propositions that are demanded by different customer groups so that everyone in the organisation knows what their contribution is in creating this value.

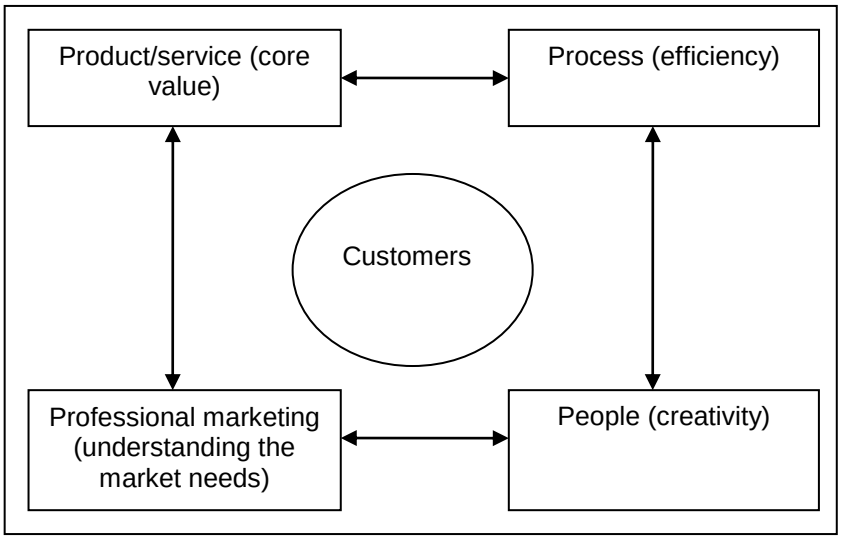


Figure 1: Marketing orientation (Wong and Saunders 1993)

2.2.2. What is artificial intelligence

Artificial intelligence is the science of designing machines that can simulate human intelligence (Ramaswami 2009).

Widman and Loparo (1990) have a more extensive definition: “AI is a set of programs that run on digital computers, as do ordinary programs. They can be applied to a wide range of tasks for which conventional programs are ill-suited: controlling robots, understanding natural language, processing knowledge-based images, playing strategic games, proving theorems automatically, and reproducing the expertise of human experts. Their distinctive character lies in their overall architectures and the ways in which they represent and reason about knowledge.”

Artificial intelligence (AI) is a branch of computer science with the objective of equipping machines with reasoning and perceptual abilities. This overall

objective is pursued through two routes, which one might crudely divide into applied and theoretical (Clocksin 2003). Applied: to engineer systems capable of performing tasks which, if performed by a human, would be said to require intelligence and theoretical: to pursue a scientific understanding of the computational principles underlying intelligent behaviour, as manifested in humans and other animals. Both routes need to propose and understand operational principles of thought and action in unambiguous and computational terms (Clocksin 2003).

Few definitions of intelligence adequately capture the richness of human experience. AI research has tended to use fluid boundaries of definition. For example, one traditional focus has been on problem solving and with the sensory and symbol processing capabilities that support problem solving (Dalziel et al. 1996; Clocksin 2003). The concern is not restricted to humans; AI researchers have long been intrigued by the behaviour of animals, which seems to show complex capabilities for sensory-motor coordination and action, even though reptiles and insects are not considered intelligent in the way in which humans are (Clocksin 2003).

2.2.3. A brief history of artificial intelligence by Clocksin (2003)

> AI received its name at a workshop at Dartmouth College in New Hampshire in 1956. There, the founders of the field set the agenda for AI research for the next 40 years. From this workshop, goal-directed problem solving implemented by search algorithms and supported by methods of automatic logical inference became the dominant conceptual framework, and continues to be so for most of the AI research community. From an engineering perspective, AI research has been applied in useful ways. Computer programs using methods derived from AI research play chess at the expert level. Programs can assess insurance and credit risks, schedule gates at airports, and search the contents of the Internet.

At the deepest level, AI programs are procedural (Widman and Loparo 1990) because they are ultimately translated into and executed as binary code. From this perspective the declarative nature of the artificial intelligence program lies in the level at which the user chooses to view the implementation of the program (Lucas Jr and Nielsen 1980). Artificial intelligence is considered to be those programs that are implemented using declarative problem solving techniques (Lucas Jr and Nielsen 1980).

In 1950 Turing predicted that, within 50 years, computers would be able to take part convincingly in human conversation (Turing 1950). Minsky (1963) predicted that within a generation, the problem of creating "artificial intelligence" will be substantially solved. Several years later, the Stanford Research Institute published the results of a study on the future of AI technology (Fischler and Firschein 1973) and they put a large and carefully designed battery of questions concerning future trends to an international panel of experts. The following is a selection of possible reasons why progress in AI has been much slower than expected:

Resource limitations

The theories are right, but the computers do not have enough processing power or memory capacity to do the job properly (Turing 1950; Fischler and Firschein 1973). Chess playing is one example where it is important to have enough processing power. Current programs employ brute-force search of possible board positions to arrive at a good move, and more computing power and memory space means that more variations can be searched more thoroughly. However, it is not known precisely how people play chess, but it is clear that people do not play chess by brute-force search. It is not obvious that resource limitations are relevant (Fischler and Firschein 1973) if scientists do not have a theory that specifies the resource requirements.

Complexity limitations

Perhaps intelligence is a property that emerges when the underlying process becomes sufficiently complex (Widman and Loparo 1990). The complexity might be so great that the process is not understandable.

The impossibility of AI

Dreyfus (1979), Penrose (1990) and Searle (1990) argue that AI is impossible. Against this, one has to face the fact that intelligent beings exist, and intelligent behaviour can be assumed to be based on physically realisable principles of operation that it is the task of science to understand and articulate in computational form (Dreyfus 1979; Penrose 1990; Searle 1990). Understanding these principles which humans do not yet do must come prior to attempts to implement them as computer programs.

Conceptual limitations

AI is not impossible (Turing 1950; Schon 1987; Searle 1990), but people are not working within a suitable conceptual framework or not paying sufficient attention to investigations made in other fields where other potentially significant conceptual frameworks can be obtained.

2.3. Identification of areas in tactical marketing plans where artificial intelligence can be applied to improve its agility

2.3.1. Tactical marketing and agility

2.3.1.1. What is tactical marketing planning

Management theory often reads like a recipe of new tricks that provide an opportunity to gain a competitive advantage or to close the gap between one company and their competitive leaders (Wong and Saunders 1993). The marketing story is told as a progression from production orientation, to sales

orientation, to product orientation and finally to marketing orientation (Levitt 2001). In 1960, Levitt introduced the notion that corporate survival depends upon doing everything necessary to satisfy the needs and wants of the customer. However, in 1985, Kotler states that companies have been talking about marketing orientation but very few of them actually do it. He adds that many chief executive officers are still confused about the difference between marketing and sales. They do not seem to realise that most of the impact of marketing is felt before the product is produced and not after (Kotler and Keller 2006). Companies often go through an extensive programme to align themselves with a marketing orientation so that they can develop a marketing plan to document their thoughts and actions going forward. McDonald (1991) refers to marketing planning as one of the biggest problems facing management.

Marketing planning is a planned application of marketing resources to achieve the marketing objectives (McDonald 2005; Kotler and Keller 2006). It is a logical sequence of activities that lead to setting marketing objectives and the plans of achieving them (Kotler and Keller 2006). A sensible way to manage the sales and marketing function is to find a systematic way of identifying a range of options (McDonald 2005), to choose one or more of them, then to schedule and cost out what has to be done to achieve the objectives.

Kotler (2006) and McDonald (2005) state that there are two aspects of marketing planning. The strategic plan is usually a plan for a medium to long term and this section spells out the target market and the value proposition. The tactical section of the marketing plan is an aspect that is used for a very short term, usually one year. It details the actions that should be taken and the people responsible for those actions.

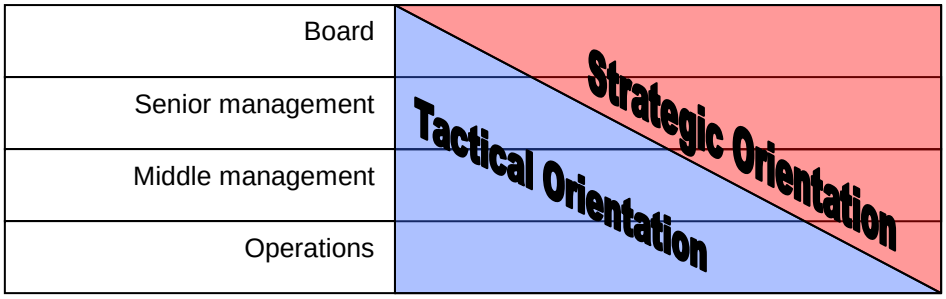


Figure 2: The role of management in tactics and strategy (McDonald 2005)

The tactical marketing plan specifies the marketing tactics, including the product features, promotion, merchandising, pricing, sales channels and service (Kotler and Keller 2006), this is in essence known as the marketing mix (Simkin 2002; McDonald 2005)

A common mistake is when managers prefer to sell the products that they like to customers that are least likely to resist McDonald (1991). This short term tactical plan is then extrapolated and turned into a marketing plan.

McDonald (2005) then states that marketing planning is essential when we consider the increasingly hostile and complex environment in which companies operate. Hundreds of external and internal factors (Rangaswamy, Eliashberg, Burke and Wind 1989; McDonald 2005) interact in a baffling and complex way to affect our ability to achieve profitable sales. McDonalds (2005) states that the environment is complex and marketing plans require hundreds of internal and external interacting variables, and Kotler's (2006) statement that tactical marketing plans are the marketing mix, it can be implied that the marketing mix is composed of these many interacting variables.

Kotler (2006) states that the marketing mix can be modelled. This is when a company gathers and analyses data from various sources such as scanner data, shipping data, pricing, media and promotional spending to understand the relationships between activities and sales. The results of the modelling will be to allocate or reallocate expenditures between various activities (Kotler and Keller

2006). This analysis also explores what parts of the budget is optimal and what parts are wasted. Kotler and Keller (2006) then criticises modelling by saying that it helps isolate events but it is not very effective at assessing how different elements work in combination.

McDonald (2005) disagrees and states that there are various software packages that can assist in determining the effects of several variables working in combination. McDonald (2005) mentions a statistical package SPSS and business modelling package such as 4thought from Cognos.

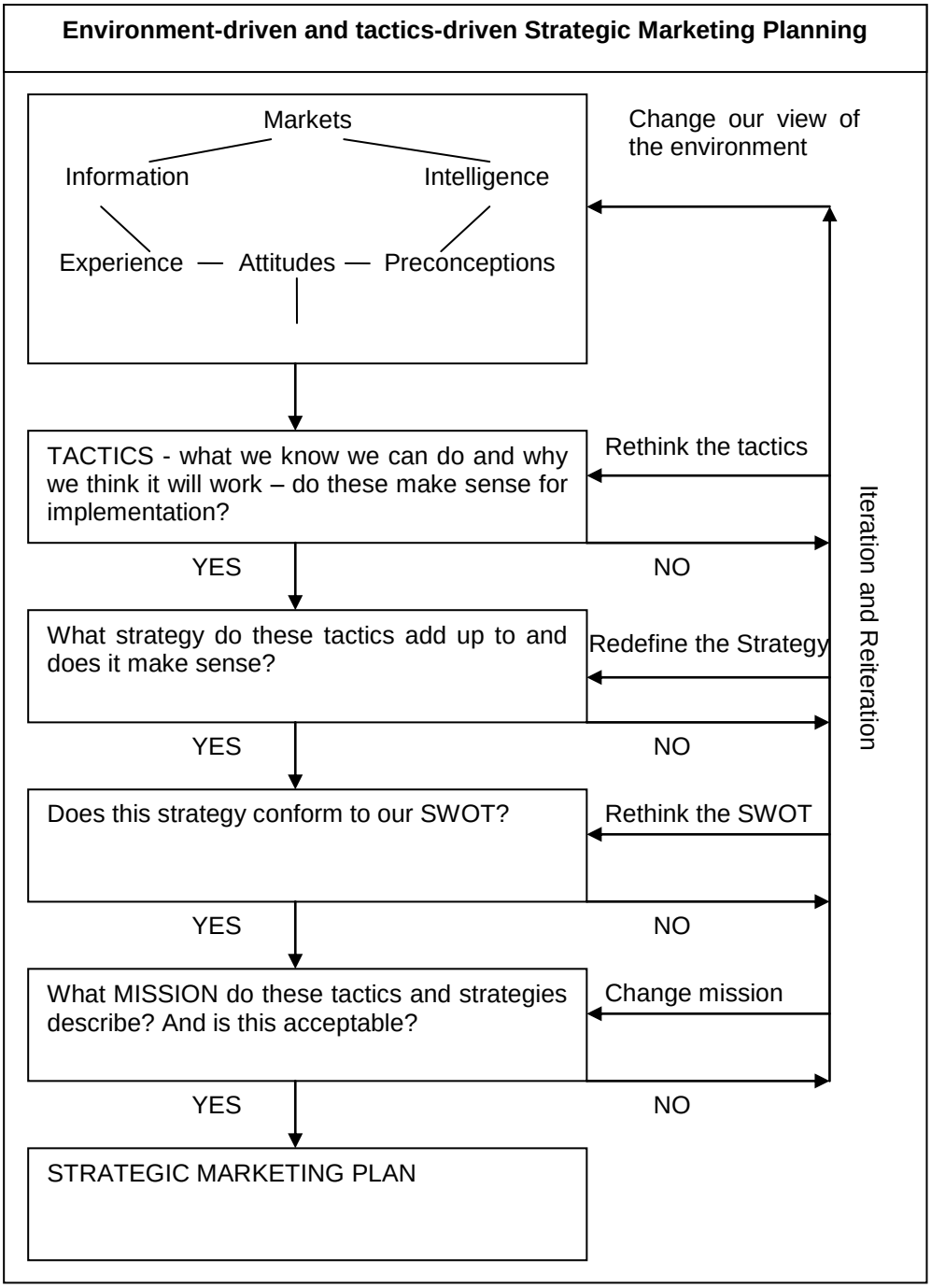


Figure 3: The role of tactics in marketing (Piercy and Giles 1990)

The figure above shows the relationship that tactics plays in the marketing plan (Piercy and Giles 1990). They state that the planning process is an iterative one. This is because a simple mathematical model may not fit a complex scenario that contains recursive relationships (Rangaswamy et al. 1989; McDonald and Wilson 1990; Piercy and Giles 1990). These are when the input to a task depends on the previous output of the same task.

It is necessary to view Figure 3 within an envelope of context effects. **Environment**: No firm is an island: Performance in general and marketing productivity in particular depend on the environmental and competitive context. This is especially true when economic and geopolitical turbulence create unusual amounts of uncertainty. The market orientation literature addresses the firm's willingness to pay attention to such market characteristics (BJ Jaworski and Kohli 1993; Day 1994; Slater and Narver 2000). The firm can choose to be proactive (market driving) or reactive (market driven) (B Jaworski, Kohli and Sahay 2000).

Competition: The competitive environment has a profound influence on the nature of marketing productivity. Marketing expenditure decisions, such as those about advertising, are often made with competitors in mind. Studies on advertising spending have identified two separate effects. On the one hand, competition can drive marketing spending higher, thus producing an escalation effect (Metwally 1978). Driven by a belief that gaining market share increases profit and enhances firm value (Buzzell and Gale 1987), firms increase marketing expenditures to gain market share, even as rivals do the same. Little evidence suggests that the expenditures have the anticipated results. For example, examining the brewing industry, Montgomery and Wernerfelt (1991) show that escalating advertising spending destroys value rather than creating it. On the other hand, research has demonstrated that (even taking competitors reactions into account) high-market share brands indeed have an incentive to outspend rivals (Carpenter, Cooper, Hanssens and Midgley 1988). These findings have fuelled the escalation in advertising spending. However, the greater wealth associated with the larger share has proved quite elusive.

Current trends show that marketing practitioners and scholars are under increased pressure to be more accountable and to show how marketing expenditure adds to shareholder value (Rust, Ambler, Carpenter, Kumar and Srivastava 2004; Doyle and Stern 2006). The perceived lack of accountability has undermined marketing's credibility, threatened marketing's standing in the firm, and even threatened marketing's existence as a distinct capability within the firm. This increases the pressure for marketers to be more productive in their strategy formulation and tactical execution (Doyle and Stern 2006).

New technologies have opened up new channels for customer–vendor interactions (e.g., cable, Internet), which increases the need to manage integrated marketing communications. These developments have led to a critical and immediate need to identify the levels of marketing expenditures for each channel (given expected revenues from customers) that provide firms with maximum opportunities for customer acquisition, retention, and cross-selling, as well as an opportunity for disintermediation (B Jaworski et al. 2000). Differences in efficiency across various channels might be captured by the sales response functions in order to identify optimal resource allocations within and across channels (Doyle and Stern 2006). Similarly, firms might rely on long-term customer profitability models to guide direct marketing initiatives. These models should enable firms to improve marketing efficiency. Research that assesses the influence of marketing and communications tactics on multiple measures of customer, market, and financial impact would also be useful (Rust et al. 2004).

Constantinides (2006) argues that despite the background and status of the 'mix' as a major theoretical and practical parameter of contemporary marketing, several academics have at times expressed doubts and objections as to the value and the future of the mix, proposing alternatives that range from minor modifications to total rejection. It is often evident in both the academic literature and marketing textbooks that the mix is deemed by many researchers and writers as inadequate to address specific marketing situations like the marketing of services, the management of relationships or the marketing of industrial products.

The two main limitations of the marketing mix as management tool (Constantinides 2006), common in all examined domains, namely the model's internal orientation and lack of personalisation. the very nature of the four ‘P’s as manageable i.e. controllable factors combined with the explicit lack of market input in the model (Kotler 2003) is in sharp contrast with the Marketing Concept and Market Orientation principles implying that marketing activities should be based on identification of customer needs and wants, typical external and therefore uncontrollable factors (Dixon and Blois 1983; Gruenroos 1994). The lack of personalisation i.e. the mass-market orientation of the ‘mix’, can likewise be traced in the origin of the framework. Significant shifts of consumer behaviour (individualisation, diminishing brand preference, value orientation, increasing sophistication etc.) have undermined the effectiveness of the impersonal one-way communication and the mass marketing approaches (Dixon and Blois 1983). The constant stream of new technologies available to businesses and customers not only reduces transaction and switching costs but also offers to customers more choices, global access of products or services and new possibilities in addressing individual and very specific needs. In such an environment the service and the personalised client approach have become imperatives; one should expect that marketing in the twenty-first century will become not only more sophisticated but also much more interactive and individual (Dixon and Blois 1983; Gruenroos 1994; Constantinides 2006; Kotler and Keller 2006).

If marketing is to exist as a significant value-adding corporate activity in the future, marketers must focus their attention on getting better insight on the dynamics and the constantly changing rules of the marketing environment of the 21st century (Porter 1998). Constantinides (2006) concludes with an argument that instead of managing the 4Ps-defined processes, managers should focus on the factors underlining customer value as well as building market oriented, flexible and inventive organisations, able to constantly innovate and adapt to fast-changing market conditions.

2.3.1.2. Why tactical marketing planning requires agility

McDonald (2005) stated that planning is essential when we consider the increasingly hostile and complex environment where hundreds of external and internal factors interact in a baffling and complex way to affect our ability to achieve profitable sales. Building on this statement, the marketing mix can be modelled (Kotler and Keller 2006) using a software package (McDonald 2005) However, the fact that the environment is complex and hostile implies that the environment changes frequently (Piercy and Giles 1990). Every time some of the factors that determined the previous marketing mix changes, the new marketing mix may be different to the previous mix (Piercy and Giles 1990). These statements imply that the tactical marketing plan requires an element of agility to be successful (Simkin 2002).

An example by Poulsen (1993) of the promotional element in an agile tactical marketing plan:

> A newly developed and implemented system for segmenting respondents 'on the fly' during a computer assisted telephone interview, while at the same time minimising the number of questions to be asked of the individual respondents. This is accomplished by using a model based segmentation scheme combined with ideas taken from artificial intelligence, especially expert systems based on probabilistic nets. In the paper the underlying the segmentation model is related to artificial intelligence and various ways knowledge is represented. The system offers several advantages. It makes segmentation based on a large number of variables, e.g. life style segmentation, operational in relation to follow-up surveys. Then, it reduces the costs of the interview in terms of money and respondent fatigue. Finally, it makes the segment variable accessible to the questionnaire designer for purposes of branching, skipping, and other conditional instructions.

This demonstrates that the agility in the promotion where the type of promotion is determined based on the segment that the respondent falls into and that is

determined by a system that is able to adapt to new information arising during a telephonic interview.

Piercy and Giles (1990) have identified that complex psychological problems arise when planning in an ever changing environment. **Fear of uncertainty**: anxiety created by the uncertainty inherent in planning for the future, symptomised by avoiding or delaying planning, pretence that there is no uncertainty, producing slogans instead of plans, or producing minimal goals which are known to be achievable. **Fear of failure**: the readiness of managers to want to disassociate themselves from error, and thus from planning which obliges the planner to risk errors. **Indecisiveness conflict**: anxiety associated with the implications of future strategies for the individual's role, in the sense that the rethinking of goals undermines the present.

Building on the example of adaptive interviewing it is suggested that improvisation may be not only what organisations actually practice but also what they should practice to flourish (Moorman and Anne 1998). Moorman and Anne (1998) have studied the effects of organisational success and their level of improvisation on product development. The results show that "organisational memory level decreases when environmental turbulence level increases and the incidence of improvisation increases. The improvisation of product development can be understood as the 'product' aspect of the marketing mix or tactical marketing plan."

van Bruggen and Wierenga (2000) argue that the marketing body of knowledge of could have grown and will further grow with the use of increasingly advanced marketing models. The results of research in marketing science, i.e., insights in marketing processes, can be used to support marketing decision making in companies. Models are not only useful for the development of marketing theory and thus indirectly for the support of marketers, predictive and normative marketing models, but also aim at directly supporting their decision-making processes. In the article of Leeflang and Wittink (2000), the authors pose that many firm's managers now routinely use model-based results for marketing decisions and they expect this to further increase. A continuing improvement of

the quality of models will be the major driver behind this (van Bruggen and Wierenga 2000). Increases in data availability and the sophistication of model building methods will further fuel the model quality leap. Ultimately, decision automation could become feasible in various marketing decision situations (van Bruggen and Wierenga 2000).

Leeflang and Wittink (2000) are positive about the actual use and success of models for the support of marketing decision making. However, in many situations marketing models have not been so successful due to various issues including technical validity, user approval and organisational success measures.

Different levels of model success exist (Wierenga, Van Bruggen and Staelin 1999). The first level of success is technical validity. This is the extent to which the system is a valid representation of the marketing process and makes statistically accurate predictions. Model builders tend to be especially interested in this dimension of model success. However, technical validity is a necessary but not sufficient condition for managerial model use and success. A second set of model-success variables refers to the subjective evaluation of success by their users. User impact variables such as user satisfaction and perceived usefulness are examples of these variables. Objective success variables are organisational impact measures such as profit, sales, and market share. These are the type of measures based on which, ultimately, the success of models will be judged. It is neither easy nor always possible to estimate the effects of marketing models on these criteria and sometimes more simple, individual, performance measures are used instead. Examples are time saved and increased personal productivity. The impact of a model on an individual user does not necessarily coincide with its impact on an organisation (Leeflang and Wittink 2000; van Bruggen and Wierenga 2000).

The argument in favour of decision automation builds on the notion of human's cognitive limitations in information acquisition and processing (Simon 1957; Hogarth and Makridakis 1981). Human decision-making processes may become biased, especially in complex environments. Information overload or increased time pressure can, for example, cause this complexity. These two

conditions are not unusual in many markets of today. Research (Blattberg and Hoch 1990; Hoch and Schkade 1996; Van Bruggen, Smidts and Wierenga 1998) shows that by providing decision makers with models one can reduce these biases and thereby improve decision performance. However, this finding should not lead to the thesis that models are even better than managers and that it would thus be worthwhile to replace managers by models (van Bruggen and Wierenga 2000).

Finally, decision automation increases the risk of too much convergent and too little divergent thinking. This will reduce the opportunities for really creative out-of-the-box solutions to problems. Bucklin, Lehmann and Little (1998) recommend decisions on existing products in stable markets to be suitable for automation. This assumes that the marketer should leave things as they are and approach problems as they are presented. Opposite to this a marketer could probably become much more successful by not taking a decision situation for granted and automate responses but by exploring and transforming the conceptual space and expanding the number of possible solutions through divergent thinking. By doing so and restructuring the whole decision situation to create a strong competitive position (Schoemaker and Russo 1989).

2.3.2. Artificial intelligence and agility

2.3.2.1. Artificial intelligence as an enabler for agility

Agility is defined as ‘‘the ability to efficiently change operating states in response to uncertain and changing market conditions” (Pawson 1995; Braunscheidel and Suresh 2009).

Jain, Benyoucef and Deshmukh (2008) adds to the definition of agility from the context of a supply chain that it is the ability of a supply chain to rapidly respond to changes in market and customer demands. This is regarded as the bearer of competitive advantage in today’s business world (Gunasekaran 1999; Christopher and Towill 2001; Yusuf, Gunasekaran, Adeleye and

Sivayoganathan 2004). Based on a survey of past decade management literature, van Hoek (2005) identified the two most significant lessons for achieving competitive advantage in the modern business environment. The first lesson is that companies have to be aligned with suppliers, the suppliers' of the suppliers, customers and the customers' of the customers, even with the competitors, so as to streamline operations (Simchi, Kaminsky and Simchi 2000). As a result, individual companies no longer compete solely as autonomous entities; rather, the competition is between rival supply chains, or more like closely coordinated, cooperative business networks (Christopher 1998; Lambert, Cooper and Pagh 1998). The second lesson is that within the supply chain, companies should work together to achieve a level of agility beyond the reach of individual companies. All companies, suppliers, manufacturers, distributors, and even customers, may have to be involved in the process of achieving an agile supply chain (Christopher 2000; Christopher and Towill 2001).

An agile supply chain is seen as a dominant competitive advantage in today's business (Jain et al. 2008); however, the ability to build an agile supply chain has developed more slowly than anticipated (Lin, Chiu and Chu 2006). The need for agility for competitiveness has traditionally been associated with the supply chains that provide and manufacture innovative products, such as high-technology industry products characterized by shortened life-cycles, a high degree of market volatility, uncertainty in demand, and unreliability in supply (Lin et al. 2006; Jain et al. 2008). Similarly, traditional, more slow-moving industries face such challenges in terms of requirements for speed, flexibility, increased product diversity and customization. Consequently, the need for agility is becoming more prevalent. These demands come, typically, from further down the supply chain in the finishing sector, or from end customers (Gunasekaran and Ngai 2004). Some traditional companies have already elements of agility because the realities of a competitive environment dictate these changes (e.g. in sectors such as automobiles, food, textiles, chemicals, precision engineering and general engineering) (Christian et al., 2001). According to Christian et al. (2001), this is, however, usually outside any

strategic vision and is approached in an ad-hoc fashion. The lack of a systematic approach to agility does not allow companies to develop the necessary proficiency in change, a prerequisite for agility (Lin et al. 2006).

According to Kidd and Karwowski (1994), supply chain management (SCM) is a fairly well-defined topic, but agility is not so well defined. Agility can be something that companies achieve without realizing it, or it can relate to issues that are difficult to quantify. The nature of the competencies implied by agility is such that they would be better considered as intangibles, similar to intellectual property, company specific knowledge, skills, expertise, etc. In summary, SCM and agility combined are significant sources of competitiveness in the business world.

There is a growing body of literature on different aspects of agility, including a qualitative description of agile supply chain (Goldman, Nagel and Preiss 1995), operation of virtual enterprise using Fuzzy logic (Goldman et al. 1995), design and implementation of information system for agile manufacturing (Song and Nagi 1997), design for agile assembly (He and Kusiak 1997) and use of business process redesign methodology (Burgess 1994). Collectively, these contributors and many others (Booth 1995; Kumar and Motwani 1995), provide insights to what constitute attributes of an agile supply chain. However, there is no methodology and tools for introducing and implementing such a complex and dynamic interactive system as agile supply chains (Lin et al. 2006). Fuzzy logic provides a useful tool to deal with problems in which the attributes and phenomena are imprecise and vague (Zadeh 1965). Furthermore, fuzzy logic has found large application in management decisions (Al-Najjar and Alsyouf 2003; Lin and Chen 2004).

Agile supply chain can be considered to be structured under the goals of satisfying customers and employees within, which every organization can design its own business strategies, organization, processes and information systems. Agile supply chain concerns change, uncertainty, and unpredictability within its business environment and makes appropriate responses to changes. Therefore, an agile supply chain requires various distinguishing capabilities, or

‘‘fitness’’. These capabilities include four main elements (Sharp, Irani and Desai 1999; Christopher 2000):

Responsiveness, which is the ability to identify changes and respond to them quickly, reactively or proactively, and also to recover from them;

Competency, which is the ability to efficiently and effectively realize enterprise objectives;

Flexibility / adaptability, which is the ability to implement different processes and apply different facilities to achieve the same goals; and

Quickness / speed, which is the ability to complete an activity as quickly as possible.

As computer hardware prices fall and software sophistication increases (Widman and Loparo 1990) artificial intelligence algorithms permit systems to reason about complex models that change over time (Widman and Loparo 1990). Fordyce, Norden and Sullivan (1986) describes how AI is able to handle a moving target. Artificial intelligence programming methods permit more realistic and robust simulation models and help to develop, run, and interpret simulation experiments (Fordyce et al. 1986; Widman and Loparo 1990).

From a perspective of agriculture and near real-time risk mitigation, AI is being used as an early warning system for extreme temperatures. Crops and livestock in most of the southeastern United States are susceptible to potential losses due to extreme cold and heat (Smith 2009). However, given suitable warning, agricultural and horticultural producers can mitigate the damage of extreme temperature events. To provide such a warning, air temperature prediction models are needed at horizons ranging from 1 to 12 hours. The goal was to explore the application of artificial neural networks (ANNs) for the prediction of air temperature during the entire year based on near real-time data. Ward-style ANNs were developed using detailed weather data collected by the Georgia Automated Environmental Monitoring Network (AEMN). The ANNs were able to provide predictions throughout the year.

According to Suh, Lim, Hwang and Kim (2004) internet technologies provide many competitive advantages such as agility, selectivity, individuality and interactivity. The Internet enables customers to search products and services meeting their needs with smaller time than before (Weiber and Kollmann 1998). The characteristics of the online marketplace to reduce search costs for products or services significantly affect the competition environment. Dramatic competition between internet companies has brought about profound changes in customer relation management. As the importance of the customer has increased rapidly in the internet shopping mall, many dot-com companies are trying to apply web-marketing strategies that fit in the online retailer's environment. Most previous researches focused on navigation patterns based on web log data and customers with membership based customer profile and purchasing information (Weiber and Kollmann 1998). These researches have weaknesses in web marketing. First, they paid less attention to surfing customers who do not login to websites such Internet shopping malls, and electronic auction sites. Although surfing customers are members of the Internet shopping mall, most of them maintain anonymity before purchasing and ordering products. Since previous researches uses profile and purchasing information of the customer with membership, they cannot apply marketing actions to anonymous customers. Second, they missed the opportunity that applies real time marketing to the surfing customer.

One way to overcome the above problems is to offer marketing activity according to the purchase probability and customer behavior using web log data. In an electronic commerce environment, analyzing web log data provides essential information to understand the effectiveness of marketing and merchandising efforts such as how customers locate the store, what products they see, and what products they buy (Lee, Podlaseck, Schonberg and Hoch 2001). The purchasing probability will decide to target the customer and provide the reason why the purchasing probability of target customer is high.

2.3.2.2. Previous marketing systems that included AI technology

Duan and Burrell (1995) have compiled a list of marketing expert systems and decision support systems for marketing:

Expert systems	**EXMAR – a prototype system which aims to provide expert assistance for the marketing planning process (McDonald and Wilson 1990)**
Expert systems	STRATEX – a knowledge-based system supporting the choice of marketing segments
Expert systems	COMSTRAT – a system for strategic marketing decisions with a special emphasis on competitive positioning
Expert systems	NEGOTEX – a system designed to assist users in developing priori-strategies for international contract negotiation between two parties
Expert systems	SHANEX – SHare ANalysis EXpert system prototype which provides possible reasons for market share changes of a product, rather than merely generating estimates of changes in the marketing share
Expert systems	ADCAD – ADvertising Communication Approach Design: a system designed to assist advertisers of consumer products in the formulation of advertising objectives, copy strategy, and the selection of

	communication approaches
Expert systems	ADDUCE – a frame-based system for reasoning about consumer response to advertising by searching for relevant past advertising experiments.
Decision support systems	STRATPORT – a DSS for strategic planning
Decision support systems	Advia – a DSS for small business planning and decision making The Country Consultant – a DSS for doing business with Eastern bloc countries
Decision support systems	SLIM – a Strategic Logistics Integrative Modelling system
Decision support systems	MKDSS – a system to support the production planner's strategy for marketing the company's central product by aiding in the selection of a suitable marketing mix.

Decision support systems have been used to support marketing managers to conduct marketing analysis in various ways:

The HYMS systems system is a hybrid of a decision support tool and expert system that can demonstrate its capability to marketing executives by helping them to make more consistent and better at decisions (Duan and Burrell 1995).

Marketing provides many opportunities for the application of expert systems and decision support systems but progress in this area is still relatively slow (Rangaswamy et al. 1989; Duan and Burrell 1995; Brown et al. 2005). It shows that although expert systems are suitable for some tasks involved in strategic marketing planning (McDonald and Wilson 1990), especially if a task is well

defined and has a large number of factors to be considered, it also has some limitations owing to its lack of flexibility (Duan and Burrell 1995). It demonstrates that the hybrid system can provide a better support than a sole expert systems or decision support systems (Duan and Burrell 1995).

Clocksin (2003) has enumerated some of the advances and shortcomings of the existing range of AI systems:

> Current programs for automatic reasoning can prove useful theorems concerning the correctness of large-scale digital circuitry, but exhibit little or no common sense (Bobrow, Mittal and Stefik 1986; Clocksin 2003; Brown et al. 2005).
>
> Current language-processing programs can translate simple sentences into database queries, but the programs are misled by the kind of idioms, metaphors, conversational ploys or ungrammatical expressions that we take for granted (Clocksin 2003).
>
> Current vision programs can recognise a simple set of human faces in standard poses, but are misled by changes of illumination, or natural changes in facial expression and pose, or changes in cosmetics, spectacles or hairstyle (Clocksin 2003).
>
> Current knowledge-based medical-expert systems can diagnose an infectious disease and prescribe an antibiotic therapy but, if you describe your motor car to the system, it will tell you what kind of meningitis your car has: the system does not know that cars do not get diseases (Clocksin 2003).
>
> Current learning systems based on neural networks can forecast financial trends, given historical data, but cannot predict the date of Easter nor prime numbers given a large set of examples (Clocksin 2003).

Clocksin (2003) has also identified and described two successful systems in the manufacturing industry that employs artificial intelligence for a substantial process without any human intervention.

The first system is a fish cutting machine incorporating advanced sensor technology and intelligent control (de Silva 2003). Tasks involved include handling, cleaning, cutting, inspection, repair and packaging.

The second system is a machine for inspecting ceramic tiles. Ceramic tile factories offer interesting possibilities for computing (Dalziel et al. 1996) because there is a mixture of continuous and discrete control.

McDonald's (McDonald and Wilson 1990) EXMAR system has numerous finding on the benefits of technology in marketing as mentioned by his report. The findings also have implications to other expert systems and are as follows:

"The development of EXMAR shows that it is possible to use expert systems methodologies to build support systems in complex areas of marketing management, especially if the domain is well defined, has a large number of factors to be considered and relevant expert knowledge is available" (McDonald and Wilson 1990).

The more complex and amorphous the expertise to be captured, the longer it takes both the expert and the knowledge engineer to reach an acceptable approximation. It is clear that to develop an expert system that is of some practical use requires both time and resources of massive proportions (McDonald and Wilson 1990).

Expert systems provide a consistency to human decision making which is valuable, since people tend to forget or ignore knowledge (McDonald and Wilson 1990).

EXMAR has generated considerable interest because it forces experts to think deeply and in a structured way about the issues that need to be considered in developing a strategic marketing plan (McDonald and Wilson 1990).

Expert systems are useful in helping both academics and practitioners to structure, validate, and use marketing knowledge and to better understand the interrelationships between the elements of marketing (McDonald and Wilson 1990).

The potential advantages of expert systems in marketing (McDonald and Wilson 1990) are: consistent advice, secure knowledge bases, making better use of experts, enhanced decision making and improved analysis

Since we live in an imperfect world, with imperfect problems and imperfect tools, it is unreasonable to expect a perfect expert system until there are perfect experts and perfect technology. On the other hand, if an expert system gives better advice than you would have had without it, it is probably worthwhile (McDonald and Wilson 1990).

2.3.3. Research Question

The research question that arises out of the literature review is: What aspects of the tactical marketing plan will have greater agility with the help of artificial intelligence technology?

2.4. Conclusion of Literature Review

The tactical marketing plan has many aspects such as: elements of a product, the price the product should be sold at, the place it should be promoted and the type of promotion that should take place (Kotler and Keller 2006). The plan for a service business includes more aspects of tactics such as: the process involved in delivering the service, the people involved and the physical evidence of the service (Kotler and Keller 2006). In the literature, the need for agility in tactical marketing plans (Simkin 2002) is articulated. The literature also demonstrated how AI technology can deliver systems that provide agility (Dalziel et al. 1996; Clocksin 2003). However, no literature has been found that states that AI technology is better suited to pricing and product composition and not suited to promotions or vice-versa. In other words, no literature has been found that

identifies which of these tactical aspects require greater agility that can be met with artificial intelligence technology.

As complexity of the market and production increases on a global scale, new integrated supply chains objectives, drivers, performance indicators and boundary conditions are being defined within the framework of agile manufacturing (Jain et al. 2008). Whilst the needs of integrated supply chain networks have been to a large extent identified, there is a lack of suitable and commercially available tools to satisfy these. Therefore, new generation tools should be developed and the existing tools significantly enhanced to support decision-making processes and to deliver required solutions to extended businesses. Current approaches to the design and construction of supply chain systems lead to fixed interdependencies between valuable resources. This constrains the resource re-use and the agility of systems, often preventing close alignment between system behavior and business process requirements. Most agility measurements are described subjectively by linguistic terms, which are characterized by ambiguity and may imply multiple possibilities. Thus, the scoring of the existing techniques can always be criticized, because the scale used to score the agility capabilities has two limitations (Lin et al. 2006): Firstly, such techniques do not take into account the ambiguity and multiple possibilities associated with the mapping of one's judgment to a number; and secondly, the subjective judgment and the selection and preference of evaluators have a significant influence on those methods.

Recently, in data processing, relational databases and association rules have been widely used in support of business operations, and there the size of database has grown rapidly, for the agility of decision-making and market prediction for varying degree of importance for agility evaluation. Therefore, knowledge discovery from a database is very important for sustaining essential information to a business (Berry and Linoff 1997; Han et al., 2000).

2.4.1. Research question

As stated previously, the research question is: What aspects of the tactical marketing plan will have greater agility with the help of artificial intelligence technology?

2.4.2. Propositions

The following propositions flow from the literature review. They are statements that frame this research. The assumption for these propositions is that there is a need for agility in tactical marketing plans.

Proposition 1: the marketing mix can be modelled.

This proposition follows directly from the statements of McDonald (2005) and Kotler (2006) that there are hundreds of external and internal variables interacting with each other and affect our ability to achieve our objectives.

Proposition 2: AI technology can be used to deliver agility in tactical marketing plans.

This proposition links the statements that marketing requires agility and the statements that artificial intelligence technology can deliver agility. From a marketing perspective, the literature stated that factors that determine a new marketing mix may be different to the previous mix (Piercy and Giles 1990). These statements imply that the tactical marketing plan requires an element of agility to be successful (Simkin 2002). From a technology perspective, AI technology can deliver systems that provide agility (Dalziel et al. 1996; Clocksin 2003; Ramaswami 2009).

Proposition 3: there are short comings of existing AI technology in the marketing field.

The last proposition is to identify the some of the shortcoming of AI technology. Clocksin (2003) has enumerated some of the advances and shortcomings of

the existing range of AI systems. The research explores the experience and perceptions of the technology and marketing professionals.

CHAPTER 3: RESEARCH METHODOLOGY

This section describes the methodology that was be followed to address the research questions put forward as possible solutions to the main problem in the Literature Review section.

3.1 Research methodology and paradigm

This study was intended to identify the areas of a tactical marketing plan that may benefit from improved agility by using artificial intelligence technology. The research paradigm for the study is qualitative in nature. The intent of qualitative research is “to answer questions about the complex nature of phenomena, often with the purpose of describing and understanding the phenomena from the participants’ point of view” (Leedy and Omrod 2001).

Leedy & Ormrod (2001) propose a qualitative approach for the following reasons:

- the purpose of the research is to describe and explore,
- the variables are unknown,
- the research is context bound and encompass personal views,
- the samples size is small, and
- In-depth semi-structured interviews are to be used to collect data.

The defining characteristics include the purpose of the research, nature of the research process, methods of data collection, form of reasoning used in analysis and the manner in which the findings are communicated (Leedy and Omrod 2001).

Certain assumptions are embedded in qualitative research. These are considered throughout the research process. The following qualitative paradigm assumptions inform this research (Creswell 1994):

- The relationship of the researcher to that researched is “researchers interacts with that being researched”,
- The role of values is “value-laden and biased”,
- The nature of reality is that “reality is subjective and multiple as seen by the participants in a study”,
- The language of the research is “informal, evolving decisions, personal voice, and accepted qualitative words”.

3.2 Research Design

The research is “concerned with exploring particular cases or events and providing the richest picture of what transpires” (Cornford and Smithson 2006) therefore the design of the research is descriptive and can be classified as idiographic (Cornford and Smithson 2006).

It is proposed that the qualitative design takes the form of a content analysis (Leedy and Omrod 2001). Leedy & Ormrod (2001) describe content analysis as “a detailed and systematic examination of the contents of a particular body of material for the purpose of identifying patterns, themes, or biases”. In this research the content analysis was carried out on the transcripts of the interviews which have taken place between the researcher and the respondents.

As mentioned above, in-depth semi-structured interviews were used as the method of data collection. The interviews were based on five open ended questions (Leedy & Ormrod, 2001). This method of data collection is suggested as it allows for the flexibility required from the evolving nature of the research

problem, and it is appropriate for research problems (such as in the one dealt with here) which requires in-depth discussion and probing (Pirow 1990).

Advantages of using in-depth semi-structured interviews for data collection include:

- Respondents can “provide historical information” (Creswell 1994),
- The researcher has control over both the questions asked and the environment (Pirow 1990; Creswell 1994),
- It provides a large amount of useful information (Leedy and Omrod 2001),
- It is flexible and enables the researcher to prompt and probe as necessary (Pirow 1990),
- It enables the researcher to take cognisance of non-verbal behaviour (Pirow 1990),
- It provides access to information that is difficult to obtain through other research methods (O'Sullivan, Rice and Saunders 1994),
- It provides the opportunity for immediate clarification regarding misunderstanding (O'Sullivan et al. 1994), and
- It provides an opportunity to cover an array of data and topics (O'Sullivan et al. 1994).

Despite its many advantages the researcher must be aware that skill and care is required in using this method of collecting data. What is more, there are several disadvantages associated with this method of data collection. These are as follows:

- Information provided by the respondent is coloured by their own perspective (Creswell 1994),

- “Researcher’s presence may bias responses” (Creswell 1994),
- “Not all people are equally articulate and perceptive” (Creswell 1994),
- Data may be misinterpreted by the researcher relative to the intended meaning of the respondent (O'Sullivan et al. 1994).

The researcher has attempted to mitigate some of these disadvantages by: continuously confirming with the respondent the intended meaning of their response, not intentionally leading the respondent and avoiding colloquialisms and ambiguous words.

3.3 Population and sample

3.3.1 Population

The population in this research is considered to be all consultants, analysts, programmers and marketers, in South Africa, who have an interest in artificial intelligence technology or improving their marketing agility.

3.3.2 Sample and sampling method

The sample design is “purposive” (Walker 1985). The nature of this sample design is such that the researcher purposefully selects respondents who have the required experience to answer the research questions (Creswell 1994). Furthermore, the objective was to select experts who are representative of the population, and who are expected to give normal perceptions and perspectives (Leedy and Omrod 2001). No attempt was made to select respondents randomly (Creswell 1994) but the researcher will endeavour to be objective in the selection of the respondents (Walker 1985).

Because of the limited number of experts in the field of artificial intelligence in South Africa, the sample consists of individuals from the technology field that have a fair knowledge of artificial intelligence. The judgement of what is

considered as fair knowledge was evaluated during the setup of the interview. The technology professional had to have studied the subject of artificial intelligence or worked with an intelligent system. Marketing professionals are included in the sample to gain their insights from the marketing perspective.

The sample was also limited to twenty people in Gauteng, South Africa. This was a convenience sample based on people identified by lecturers of Wits Business School in the marketing and Technology fields. Additional people have been identified by references provided by colleagues.

The table below describes the profile of the respondents that were used in the research.

Table 1: Profile of respondents

Technology professionals	Marketing professionals
CEO and co-founders of a speciality technology firm that implement artificial intelligence technology.	Strategy director and account manager at a multinational advertising agency.
Technical director and technical manager of a business intelligence firm.	Marketing manager of a car manufacturer.
Technical sales manager of a large international software company.	Sales manager at a software vendor.
Director of a company that specialises in business process flow.	Category manager at a large multinational consumer goods manufacturing firm.
Technical safety manager at a large multinational consumer goods manufacturing firm.	Business development manager at an engineering consulting firm.
	Marketing and market access manager at a multinational pharmaceutical firm.
	Marketing executive at a national bank

3.4 The research instrument

The research instrument was an interview with each respondent. The interviewee was given a document, shown in Appendix A, to display the topic, state examples of artificially intelligent systems in real life and display the questions that they must expect in the interview. The questions were open-ended so that a discussion takes place.

The interview began with a discussion of the purpose of the research and how the responses from the interviewees may benefit the study. The second step was to discuss the three definitions to assess the respondent's familiarity with the concepts of artificial intelligence, agility and tactical marketing. Once the respondents had a similar understanding of these concepts as the described in this questionnaire guideline in Appendix A, five open-ended questions were asked. These questions follow the propositions in the research question.

3.5 Procedure for data collection

The respondent nominated was contacted initially by telephone to inform him/her of the purpose of the study, subjects to be covered and the research process, including the expected duration of the interview. The researcher invited the nominated respondent to participate in the study. Upon acceptance, electronic communication was sent thanking the respondent for being willing to participate in the study and confirming the place, date and time of the interview. Each respondent was offered a copy of the research report. This will be an incentive for participating in the study. Importantly, respondents are guaranteed that their responses will be confidential and remain anonymous.

The in-depth semi-structured interviews took place at the site of the respondent. This is thought to be a suitable location as it is convenient for respondents and more likely to put respondents at ease in talking to the researcher. Each interview was audio taped and transcribed thereafter. In addition notes were to be taken should there be any equipment failure. The researcher took care not to lead people in their response during the course of the interview.

3.6 Data analysis and interpretation

The data analysis activity took place concurrently with the collection and interpretation of the data, and the writing of the report. This is different to quantitative research where the process is linear (Creswell 1994).

The following procedure was deployed in analysing the data (Leedy and Omrod 2001):

1. The data used was viewed in order to get a sense of the data in its entirety,
2. The data was organised by using a computer spreadsheet,
3. The data was reduced to main themes (Creswell 1994), and
4. The data was integrated and synthesized.

No statistical analysis was performed on these results.

3.7 Limitations of the study

The study has been limited to knowledgeable people in South Africa. The weakness of this is that most marketing people may not understand how AI can benefit them and do not seek the services of my sample group. This means that their depth of experience is not as vast as in North America or other technologically driven marketing orientated countries.

3.8 Validity and reliability

The validity of research is determined by the internal and external validity of the research. Internal validity is “the extent to which its design and the data that it yields allow the researcher to draw accurate conclusions about cause-and-effect and other relationships within the data” (Leedy and Omrod 2001), and

external validity is “the extent to which its results apply to situations beyond the study itself” (Leedy and Omrod 2001).

3.8.1 External validity

To ensure external validity the findings need to be generalised (Leedy and Omrod 2001). This implies that the sample is representative of the population (Leedy and Omrod 2001). However, the intent for qualitative research is not to be able to infer the findings onto the population. Rather, it is an attempt to interpret the experiences from a unique perspective (Creswell 1994). The validity criterion to be used in this research is that it is cogent and plausible. In addition, the external validity of this research is enhanced in that it takes place in “A real-life setting” (Leedy and Omrod 2001).

3.8.2 Internal validity

Internal validity is important as it attempts to, “minimise alternative explanations for the results obtained” (Leedy and Omrod 2001). The internal validity of the research was checked against respondents involved in the research by asking them if the conclusions are accurate and match reality. This was done by providing each respondent with a summary of the findings with a request for comments. Furthermore, the researcher requested the opinion of peers in technology and marketing as to whether they believe valid interpretation and conclusions have been made.

3.8.3 Reliability

This study is limited in the extent to which it might be reliable, given that it is unlikely that the same study conducted in a different context would reach exactly the same conclusions. However, the researcher attempted to improve the chance of replication by: operating in a systematic manner during the interview, connecting the views of the respondents to a theoretical framework and providing additional detail regarding central assumptions, the selection of

respondents and the steps followed throughout the research process (De Ruyter and Scholl 1998).

CHAPTER 4: PRESENTATION OF RESULTS

4.1 Introduction

The results are presented by a list of key facts statements that pertain to each respondent's responses to each of the discussion points. Figures that some respondents have illustrated will also be presented. The discussions around the propositions were not limited to each proposition therefore the respondents were allowed to refer to previous propositions or make statements that will be referred to in the following propositions. This unstructured nature of discussion will allow for the possible listing of repeated statements in multiple propositions. The listing of statements will be separated by the field of expertise of the respondent. Respondents have repeated statements that other respondents have stated and these repeated comments are not included in the presentation of results.

4.2 Demographic profile of respondents

The planned number of respondents was determined to be twenty with an even split of respondents from the technology field and the marketing field. The demographic profile of the respondents included eleven respondents in the field of marketing and seven in the field of technology. The difference between the number of planned and actual technology respondents can be attributed to the lack of skills or knowledge in the field of artificial intelligence in Johannesburg, South Africa. The difference between the number of planned and actual marketing respondents seems to have been an enthusiastic interest in the idea of how artificial intelligence and assist the tactics of marketing. Two of the marketing respondents were in a strategic role rather than a tactical role. They did, however, have a background in tactical execution and were accepted into the selection with the intent that they may provide greater insight into how enhanced tactical execution will benefit the strategic objectives.

4.3 Results pertaining to proposition 1

The discussion centred on the idea that the marketing mix can be modelled. The question posed to the respondents was “Can the specifics of the marketing mix be modelled?” Their responses are listed below.

Table 2: Results pertaining to question 1

Responses from marketing professionals	Responses from technology professionals
Some companies rely purely on tactics and do not do any planning.	Companies need to understand the relationship between four P’s and objective function like profit or ROI.
The emotional side can’t be modelled. Even price can’t be modelled. BMW sells at different price points in the world. This is different to utility pricing.	There is a fair amount of work that attempts to quantify the relationship between marketing and the bottom line.
If you doing something which is important like setting the initial price, this is not frequent and should include human judgement.	It’s still a fuzzy science and that’s why not much AI is in the tactical field.
Based on understanding consumer behaviour. This is difficult and a shot in the dark at best.	Two problems why not: firstly, body of knowledge is still small and secondly, marketing is not filed with quantitative people. The second point is the biggest problem.

Responses from marketing professionals	Responses from technology professionals
The packaging is very emotional and most people think it's rational.	It's difficult to create a quantitative relationship.
The era is changing. Assumptions are not holding. Advertising is now becoming more responsive and no longer passive and above or below the line. It's through the line mostly now.	Simple problems like advertisements on a billboard are difficult to measure. How do you measure the improvement that is attributed to the just that billboard? You can't measure the number of people that viewed it and the number that will go watch the event advertised.
Banking has some core models that describe relationships and most of them will quantify effects. This is used in tactics.	Better suited to online advertising. Amazon has got it right. They send direct mail. They can construct a one to one campaign based on your individual profile.
Historical data is important. But no one saw the current global financial crisis. Maybe they saw it but did not act.	We do online gaming. Some campaigns are costly because they include money. This is more observable. You can record their behaviours and you can understand the individual. You can than measure it. It's still not easy because there are many factors.

Responses from marketing professionals	Responses from technology professionals
The core can be modelled but the special events and circumstances change all the time.	The physical gaming world does do a good job of one to one marketing for the big players but that will be small volumes. The United States is better at doing this.
People and the creative aspects of promotion cannot be modelled.	Yes, unequivocally yes. Modelling is a function of a few things. It's a response of a stimulus under certain conditions. AI is pattern recognition with lots of complexity.
Man will become redundant eventually. Maybe hundreds of years from now. Operators can be eliminated. The key will be the way it assimilates information and how it is able to learn.	If you have a discrete event like a change in price. You can take out some clouding factors like the time and seasonal market conditions.
It's only applicable if it adds value to people. The fact that it can beat a human in chess is great. It shows we crossed some boundary. But it's still a useless skill in the real world.	Only if you can identify the stimulus, pick off the noise factors and measure the results. Then you can model it: price, place, promotion, etc.
It scares people because it takes away their control and therefore their power.	You can do qualitative because it is part of the stimulus. However it will be hard to attribute it to a part of the

Responses from marketing professionals	Responses from technology professionals
	measurements of results.
You already have forecasting tools for place and product. Promotions will be difficult. Computers will tell you to paint it red. But you don't know the texture or tone and you still have to paint it.	The customer comments or the qualitative responses might be difficult. You would have to reduce it to a number at some stage.
Yes, they already model operational activities.	Yes, there is other technology that closely resembles human thought and reasoning patterns and that can be used simulate the thoughts when the marketing mix is being decided. Although to fully understand thought is still about a hundred years away.
You will not get to that stage. The market is too dynamic for that. It is better suited to more repetitive work.	Use the word model cautiously and rather use the term simulations. There has to be some quantitative basis. Simulation is more logical choice to assist. This will bring the model closer to reality.
It can work in certain markets. There has to be a lot of repetition. The more personal the market becomes the more difficult it is to rely upon artificial	The objective is to model market behaviour. You can model some simple relationships and then build on that to get closer to reality.

Responses from marketing professionals	Responses from technology professionals
intelligence.	
Relationship marketing will be more difficult.	Political, economic social technological, environmental and legal (PESTEL) factors are parameters for the existing market model and will give off some probabilities. This model is able to test your plan and the result is the decision. The benefit is to companies where they can put a plan together and then let the plan interact with the model.
The bigger your organisation, the more difficult it is to model.	Most computer games already have some simulation and AI in it and modelling market behaviour is already reality.
If you have all the information, which you can possibly already get. I don't see why you will not be able to model it. Then you can spend more time creating new markets.	It will need to have some feedback loop so that it can learn from itself otherwise you tweaking it all the time.
You need a way to capture the intangible information and historical personal experience.	In the "lean" offices initiative it's about changing culture and behaviours and change management. They model a certain mix and this can be adapted to

Responses from marketing professionals	Responses from technology professionals
	marketing. The current ramp up to the lean offices has been a tough transition and they are starting to get that right.
That computer should be able to categorize decisions. The difficult decisions should be, performed by humans.	There are some very simple and specific tools available to model aspects of marketing mix.
The computer will need to know if the data is complete and if the result will be intuitive and within boundaries.	Workflow documentation is some form of modelling of operations and we look at the wasted time and eliminate it. If we automate some task and reduce the time wasted the order-to-cash time will reduce.
After some experience the decisions will move from human to more automatic categories, because you will start accumulating data for those choices.	Technology can be used to predict certain things based on trends and 'what-if' analysis.
Models may exist but not used. Division presidents may overrule creation of local advertisement, and force you to flight international	Banks have marketing tactics of their assets. Mostly ATMs. The price is fixed but the place and promotion of it is not and this needs adjustment to

Responses from marketing professionals	Responses from technology professionals
advertisement.	maximise profit and market share.
Marketing complexity is increasing in certain parts of the market.	Financial services need to have a single view of the customer. This allows for more consistent marketing. So it can be modelled by looking for patterns but the input data needs to consistent.
Need to start with a company that already accumulated their data for marketing tactics decisions and results.	Meta data needs to be created to give context.
	Enterprise resource planers (ERPs) currently are used to some extent to model the marketing mix by estimating demand and looking at the resources required to meet demand. This is more product and place specific.
	Currently the mission of a company cannot be linked directly to the tactics and is not properly measured. Yes all companies will tell you the correct theory but very few actually practice it effectively.

Responses from marketing professionals	Responses from technology professionals
	People will be the most difficult part to model. People are not the same and you don't know how they will react in every situation.
	Yes it can be modelled. All current human aspects of models are built on training data. If this can be fed or built on a computer, it can be modelled.
	You can model the population behaviour on similar buying patterns and then use than information to test new buying products.
	The hardest thing to model is the emotional aspects and the creative aspects. If is intangible you can't model it. If there is some research to say what is a more pleasing option to consumers, then that can be used. But new promotions cannot.
	You can also do some study where the study group does not know what you are studying and this will give a more realistic statistic of how emotional

Responses from marketing professionals	Responses from technology professionals
	parts work.
	You need to make the (parameter) window smaller and have a smaller target and start from there.
	Service companies will be better suited for this as they are trying to understand the customer better and this is where the knowledge base comes into account and information can be modelled
	Yes the goal is usually to increase ROI. Companies usually have some sort of model even if it is only mental or mathematical.
	Must have linear or non linear models.
	Even creative parts of the marketing mix can be modelled. Collecting data will be very important. How they currently make their choices? This is historical data already but the rate of change of consumer trends will also need to be adapted to get close to

Responses from marketing professionals	Responses from technology professionals
	reality.
	The main objective will be to model the consumer behaviour. Then within the boundaries of the model you can maximise the Return on Equity (ROE) function

4.4 Results pertaining to proposition 2

The discussion centred on the idea of agility. The need for agility was questioned with question 2: “Discuss the need for agility in tactical marketing plans.” The feasibility of agility in AI was questioned with question 3: “Can AI technology be used in the implementation (modelling) of the marketing mix? What can be modelled? What is the benefit of agility?”

The table below is the responses to the question of: “Discuss the need for agility in tactical marketing plans”

Table 3: Results pertaining to question 2

Responses from marketing professionals	Responses from technology professionals
Agility means that you will have the holistic picture and not an isolated picture in real time.	The competitor might do something. You need to respond quickly.

Responses from marketing professionals	Responses from technology professionals
The markets are dynamic but people in the organisation act slower than the total market.	If competition drives promotion. E.g.: Pick n Pay and Makro sell HTH pool cleaner. Now if Pick n Pay has a promotion, what does Makro do? Do you promote it as well? Do you promote substitute products?
Agility will make you more competitive.	AI relies on some knowledge base or pattern recognition. Competitor activity puts you into some historical paradigm.
By the time you research and launch a product, a competitor beats you to the market.	There are some contexts where it can work and this is more specific and more niche.
Agility is staying ahead of the game.	Can work in promotions. You have a history. A rich base. And you can train a system.
The whole value chain needs to be agile. That's why we have Service Level Agreements (SLAs) internally.	Services can be more agile. Like service relationship managers and they use the correlation between sales and client personalities and derive patterns.

Responses from marketing professionals	Responses from technology professionals
If we're not in front of the client, the competitor (foreign or local) is in front of them trying to take them away from us. We need to always be there and responding fast to them.	You get first mover advantage and become a market leader.
If I can do work faster. I will be able to see more clients in my time because I don't have to wait for data to be processed into information.	General market perception is improved. Like an innovator award.
Agility is fundamental to short term success that has a long term bearing.	You also have a downside. You could be wrong. Agility is expensive. You are on the bleeding edge as opposed to leading edge.
The bigger you are the longer it takes to change and adapt.	Service agility will do anything for anyone anytime. To meet this flexibility, you pay high for it. This is in conflict with production efficiency. E.g. Henry Ford. Any colour as long as it's black.
Also the bigger the change the longer it takes. Like 20% price decrease vs. 5%.	Not sure if it's loyally directly related to agility. It's indirect if you get it right frequently.

Responses from marketing professionals	Responses from technology professionals
AI will cut out waste time.	Central News Agency (CNA) lost agility. They were good news agent, And then they started with toys, cds, books, etc. It's a leader's curse, niche players pick off lines and you no longer a leader
Depending on the industry you will have different levels of agility.	Too agile and unfocused and you may lose credibility.
The bigger your company and the more likely that it will be driven by ego and as a result you will be less agile. The less likely it is to implement responsiveness.	Discovery Life is agile and is a focused company in the mind of consumers.
Big organisations tend to be driven by personal agendas and they sometimes forget that they existence is determined by the market that they serve.	Must meet strategic goals.
A small company cannot afford to not be agile.	Marketing tactics agility will frustrate production operations.

Responses from marketing professionals	Responses from technology professionals
In early 2000, Oracle went and purchased all small companies and if we did not respond with relationship building, we will not be here today.	Productivity and efficiency is different. Look at fashion companies. GAP, etc have scouts and the best effort is to scout, transmit, design, produce, transport ASAP before trends change.
In these times we need to communicate how we can help companies survive where all competitors are declining.	Agility is not an option in business today. The internet has the speed up the disseminating of information and made the world a small place. Your local competitor is no longer within your town, or country. They are global. And they will gear up to take you out. It's warfare!
You could import innovation or you could introduce the need.	If you are not agile. You will go out of business.
Take the data from your market but also be a thought leader.	There is a conflict in that human beings are creatures of habit and do not change unless forced to. That's why organisations exist for the sole purpose of change management. When they go into an organisation the people soon realise that if they don't change, they will not last long.

Responses from marketing professionals	Responses from technology professionals
Marketing is all about agility. It's about refreshing your tactics all the time to be relevant.	To eradicate this creature of habit status. You can use change management or the incentives that are given or the way people are measured. Another way is to make the culture of the organisation to be as agile as possible. It's a 'mind-shift' thing.
Time is the biggest constraint. Everything happens too fast.	Given enough time you will reach a steady state as there is only so much improvement that can be made to something. We don't know where it is on a time line. But we know that the rate the market is changing faster than rate individual companies change.
There is hardly any buy-in from non-marketing people. They think we only give away hats.	The market will change and then you or competitors will change to meet new demand. You need to be the first to react most of the time to be a leader. This is agility.
Large corporates will have a lot of beaurocracy. Not all. It's the strategy of the company.	Zoomix currently uses AI to learn about new sources of data to verify certain types of information.

Responses from marketing professionals	Responses from technology professionals
	It can also allow you to increase the hit rate in a call centre so you have the right guy phoning and speaking to the right client and can close the deal right there and then.
	It’s a combination of searching and understand the data and coming out with information and then applying a search on a knowledge base to come up with context specific answers fast.
	You need it to support you to drive sales.
	You can maximise the return on you consultants as they can think and process decisions faster.
	Intelligent systems can help drive customer satisfaction by telling you the relevant info when you want it. And this shows the customer that the bank is working and not outsourcing the private information. And risk getting bad service.

Responses from marketing professionals	Responses from technology professionals
	Amazon is agile. As I fly to the US, I see the different parts of the sale congregating to meet my wish list. The different warehouses and logistics parts will deliver everything to the exact place and time I require. They know where I will be and procure appropriately.
	Time is money and your customer would rather be focusing on their customers instead of worrying about the inputs.
	You need agility because every time you do something, you're never always going to get it right. You need the agility to change or adapt to the mistakes and have a feedback loop to learn what the mistakes were and the conditions they were in.
	The assumptions of macro factors, market, competitors are all assumptions. So are internal factors. These need to be tested.

Responses from marketing professionals	Responses from technology professionals
	You need to learn very fast how your segments of the market behave.
	Agility is the lifeblood of marketing tactics.
	Anecdotal evidence: oil price. Peak and then fall. GM did not adapt fast enough to the consumer preference.

The table below is the responses to the question of: "Can AI technology be used in the implementation (modelling) of the marketing mix? What can be modelled? What is the benefit of agility?"

Table 4: Results pertaining to question 3

Responses from marketing professionals	Responses from technology professionals
AI can help. Doubt it will have full responsibility at the start.	AI is a black box perception. Getting a decision is one thing but getting buy-in is another. Also choice of execution is more important.

Responses from marketing professionals	Responses from technology professionals
Do the right thing first. Then do it fast. Not the other way around.	Getting to a decision is very useful but it depends on the context and the situation.
We are forever evolving with technology and so there is a place for it. I know it but don't know what it will look like.	Start off in tight parameters and then expand it.
Info gathering, recording and pattern recognition.	Important to show why the decision was made.
It will be used for decision support, otherwise people become redundant, and people will not allow this.	AI should be used to capture knowledge in a quantitative way. If you take an expert system, it attempts to embody a lot of knowledge of a system that can be modelled.
I think it is not used because people only see the bad aspects of it like redundancy.	I know of an expert system that looked at the efficiency of a petro refinery based on the emissions.
Potential for bond traders.	Medical diagnosis as well.
Older generation will not like it. Younger will thrive.	This can be done in marketing where you have experts that come together to put something together and less

Responses from marketing professionals	Responses from technology professionals
	experienced people are able to learn and use the models.
Most aspects already have some siloed expert systems. But you can marry those parts together to get an AI system.	You can also use it to see shifts in markets.
If you knew the customer and know exactly what he wants you can have the system design the elements of the mix and promote it.	If you have a very big system like predicting global events you could use AI to you benefit of time by using a semantic network and neural net to look at all data sources and factors and predict war. Needs to learn.
CRM is already trying to tailor make messages.	It's good at holistic views of certain situations. If you had to narrow the situation down it will be of limited use but not completely useless.
To educate the machine you will input your plan over time and then it will do something similar.	The whole organisation will be more agile. But you need to see if you're set up to be agile and do you want to change rapidly.
You can use it as performance appraisal and somewhat in operations.	E.g.: it's all well and good to know very quickly that a war will take place between nation A and nation B but if

Responses from marketing professionals	Responses from technology professionals
	you can't make enough bullets on time you're dead.
You can determine the attribute of sales to various elements.	The setup of infrastructure and culture needs to be geared for change.
We already have software that manages certain aspects and support decisions. They will give you a recommendation but you must apply your experience.	Cash in the bank, competitive. Revenue. Government will look at efficiency and not run profits. Basically the objective is to do more, with fewer resources. Business objectives might be to grow but governmental growth is waste.
It will increase your productivity but I think that is the case with all technology.	If your lead-to-cash time is down. Your customer will come back. So you got loyalty and cash flow.
You will have more time to spend on strategy as opposed to operations.	The online world does allow for sales to be customised to the customer in such a way that the customer is technically the salesman. You have endless opportunity to up sell. An example of this is when Dell asks if you want a printer or spare cartridges for a fee. This is where they make the most profit.

Responses from marketing professionals	Responses from technology professionals
You can focus on things that are more important and you can tell your staff to focus on value adding.	Procurement needs AI.
You can model certain aspects of promotions.	Can't model people. Most time the physical job, like the service of a car. Too complex and a machine will be too expensive to be fully agile.
The more personal it is, the more difficult it becomes to model. This is because the personal service is more varied and less standard.	You will be able to see more clients. This increases productivity and reduces expenses per rand of revenue or volume.
You will run more efficiently immediately. But you will not get customer satisfaction increases immediately.	You will be able to add more tasks to help sales and not focus on top three priorities.
Your system cannot rely only on historical data.	Yes it can be used, as long as there is data there. You need something to train it.
System should be a combination of these old data and future in science.	AI is a tool to manage and measure performance and increase it. If it's meant to replace them than they will

Responses from marketing professionals	Responses from technology professionals
	not buy into it.
The system is more helpful if it can help you predict the future. Even possible variations to potential outcomes.	
You have a competitive advantage, and you will increase revenue.	
Save time.	
Cleaner decisions.	
More measurable.	
It would turn the creative subjects into more scientific subjects.	
Need to model operations and build AI into it first. It will get buy-in and then integrate it into the greater or holistic marketing orientated model.	

4.5 Results pertaining to proposition 3

The discussion centred on the shortcomings of artificial intelligence technology and the relation to agility. The table below is the responses to the question of: “What would the shortcomings be to agility if marketing tactics are assisted by AI technology?”

Table 5: Results pertaining to question 4

Responses from marketing professionals	Responses from technology professionals
If you have too much info and not organised intuitively. You will end up with a ‘mish-mash’ of data.	Depending on the logic, it could be a black box. You could get garbage.
Sabotage. If people go to competitors, there is a risk they could build faults in your model or the data.	If the operating state changes outside of operating bounds you will get junk.
Some of the things are challenges and not shortcomings. True shortcomings will be how you use it.	It has to have a starting basis with vast amounts data and knowledge.
Constant tweaking is iterative convergence. It’s part of the learning process and not really a shortcoming.	You must stress test and ratify the outcomes. You could get anomalies that could be high impact and a computer will only work with what it knows and will give a junk result. Result will be correct to the system. Don’t cut the human element out.

Responses from marketing professionals	Responses from technology professionals
Human mind is complex because of emotion. Emotion is not 100% predictable but we can get closer.	You must keep ‘calibrating’ it. Not ‘tweaking’ or ‘fine-tuning’.
They might replace us. In Africa we have so few people the need to service many people. This is why costs are high and technology will be the revolution to service more clients and uplift the continent.	AI will not think outside the box.
You can’t replicate human skills and talent. The easy stuff can be replicated, but not specialties.	Some trends are now supposed to be used in future work.
It’s still a machine; it will need to be maintained.	No executive will action a decision that is not intuitive or understandable.
People get remunerated by their human superiors. So they will follow the superior even if the computer is different in the approach to a solution.	A human needs to see if the computer is on to something new or important or to see if the machine is wrong.
If someone burnt their fingers once it becomes a stigma that AI is prone to failure.	By reducing it to mathematics. You might lose touch with markets. Marketers are touchy and feely so that

Responses from marketing professionals	Responses from technology professionals
	will not happen quickly.
You don’t want a bun fight with a calculator if the results are not intuitive.	AI is alluring but people are scared of it. Most managers and marketers do not have time to understand the practicalities of it. Salesmen will sell AI technology but companies will not extract value.
Faulty modelling. People will also wonder why they need to be there if the machines take over.	Your chain is as strong as the weakest link. So you need a holistic view and not look at one component of tactics in isolation.
Software can be prone to viruses.	The realism of the model might not be up to scratch. A fool with a tool is still a fool.
Integration needs to be intuitive. It needs to have an easy way of navigating through the settings and plans.	Politics in enterprises might also hinder application or even implementation of the model. In lean thinking people need to realise that they have a job to do and that customers put them there. A tool helping them that does this better will not be resisted.

Responses from marketing professionals	Responses from technology professionals
You can program a good conscience. But whose conscience should you use?	You will also encounter problems with incompetent managers and therefore a leadership change is required. People need to know that they should be thinking of shortening the lead to cash times. All the time. You need the right culture and this is the bigger picture.
Change management will have people problems. The acceptance of the system will take a long period. It will need to prove itself.	Smaller companies will be lean and have the right culture.
It is still a machine, what happens if you have a power shortage. What happens if the cost of maintenance exceeds the benefits? Instead of focusing on your market this may become another internal issue.	You will always need a human intellect to do the checks. You will always get some left field event. So you cannot leave it on automatic mode all the time.
Right now it is difficult for marketing people to talk to IT people. There needs to be some middle ground so that people can speak the same language and share ideas easily. This needs to be where IT resides in marketing or marketing resides in the	I would wait to get it to prove itself but I doubt I will ever leave it to its own devices.

Responses from marketing professionals	Responses from technology professionals
IT depart.	
Who takes ownership of bad decisions?	Possibilities of group think when building the expert model.
You will need to build in the financial constraints parameters.	Fundamental changes require intrinsic agility of the model. The data inputs may need to change drastically.
Relationship marketing is very personal. This means that you probably will not have the system interacting with clients. You would be better with the system giving information to help you respond to a client faster. So it will be a sort of decision support system.	Few systems have a feedback loop that is able to learn from itself.
	The reporting may be too complex to be understood.
	If humans come up with better plans, the system will need to be able to test it. Because this is not initially generated by the system.

Responses from marketing professionals	Responses from technology professionals
	Political aspects will need to be handled carefully so that management has buy-in if the tactics are not intuitive to management.
	There are too many factors in building a model for tactics; the complexity to build something is extremely difficult.
	You don’t want to change people into ‘stamp-lickers’.
	You could use it in a malicious way. Marketing a product that you don’t want and knowing exactly how you would want it to be marketed.
	Majority of people just want to lick stamps. People may increase their degree of ‘black-box-mentality’. They already do it. It’s just degrees.
	People with the biggest budget will exploit is the most and they will perpetuate their winning cycle.

Responses from marketing professionals	Responses from technology professionals
	Just like current search engine technology where the guy with the biggest budget will come out on top.
	Need to choose the algorithms appropriately.
	You should have the pattern/trend shown. Not a black box. You need the decision to be traced.

The table below is the responses to the question of: "Can you describe your past experiences with intelligent systems?"

Table 6: Results pertaining to question 5

Responses from marketing professionals	Responses from technology professionals
	After Business Intelligence (BI) you have a few technological steps to go. Then the following step would be AI. To think and action the intelligence.
	BI currently gives you a summary and some flexibility but does not tell you what is relevant to your business at

Responses from marketing professionals	Responses from technology professionals
	that specific point in time. It's very generic.
	You need very specific situation where you can build AI.
	Modelling markets is interesting.
	ACNielsen is too aggregate. But one-to-one marketing is too granular. You need a middle ground.
	ATM placement modelling.
	We do guided analytics and this is the logical progression.
	Forecasting. Retailers to simulate buyer behaviour.
	Private investment AI portfolio management is able to predict with close certainty a trend.
	You can use this to create and develop your market as opposed to exploiting an existing market. Basically.

Responses from marketing professionals	Responses from technology professionals
	Marketing 2.0 is all about carving your own market.

4.8 Summary of the results

The results contain many ideas and these ideas have been shared between the respondents. Some of the responses between the marketing and technology professionals disagreed and sometimes the responses between each specific respondent group were in disagreement. In summary, there was agreement that the marketing mix can be modelled and agreement that the quantitative aspects can be modelled. There was disagreement between the marketing and technology professionals about how the modelling can be accomplished for qualitative factors of the tactical marketing plan.

The second and third questions brought about many more responses as this may have been as a result of the respondents becoming more comfortable with the line of questioning and the topic of the research. Once the respondents become more comfortable, they were afforded the opportunity to come back to any question that they believed that they did not provide sufficient detail. There was agreement between both respondent groups that tactical marketing requires more agility and this was as a result of the dynamics of their particular markets becoming more complex. They also agreed that AI technology should be used as an automation enabler.

The last two questions were expected to have fewer responses as this question would have been more appropriate to professionals in the field of artificial intelligence. They have mentioned that the shortcomings of AI technology would be more related to the human element and that managing expectations of the system would require greater care as this is a largely unknown science with a very sparse history of implementations.

CHAPTER 5: DISCUSSION OF THE RESULTS

5.1 Introduction

The aim of this chapter is to explain the results in Chapter 4 and how they compare to their literature review in Chapter 2. The respondent's profile will also be analysed with the response that they have provided.

5.2 Demographic profile of respondents

The planned sample was targeted to be an even split between marketing professionals and technology professionals. The expectation was that the marketing professionals will not be familiar with the subject of artificial intelligence but they may be able to provide insights as to its benefits and provide a general idea of the area of marketing that the technology should applied to. The technology professionals were also not expected to be comprised mostly of artificial intelligence technology developers. They were also not expected to be well versed in the subject of marketing. The expectation was that they have an understanding of the technology, the strengths and weaknesses that they hold and provide an idea of how it can be implemented in the field of marketing tactics.

The majority of the respondents had an understanding of the concepts of artificial intelligence, agility and tactical marketing. Further explanation of these concepts was not necessary. Respondents also demonstrated enthusiasm for the idea that it is possible for artificial intelligence to be linked to marketing tactics to increase its agility.

5.3 Discussion pertaining to Proposition 1

Proposition 1: The marketing mix can be modelled

Analysis of the responses and a comparison with the literature

The literature suggested that the marketing plan is comprised of a strategic section and a tactical section. The strategic section comprised of the overall mission of the firm and outlines the value proposition and the desired target market. The tactical section details exactly how the strategy should be executed. The literature had included some examples of tactical execution in the field of operations and in the field of marketing strategic planning. There has been, so far, no literature specific to the ability to model the market tactics on an intelligent system. The literature also has stated that past attempts to make systems intelligent have failed and has not regained the enthusiasm that it had in the past.

The majority of respondents agree that the elements of the marketing mix can be modelled by a computer. However, they agree that not all of the elements can be modelled. A common statement was that the quantitative aspects of the marketing mix can be modelled or simulated. These aspects of the mix include: price, product design, location and distribution of the product and some aspects of promotions. A service company will also include additional elements that can be modelled. These elements include the productivity of the field agents and some specific aspects of people selection. The elements that could not be modelled were more qualitative and emotional. An example of this challenge from a service perspective is: if a marketing practitioner is building a relationship with a client. A computer will not be able to tell a joke to make the client feel at ease. From a product perspective, an intelligent system will not be able to drive to a venue and place the banners that promote the product.

“Use the word ‘model’ cautiously; rather use the word ‘simulation’.”

A number of respondents have noted that, on an intuitive level, the word ‘model’ seems to invoke the idea that the relationships are cast in stone and that they work together regardless of external conditions. They noted that the word ‘simulation’ is better suited to this objective of modelling the marketing mix for two reasons. The first reason is that one should not create a perception that that the relationships between variables are fixed. Managers, marketers and technology professionals should espouse a perception that any quantification is purely a test of how the real world will perform and not a fact of life. The second reason is that there is limited knowledge of how relationships between marketing mix variables change over time. This results in the model continuously changing and therefore should not have been called a model in the first place.

The technology professionals had an understanding that the tactical aspects of marketing are more quantitative than what the marketing professionals understood. An example of this is when respondents were asked if an intelligent system was able to select the colour of new product to be created and marketed. The technology professionals responded positively that a machine can do this. They elaborated that the machine may be able to search from the competitor colours and pick a colour, from a predefined list, that was mutually exclusive. Another response was that the computer is able to look at historical data and understand what colour would yield the biggest positive response. The marketing professionals were less positive about an intelligent system’s capabilities. Their responses were that the packaging of products is very emotional to a business and their customers. The design, layout, materials and colour will be varied to create samples and tested with customers and the business. They have also conceded that this method may not yield the most positive responses immediately but successive iterations of this method will bring the marketing professional closer to a single option that will yield the greatest possible positive response using this method. A few of the marketing professionals extended this response saying that this ‘trial’ method is based on historical data and research that is not widely available. This historical data can be stored on a computer and experts in the marketing field may be able to

design a procedure that will chose the best selection method, whether it is based on being unique or being familiar.

Another common understanding between the marketing and technology professionals was the objective of the marketing mix. Respondents stated that a company has and overall objective function and the marketing function of the company was one particular component in the objective function. Marketing must be able to work within certain boundaries to manipulate some parameters so that the return on an investment is maximised. The marketing professionals were able to elaborate on this marketing topic by saying that even intangible choices are elements of the return on investment. One example of this is choice of colour of product. The colour will trigger certain images and ideas in the minds of the customer and if the customer identifies with this image, they will increase their loyalty with the brand and thus increasing brand value.

“It will need a feedback loop. Otherwise you’ll be tweaking and calibrating all the time.”

Both types of professionals interviewed agreed that the intangible aspects of the marketing tactical plan will be difficult or impossible to model. They knew that certain relationships exist between intangible factors and return on investment, like the colour of a product, but the quantification of the relationship is difficult and in most instances impossible. One of the respondents proposed that it is impossible to put a table together listing different colours and their levels of profitability. This proposition was extended with a paradox that even if this chart existed, and everyone used the most profitable colour, all products would not look unique and therefore profitability will eventually be minimised. A technology professional added that if you wanted some intangible or qualitative aspect of tactics modelled, you would need to eventually reduce it to a number or a categorical variable. He mentioned that this method will probably not yield the right answers from the start but it is a step in the right direction.

When questioned about the existence of modelling tools, a number of technology professionals stated that there are a number of expert tools

available for specific parts of marketing like the distribution using business intelligence software, the price and the technical product design using competitor data from the internet, the geographic promotional selection using customer profile data from private research companies and the consultant-and-customer permutations using customer purchase behaviour and psychological profiling of consultants. Marketing and technology professionals agree that this eased some of the burden of getting technical options in the tactical plan but the difficulty was in how that plan was put together using combinations of the options that these expert systems produced. Two reasons put forward by a respondent about the lack of existence of intelligence systems design or implement the tactics across all elements are, firstly, that the body of knowledge of artificially intelligent systems is small and has not come into the mainstream. This may be due to the historical underachievement. This compares with the finding in the literature review. The second reason put forward is the lack of volume of quantitative people in the marketing field. The respondent mentioned that the marketing field is comprised of people that are more creative. Marketing companies may try to compensate by employing technical experts that will interact with creative people but if they don't have respect for each other's abilities there will be no trust and we will not move forward in making marketing more scientific or quantifiable.

A major difference between the data collected and the literature researched is that of the difficulty in putting a tactical plan together. The literature implied that the markets are becoming more efficient because more data is being made available in the public domain and that computation of most variables become faster as systems are able to process data into information faster and cheaper. This compares well with the literature review that computing processing power if becoming faster and cheaper. The reality of the situation is that, while more information about the market is made public, the diversity and fragmentation of this information is also increasing. An example of diversity is when the openness of the internet is able to make companies compete on a global scale and products and services have many more configurations than a product on a local scale. Foreign companies are able to compete with local companies

because local customers become more aware of variety and begin demanding that products and services be customised to their desires. An example of fragmentation is the different types of media that are exploited by marketers. Marketing professional stated that a few years ago you only had above-the-line and below-the-line advertising where your options are television, radio, billboards, newspapers and magazines. In the current environment marketers have mobile phones, in-store advertising, the internet, email, telemarketers, construction-site camouflage and many more. This current environment is also getting more difficult because of fragmentation within each new medium. For example the internet is not only banner advertising on search engines, you have Facebook, Youtube, Twitter, MySpace, various blog sites. This respondent also mentioned that these mediums and sub-mediums are relatively new and not much is known about the effectiveness of it because consumers are able to scan more information than traditional mediums and this opens up the market to more and more advertising messages. A technology professional was able to elaborate on this and stated that it is easier to track a marketing message to a specific user, independent of the actual page visited, on the internet than it is to track in the physical world. This brought the field of marketing closer to a one-to-one marketing communications. However, little is still known on how this translated to effectiveness of the message. This is because internet advertising may be able to track purchase behaviour of products or services purchased online but they do not have a way to track individual purchase behaviour in the physical world. Some technology professionals stated it may seem easier to track customers in theory, but it is more difficult in practice as computer users become more aware of their privacy and any infringements of that privacy. Users are able to install software on their computer to block advertising and even disguise themselves to the advertiser. As advertising proliferates across the internet, users will become more frustrated with distracting and invasive advertising that they may just cut it out completely.

“A divisional head overruled the decision to flight a locally produced advertisement in favour of an international one but we knew that the market will not identify with it and the promotion was a failure.”

Another inconsistency with the theory is the idea of marketing orientation, in particular, the idea that employees of a company make decisions to maximise the return. An example was given where an international advertisement was forced upon the local market at a similar cost to the locally produced advertisement. The result was a failure to the promotional campaign even though the recommendations to the decision makers were that the local advertisement will be more effective. Many other respondents agreed that these forms of inconsistencies with the theory are purely anomalous and stem from poor leadership and to some degree incompetence with a few individuals. These inconsistencies are in not representations of the general market but one needs to make sure that this is not a hindrance in creating and testing models of the marketing mix.



Figure 4: Porter's five forces (McDonald 2005)

Upon questioning respondents about how they would go about modelling a marketing mix, they responded with a general idea of the Five Forces Model by Michael Porter. The reason for this is that the tactics of a marketing plan are dynamic and interact with customers, suppliers and direct and indirect competitors on a day to day basis. This also results in frequent changes in tactics. A marketing professional posed an example of when a company is losing market share on a product due to a change in price of a competing product. A typical investigation may be to analyse the margin and product

features of the original company and act on it by modifying certain aspects. However, if they act in isolation they might be in trouble if they find out that the competitor has integrated better across the supply chain and is able to provide a superior product at a lower cost. This example demonstrates the need for intelligence across the supply chain to identify the activities of customer, consumers, suppliers and competitors so that the original company's response is fast but also complete in data collection and analysis. Some of the respondents, marketing and technology, have mentioned the Porter's Five Forces model but the intention was to use it as assumptions in a virtual model of the market, more specifically, a model to simulate consumer behaviour. One technology professional went further on to state that an artificially intelligence system should be able to constantly retest these assumptions so that the consumer behaviour model simulates reality closer upon every iteration. A marketer articulated that there are three requirements to modelling the marketing mix when interacting with Porter's Five Forces. The first requirement is that the data collection must be so granular that one can get close to the perceptual reasoning of the consumer and understand the purchasing behaviour. The second requirement is the period of data collection must be very long and more weight needs to be placed on the most recent data. The last requirement is that models not be restricted to linear forms. Non-linear models are able to mimic the complexity of the market better than simple linear models.

All of the professionals have responded that the frequency of change of different elements of the marketing mix varies across companies and products. The rate of change is not even specific to particular industries. For example one car manufacturer may change elements of volume, price and product specification like Audi whereas their direct competitor, BMW, will keep those elements largely unchanged but continuously change their marketing execution. In general the responses are that companies should aspire to model as much as they can but it may be a burden if they are modelling elements that the strategy dictates to be unchanged. This implies that modelling should be approached in the context of a company and not as a one-size-fits-all best practice.

Another example of the difficulty of quantifying a relationship between revenue and marketing spending is the situation of billboard advertising for an event. A technology professional elaborated that the activity of putting up a poster on a highway is simple but measuring its success is extremely difficult. There is no history or some forecast that would predict the revenue without the billboard, so how can the sales be measured when the billboard is used? A different respondent mentioned that billboards are one of the special cases of marketing tactics where any quantification is merely speculation.

“You need to start with a company that has a long history of decisions and results.”

A number of marketing professional said that the best situation to build models of the marketing mix is when an organisation already has a long history of information about the market and the decisions taken at various points. This market history can be used to gauge the results of the decisions. The elements of the decision may be recorded somewhere but many of the elements were already determined by the market. Some marketers noted that these types of companies would already have some models built to better understand their market.

One of the respondents revealed an insight into modelling and that multiple models need to be created independently from each other. The combination of these models will better represent reality than a single model. These different models need to be built buy different experts in an organisation because each division may have a different idea on how the market actually works.

In conclusion of the first research question, the literature and the sample agree that the marketing mix can be modelled. This statement is limited to the constraint that some aspects of marketing that are not quantifiable therefore no mathematical relationship can be derived. Another conclusion is that the data used to model the relationships must be taken over a long period of time.

5.4 Discussion pertaining to Proposition 2

Proposition 2: AI technology can be used to deliver agility in tactical marketing plans.

Agility

The literature review has stated that markets are developing at a faster pace and more information is being placed in the public domain at a faster pace. The implication is that companies should be more agile to respond to changing market conditions like customer behaviour, competitor action, legislation and internal supply chain dynamics.

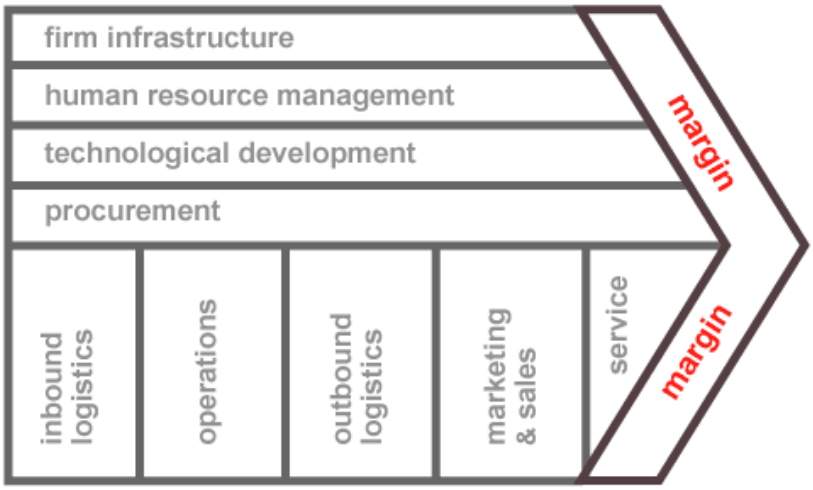


Figure 5: Value chain (McDonald 2005)

"Agility is the lifeblood of marketing"

The respondents had a general response that agreed that companies are working harder to be more agile in their value chain to respond to faster changing markets. One of the respondents disagreed and counter argued that local markets are becoming global. When a big company acquires smaller companies the "lean" concept used in production, where standardisation is the norm, and agility is the last objective.

Many of the respondents have given anecdotal evidence of the risks that companies face if they are not agile enough to react to changes in the market. One example was that of an American car manufacturer, General Motors. They were making big vehicles with big engines and in 2007 the oil price peak coincided with the increased awareness of global warming. This lead to many consumers in that market preferring to purchase smaller, more economical vehicles made by the Japanese and Korean manufacturers and this lead to a major slump in sales for General Motors. Another anecdotal example of the lack of agility in the South African market is when a major bank planned a launch of a new service and while making extensive trials and demonstrations their competitors were able to make a similar service and implement it in the market faster.

“Agility is expensive”

Few of the technology professionals are involved in delivering systems that will increase the agility of a business. They have stated that agility is an expensive concept to implement and maintain. Operational activities are geared for volume and to perform repetitive tasks simultaneously and agility is the ability to change the tasks or even the scheduling of the same tasks. This ability will lead to larger waiting times and therefore the yield from a factory production line will reduce. Therefore agility can rapidly change operating states but the overall time to produce the same volume of products will be very large when compared to a static state production line. If the products take longer to produce, you will be spending more on the overhead expenses to product the same volume of products. A simple example of how agility can be expensive is when you require a postage delivery in a certain format and within a certain short time at a specific location, courier companies will do it, but the costs are multiples of standard postage.

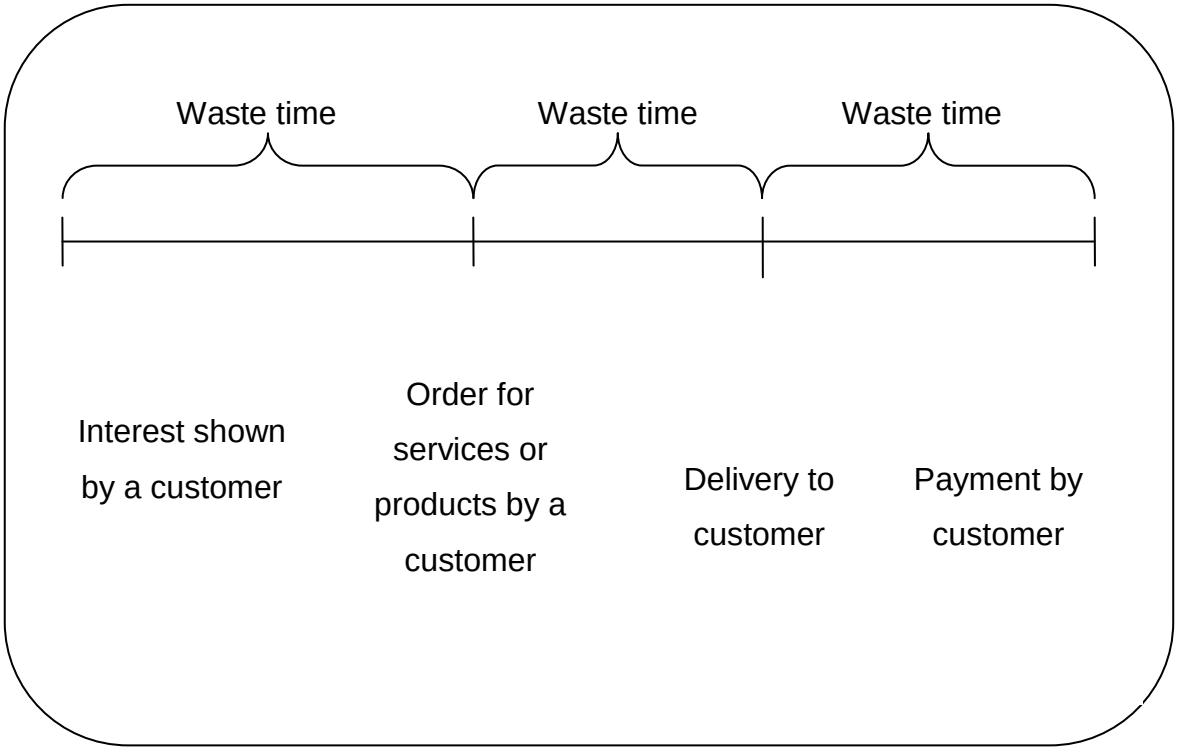


Figure 6: Order lead time (Respondent)

“By being agile you cut out waste time”

One respondent stated that it is difficult to be agile in high volume businesses because changes in are complex and take time. The whole value chain needs to be designed to cope with changes and this will bring about agility. “If the system is designed well, agility is built in, and waste time is cut down to a minimum“. The result of lower waste time is that the time taken for an order to be fulfilled, in either service or production environments, is reduced to a minimum and therefore gaining the revenue for the order earlier than when the waste time exists. This is a competitive advantage for organisations because they will gain efficiencies internally and improve cash flow because income will be received faster from the time of the order.

“Agility is not an option in business today. The internet has the speed of disseminating information at such a high rate that it has made the world a small

place. Your local competitor is no longer within your town, or country. They are global. And they will gear up to take you out. It's warfare. Politics and economics change rapidly and it's a fact of life."

Some of the marketing professionals stated that it is difficult to manually track information from all the various mediums of advertising. Some competitors are reinforcing their marketing communications on all media like the internet, billboards, viral emails, television and radio. They have also stated that it may be easy to start sending these messages out if its just one type of message in multiple formats, but it becomes enormously difficult to send and even track what you sent if the types of different products are large in quantity. One marketer responded by saying that it is a new era in the marketing space. Advertising needs to be more responsive as previous long-held assumptions about advertising effectiveness are no longer holding. Another respondent said that in corporate banking environment, if they do not respond to client requests fast enough, local and foreign competitors will respond quicker and possible gain that customer on future transactions.

"Agility is the ability to deliver anything, anywhere at anytime"

Respondents from both marketing and technology professions have also stated that the concept of agility is misused business jargon. A business should not aim to be agile in all aspects but it should only aim to be agile within the context of the strategy. If a company is in the business of finance then they should focus on that part of the market and not start buying the cars or building the houses for the customers. One respondent proposed that this level of agility can be attained and there may even be a small but profitable market for it but then this will quickly turn into an unserviceable burden. Existing companies that aim to be agile by venturing into now competencies run the risk of confusing their existing market base and seeming to be unfocused.

"Some people really want to lick stamps all day"

Both types of respondents have overwhelmingly agreed that human beings are creatures of habit and that efficiencies are only gained if tasks are repeated a

number of times. Certain types of people want the variation in life but most people prefer the predictability of certain job types. A respondent commented that an effective change management team should take the lead in driving agile behaviour. He added that incentives can also be put in place to drive agile behaviour.

A respondent put forward an example of real world agility within the context of a businesses strategy. Amazon.com is known as an online book and music store but to one respondent it is a logistics company because they are so agile. They are able to consolidate orders from around the world to points of delivery that are most convenient to their customers. They also provide the ability to change the contents of the order even after the order has been placed.

When the respondents were asked about their organisation's impediments to be more agile, given their strategic objectives, they responded with the following ideas. As organisations become bigger, the focus moves to governance and beaurocracy and this makes people in the organisation think of themselves as opposed to thinking of the customers changing needs. They tend to forget that it is the customer's needs that determined their existence in the first place and customers are the reason that they are still in business. An additional comment on this was that if an organisation becomes bigger the time taken to implement an idea also becomes longer. Some big companies prefer that ideas should be created and developed at the top of the corporate hierarchy and then followed by the lower ranked employees. This is in conflict with the notion that the person at the bottom level interacts with the customers more closely and is the best person to identify how the customer needs are changing. It was a general consensus that bigger organisations are less agile within a market.

Another impediment to agility was the significance of the decision. A response was that high-impact decisions to the increase prices by 20% instead of 2% usually took longer as the assessment of the market and the potential reaction to the change will dramatically affect the business.

How artificial intelligence can be used to make marketing tactics more agile

Even through many of the respondents are not actively involved in artificial intelligence technology, they were able to conceptualise the idea of a machine taking over some of the functions of tactical marketing. Majority of the respondent agreed that artificial intelligence technology will be able to help tactical marketing professionals assess situations faster and be able to present valid options for execution. These respondents added that even though technology may not be able to plan success in every action, it will be able to reduce the time taken to make a decision regardless of what the decision is. Furthermore, if they are able to process more decisions in shorter times, they will be more agile in responding to the market whether the response leads to action or inaction.

“This system will lead to cleaner and auditable decisions”

One of the respondents suggested that an intelligent system must be able to produce the ‘workings’ of a decision and all the steps involved in the decision to provide a trace of the steps in a decision. These steps need to be assessed with the insight of a person and then when the action is taken; the results need to be fed back into the system to identify optimisation in the decision steps for future iterations. The benefit, as told by this respondent, is that a company is able to keep its knowledge base intact as old employees leave and new employees arrive. The downtime involved in change management is usually a big portion of the year but this will be able to cut that down to a few days or weeks. The purpose is not to replace the marketer, but to make them more productive and allow them to be creative and let the expert system perform the technical calculations. This frees up time for the marketer to grow a market instead of maintaining it.

“I would rather use its recommendations than leave it to its own devices.”

There was an overwhelming agreement that an artificially intelligent system should not be allowed to action decisions in the initial phases of development

and implementation. Once the system is able to prove consistent and positive recommendations, it should be allowed to action the recommendations within a tightly controlled boundary while still being monitored for inconsistencies. One of the respondents went on further to describe the decision pattern to resemble a triage decision process. “In times of war, when an injured person enters the medical area, a doctor will decide if the patient can wait, requires immediate attention or the patient cannot be helped at all.” In the context of intelligent systems, the system will need to assess if it can deal with the situation on its own, hand it over to a human or interact with a human with the intention of dealing with this situation on its own in the future. The consensus was that an intelligent system be implemented as a decision support system and over time be allowed to be autonomous. This however, depends on the self control mechanisms that are built into the system. Even if the system is left to its own devices, it should be able to automatically switch back to ‘manual’ if the confidence of its action is lower than expected. Some of the respondents added that this level of ‘paranoia’ might even render a system a waste of time as it will never achieve the maximum productive of being completely autonomous.

A number of technology professional have worked with expert systems in the marketing arena and they suggested that there are some areas of the tactics where there is no expert system and other areas where expert systems are not suitable. Once these gaps are filled, an intelligent system must be able to interact with these expert systems to produce recommendations with some grey areas that a human can fill in intangible information.

“Artificial intelligence is the logical next step for business intelligence” and “There are a few steps that need to be crossed over before business intelligence becomes artificial intelligence.”

Some of the technology professionals are involved in the area of implementing business intelligence systems to customers. These systems are used mainly for reporting and these reports lead to decision making. One professional suggested that business intelligence systems already are recording internal company and external competitor and market data. The problem is that, even

after aggregation and summary, there is still too much information for a human to fully understand and take action upon. People may be overwhelmed by the amount of information, they may be too busy, they may even be on vacation and they need some help because they don't know how much data or information they have. In the context of a global recession, few of the respondents stated companies are under pressure to do more work with fewer resources. This puts pressure on analysts as they will need to process more information in shorter times. Business intelligence helps convert millions of figures into hundreds of metrics but that is still too many for a person to accurately understand in its entirety. Artificial intelligence is logically the next phase of business intelligence because the data is already there and some rules need to be build to manage the actions that are taken.

Another technology professional suggested that artificial intelligence is not ready to be the successor to business intelligence. Even though a company holds vast amounts of data across the business and far into the past, they need some system that is able to give the data a context so that its importance can be assessed. The explanation that was given is that even if a company distils millions of values into a few hundred metrics, they are still unable to understand what metric is important to that business or certain individuals at that particular point in time. The future of business intelligence is to first create context to the information and then develop insights automatically. Artificial intelligence may be the logical step after this.

"It depends on the context. Start it off within tight parameters and then expand it."

Many technology professionals agreed that the context of the artificial intelligence implementation needs to be applied appropriately. A study needs to be performed as to what aspects of the business requires, but currently lacks, agility. The next study must be to understand if an intelligent system can be applied to that particular aspect of business. The feasibility study must be able to judge whether or not the intelligent system is appropriate for the problem it will be solving.

“Feedback is crucial”

The limited number of technology professionals that have experience in implementing intelligent systems have stated that the system must cater for a dynamic market and changes in the environment and decision results need to the fed back to the system so that future decisions are more well informed. This statement from those professionals implies that intelligent systems must be able to learn from past behaviour.

In summary the responses compare well with the literature review. The idea was that tactical plans need to be more agile as the markets become more diverse and fragmented. Artificial intelligence is a source of agility to the tactical plans. Another commonality is that people may be scared of the technology because they may find is overwhelming or fear that it will replace them. Most of responses agree that AI technology should start of supporting decisions and then later graduate to autonomous decision execution. Another point of agreement is that of feedback in the technology. The systems need to be design to learn from historical evidence and provide an audit trail of decision steps.

5.5 Discussion pertaining to Proposition 3

Shortcomings and challenges of artificial intelligence technology if it assisted marketing tactics to be more agile

The literature suggested that technology may work well within the limitation of its own field of expertise. The technology will also give undesired or even unintuitive results if the system is operating outside its parameters. For example the automatic medical diagnosis system will be able to diagnose patients faster with a good accuracy but if a person described a car to the system, it will tell them what type of meningitis they suffer and not be intelligent enough to know that the inputs are not medical conditions.

One of the biggest shortcomings of an intelligent system is the fact, documented in the literature, that computer systems will not be able to think creatively. Creative tasks like sculpting, painting, singing, playing an instrument, managing relationships or performing on stage are not suited to computers. Some parts of creativity that require frequent repetition may already have been automated to some extent but the frequency of change outweigh the cost to design and implement a system that can adapt in a creative way.

“You will need constant calibrating. This is not the same as tweaking.”

Many of the respondents mentioned that an intelligent system would require maintenance on a frequent basis. This comes from their experience because the existing situation of manual calculations and execution are not cast in stone and require frequent adaptations of a vague guideline. Marketing respondent mentioned that their plans do not always work when applying a plan from one region to another. This level of difficulty is amplified when some plans are applied in the same region, but at a different point in time. This shortcoming may be applied to intelligent systems, in that, even if the system is able to learn to adapt to changing trends, the direction or magnitude of the trend may need to be adjusted manually. One technology respondent stated that this is known as ‘calibrating’ and that it is often mistakenly referred to ‘tweaking’. A recommendation was made by some technology professionals that the concept of the ‘black box’ can be corrected by clearly demonstrating the logic of the system and by frequent training of the institution’s employees. They also mentioned that this is easier said than done because of the vast selection of algorithms available to program the said logic.

“No one will action a decision that is not intuitive.”

An intelligent system will need to provide for an audit trail of the steps taken for a particular decision as unintuitive recommendations will be thrown out immediately. If the system is able to display the steps performed in the calculation, the marketing professionals will be able to understand the system

and the market in a deeper or in a different light. This will aid improvements in marketing actions and improvements in system development.

Another major shortcoming of applying intelligent technology to marketing tactics, is that the system may be turned into a ‘black box’ whereby users of the system are not interested in the inner workings of the system but depend on the outcomes. Both marketing and technology professionals stated that this is probably the biggest challenge to faster development of a greater variety of intelligent systems. A secondary pitfall that is related to this is the operational line of responsibility. If a computer makes a decision about a particular task, how does one hold the computer responsible? Even if the team involved in creating or maintaining the system is charged with the ultimate responsibility of a decision, how do they control the inputs from within that firm or externally from the environment?

A number of respondents stated that if the system eventually became as robust as imagined, jobs that humans perform will become redundant and this will cause a natural resistance to the technology from the outset. Other respondents viewed this outcome in a more positive light and stated that they could focus on more productive tasks instead of tasks that are menial and ‘require redundancy’.

Few of the respondents have had experience in designing or implementing an intelligent system. They stated that a stigma has been created over the years by institutions implementing intelligent systems and failing to deliver on the promises of robustness. This stigma has been carried forward to other institutions in the same industries as those early adopters and prevented the competitors from trying to implement the same concept in a different manner.

On a more obvious level, some of the shortcomings mentioned were the ability to handle power failures, corruption of data, redundancy of storage, and ease of navigation through the software. The department within an organisation that is responsible for the system is also an important point as most marketing professionals are not well versed in computer systems and there is a risk of

miscommunication when technology professionals are the only individuals in charge of understanding the inner workings of the system.

Some of the respondent did, however, state that these ‘shortcomings’ should not be referred to as such and should be considered as ‘challenges’. This was because the known faults are not faults that cannot be avoided. They can be worked around or mitigated in some way. Some of the ways can be through robust and well-documented parameters that the intelligent system is confined in operation.

5.6 Conclusion

In conclusion, the responses from the people interviewed were similar to the research attained in the literature. They both have identified that artificial intelligence promised to compete with human intelligence but failed to do so because current systems are unable to identify the context in which the problems exist. Artificial intelligence systems have been guided to more specific problems and respondents corroborate this issue where expert systems are being used in operations and to a limited extent, in marketing tactics, like distribution.

Both technology and marketing professionals agree that there is a need for agility in tactical marketing but there is little expertise as to the specific direction of application. They also agree that artificial intelligence is the tool that will be able to deliver agility because it is able to process much more data and information than a human.

The points of agreement are that artificial intelligence systems will be better suited to more quantitative work rather than qualitative work. However, there was disagreement as to what element of the marketing mix is considered as a quantitative element or a qualitative element. The agreement was that elements like distribution, price, and product specifications are already being modelled to some extent by expert systems and those models can be reapplied to an artificial intelligence system.

The points of difference are that some of the elements of marketing like promotions are too emotional, according to marketing professionals, for a computer to understand and reason. The technology professionals responded that these elements are just categorical factors that can be reduced to inputs that computers are able to understand and manipulate to attain an objective function like return on investment.

A company will be more agile in the market when it is assisted by an artificially intelligent system because it will be capable of processing decisions much faster than a human. The benefits of being more agile is that a company will be faster to react to market changes and this will, over time, generate a perception in the mind of the market participants of being and innovator and a thought leader. This is seen as a competitive advantage if the innovation yields successes more often than failures. When a company is more competitively advantageous, the company will benefit from higher revenues. Furthermore, faster decision times will also lead to more productive operational activities in marketing and to some extent in other operational aspects of a business. This leads to lower costs per unit of revenue. With higher revenues due to competitiveness and lower costs due to efficiencies, a company will be able to achieve superior returns as profits will be increased.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This chapter will summarise the findings of the research and compare it to the objectives set out in the in beginning of the research paper. The summaries will also attempt to provide a recommendation for a framework to marketing and technology professionals for the design of an artificial intelligent system that can be applied to tactical marketing. The research follows with some suggestions for future research that may add more insight into the subject.

6.2 Conclusions of the study

The findings of the study were the same as the expectations of the literature review. The study attempted to understand the use of artificial intelligence to improve the agility of tactical marketing plans in South Africa. The literature review had demonstrated that extensive research has been performed into artificial intelligence but not specifically into the area of marketing tactics. There have been a number of systems developed for marketing strategy with limited extensions into tactics. This research aimed to understand why there has been so little investigation done on marketing tactics and artificial intelligence, what elements of the tactical plan are deemed to be suited to automation via intelligent systems and understand the pitfalls and shortcomings of intelligent systems.

The methodology of the research was to interview marketing and technology professionals in South Africa to understand their experience and their perceptions as to how to artificial intelligence can make marketing tactics more agile.

The findings of this research compare well to historical findings. The literature review stated that there have been great promises in the past of the performance of intelligent systems but this did not materialise. The responses from the professionals interviewed agreed with this history and agreed that there is a very small body of knowledge in terms of artificial intelligence combined with marketing tactics. The common view was that some aspects of the tactical plan, or four P's of marketing, that can be modelled in some way so that the professionals can understand some of the dynamic interactions of the variables. These elements are limited to quantifiable elements such as the price, product specification, place and type of promotion. The elements of the tactical marketing plan that are not susceptible to modelling are the qualitative or creative elements such as the design of the promotion, or the aspect of people in a service marketing plan. The respondents reiterated this finding; however, the technology professionals were more open to modelling the creative aspects of the marketing mix as they viewed those elements to be quantifiable because they thought that those elements were categorical components to a scientific relationship.

All of the respondents stated that there is a need for tactical marketing to be more agile. This is due to the fact that market conditions are changing at a more rapid pace. These responses matched the findings literature review. The marketing and technology professionals did extend the literature review with more insight as to what aspects of the market are changing faster. The respondents stated that the mediums of media used are getting more fragmented with the introduction of social media platforms like Facebook and Twitter. The existing media platforms are also getting more fragmented with more specialised television and radio channels and more specifically targeted print media.

The benefit of being more agile with more fragmented media is that marketers have access to specific target markets and they are able to find and communicate to these target markets in a more effective way. This is in line with marketing theory which implies that marketers should strive to get closer to a

one-to-one marketing communications situation. Another benefit of being more agile is the ability to rapidly respond to changing market conditions. For example, if the inflation rate increases, consumers prefer to extract more value out of their spending. Marketers can respond to this by offering deals that are perceived to be more valuable in the mind of the consumer.

The shortcomings of intelligence systems combined with tactical marketing compare well between the literature and the responses from the professionals interviewed. Both sources of research have stated that the risks associated with introducing a complex system to do a series of simple tasks. The system may turn into a ‘black-box’ and the people originally responsible may give up their accountability for the sake of convenience. The risk is that the intelligent system will not be directed, or calibrated, appropriately to adapt to the changing market conditions and the institute may fall into decline.

6.3 Recommendations

Based on the data collected and synthesised with the literature, a number of recommendations can be drawn to achieve the research objective. The objective was to identify a context whereby artificial intelligence systems can be implemented to increase the agility of marketing tactics.

The first recommendation is that if a system is to be developed, the target institution should be a company with many years of historical data for the system to be able to learn past behaviour.

The second recommendation is that a target company should be a product company as this leads to more quantitative elements in a marketing mix.

The third recommendation is that the initial application of artificial intelligence must be focused on very tightly controlled parameters. As the system learns and develops, it will be able to provide reliable results around the specific problem and then the application should increase the scope of the problem. The

ultimate goal is to have an intelligent and autonomous system but the starting point will be small and tightly scoped.

6.4 Suggestions for further research

Further research will need to be done to compare different artificial intelligence algorithms and the different marketing problems that exist. The research may provide insights as to what algorithm will best suit a particular problem.

Another requirement from future research will be to identify and categorise the different types or classes of marketing tactical problems and then determine if any expert system exists to assist that problem.

The amount of knowledge around the technical aspects of artificial intelligence is significant but there is limited knowledge of the applications that each system is able to perform in.

Further research will need to be done to determine the factors that will contribute to a successful implementation of an intelligent system.

REFERENCES

Al-Najjar, B. and Alsyouf, I. (2003) Selecting the most efficient maintenance approach using fuzzy multiple criteria decision making, *International Journal of Production Economics,* 84(1), p. 85-100.

Blattberg, R. and Hoch, S. (1990) Database Models and Managerial Intuition: 50% Model + 50% Manager, *Management Science*, p. 887-899.

Bobrow, D., Mittal, S. and Stefik, M. (1986) Expert systems: perils and promise.

Booth, R. (1995) 'More agile than lean', p. 191-207.

Braunscheidel, M. and Suresh, N. (2009) The organizational antecedents of a firm's supply chain agility for risk mitigation and response, *Journal of Operations Management,* 27(2), p. 119-140.

Brown, S., Webster Jr, F., Steenkamp, J., Wilkie, W., Sheth, J., Sisodia, R., Kerin, R., MacInnis, D., McAlister, L. and Raju, J. (2005) Marketing Renaissance: Opportunities and imperatives for improving marketing thought, practice, and infrastructure, *Journal of Marketing,* 69(4), p. 1-25.

Bucklin, R., Lehmann, D. and Little, J. (1998) From Decision Support to Decision Automation: A 2020 Vision, *Marketing Letters,* 9(3), p. 235-246.

Burgess, T. (1994) Making the leap to agility, *International Journal of Operations and Production Management,* 14(11), p. 23–34.

Buzzell, R. and Gale, B. (1987) *The PIMS principles: Linking strategy to performance*, Free Press.

Carpenter, G., Cooper, L., Hanssens, D. and Midgley, D. (1988) Modeling asymmetric competition, *Marketing Science*, p. 393-412.

Christian, I., Ismail, H., Mooney, J., Snowden, S., Toward, M. and Zhang, D. (2001) Agile manufacturing transitional strategies, *Manufacturing Information Systems*, pp. 69.

Christopher, M. (1998) Logistics and Supply Chain Management: Strategies for reducing cost and improving service. London, *Financial Times Pitman Publishing*.

Christopher, M. (2000) The agile supply chain competing in volatile markets, *Industrial marketing management,* 29(1), p. 37-44.

Christopher, M. and Towill, D. (2001) An integrated model for the design of agile supply chains, *International Journal of Physical Distribution and Logistics Management,* 31(4), p. 235-246.

Clocksin, W. (2003) Artificial intelligence and the future, *Philosophical Transactions: Mathematical, Physical and Engineering Sciences*, p. 1721-1748.

Constantinides, E. (2006) The Marketing Mix Revisited: Towards the 21st Century Marketing, *Journal of Marketing Management,* 22(3/4), p. 407-438.

Cornford, T. and Smithson, S. (2006) Project research in information systems.

Creswell, J. (1994) *Research design: Qualitative, quantitative, and mixed methods approaches*, Sage Pubns.

Dalziel, M., Wiseman, N., Oliver, M., Forrest, A., Clocksin, W., King, T., Wipfel, R., Warren, I., Phillips, D. and Chuang, P. (1996) Adaptive vision-based controller, Google Patents

Day, G. (1994) The capabilities of market-driven organizations, *The Journal of Marketing*, p. 37-52.

De Ruyter, K. and Scholl, N. (1998) Positioning qualitative market research: reflections from theory and practice, *Qualitative Market Research: An International Journal,* 1(1), p. 7-14.

de Silva, C. (2003) The role of soft computing in intelligent machines, *Philosophical Transactions: Mathematical, Physical and Engineering Sciences*, p. 1749-1780.

Dixon, D. and Blois, K. (1983) Some limitations of the 4Ps as a paradigm for marketing, *Back to Basics, Proceedings of the Marketing Education Group, Cranfield School of Management*, p. 92-107.

Doyle, P. and Stern, P. (2006) *Marketing management and strategy*, Prentice Hall.

Dreyfus, H. (1979) *What computers can't do: The limits of artificial intelligence*, HarperCollins Publishers.

Drucker, P. (1973) Management: Tasks, Responsibilities, *Practice, New York*.

Duan, Y. and Burrell, P. (1995) A hybrid system for strategic marketing planning, *Marketing Intelligence & Planning,* 13(11), p. 5-12.

Fischler, M. and Firschein, O. (1973) 'A fault tolerant multiprocessor architecture for real-time control applications', ACM New York, NY, USA, p. 151-157.

Fordyce, K., Norden, P. and Sullivan, G. (1986) Artificial Intelligence and the Management Science Practitioner: Expert Systems: Getting a Handle on a Moving Target, *Interfaces*, p. 61-63.

Goldman, S., Nagel, R. and Preiss, K. (1995) *Agile competitors and virtual organizations: strategies for enriching the customer*, Van Nostrand Reinhold Company.

Gruenroos, C. (1994) Quo vadis, marketing? Toward a relationship marketing paradigm, *Journal of Marketing Management,* 10, p. 347-347.

Guinn, C. and Hubal, R. (2004) 'An evaluation of virtual human technology in informational kiosks', ACM New York, NY, USA, p. 297-302.

Gunasekaran, A. (1999) Agile manufacturing: a framework for research and development, *International Journal of Production Economics,* 62(1-2), p. 87-105.

Gunasekaran, A. and Ngai, E. (2004) Information systems in supply chain integration and management, *European Journal of Operational Research,* 159(2), p. 269-295.

He, D. and Kusiak, A. (1997) Design of assembly systems for modular products, *IEEE Transactions on Robotics and Automation,* 13(5), p. 646-655.

Hoch, S. and Schkade, D. (1996) A psychological approach to decision support systems, *Management Science*, p. 51-64.

Hogarth, R. and Makridakis, S. (1981) Forecasting and planning: An evaluation, *Management Science*, p. 115-138.

Jain, V., Benyoucef, L. and Deshmukh, S. (2008) A new approach for evaluating agility in supply chains using Fuzzy Association Rules Mining, *Engineering Applications of Artificial Intelligence,* 21(3), p. 367-385.

Jaworski, B. and Kohli, A. (1993) Market orientation: antecedents and consequences, *The Journal of Marketing*, p. 53-70.

Jaworski, B., Kohli, A. and Sahay, A. (2000) Market-driven versus driving markets, *Journal of the Academy of Marketing Science,* 28(1), p. 45-54.

Kidd, P. and Karwowski, W. (1994) Agile manufacturing: key issues, *Advances in agile manufacturing: integrating technology, organization and people*, pp. 29.

Kotler, P. and Keller, K. (2006) Marketing Management, 12e, *Upper Saddle River, NJ*.

Kumar, A. and Motwani, J. (1995) A methodology for assessing time-based competitive advantage of manufacturing firms, *International Journal of Operations and Production Management,* 15, p. 36-36.

Lambert, D., Cooper, M. and Pagh, J. (1998) Supply chain management: implementation issues and research opportunities, *International Journal of Logistics Management,* 9, p. 1-20.

Landa-Silva, D., Marikar, F. and Le, K. (2009) 'Heuristic approach for automated shelf space allocation', ACM New York, NY, USA, p. 922-928.

Lee, J., Podlaseck, M., Schonberg, E. and Hoch, R. (2001) Visualization and analysis of clickstream data of online stores for understanding web merchandising, *Data Mining and Knowledge Discovery,* 5(1), p. 59-84.

Leedy, P. and Omrod, J. (2001) Practical Research: Planning and Design, Merrill Prentice Hall, *Upper Saddle River, NJ*.

Leeflang, P. and Wittink, D. (2000) Building models for marketing decisions: past, present and future, *International Journal of Research in Marketing,* 17(2-3), p. 105-126.

Levitt, T. (2001) Marketing myopia, *Marketing: Critical Perspectives on Business and Management,* 3, pp. 58.

Lin, C. and Chen, C. (2004) New product go/no-go evaluation at the front end: a fuzzy linguistic approach, *IEEE Transactions on Engineering Management,* 51(2), p. 197-207.

Lin, C., Chiu, H. and Chu, P. (2006) Agility index in the supply chain, *International Journal of Production Economics,* 100(2), p. 285-299.

Lindamood, J., Heatherly, R., Kantarcioglu, M. and Thuraisingham, B. (2009) Inferring private information using social network data, *WWW Poster*.

Lucas Jr, H. and Nielsen, N. (1980) The impact of the mode of information presentation on learning and performance, *Management Science*, p. 982-993.

McDonald, M. (1991) Ten Barriers to Marketing Planning, *The Journal of Consumer Marketing,* 8(Spring), pp. 45.

McDonald, M. (2005) *Marketing plans: how to prepare them, how to use them*, Butterworth Heinemann.

McDonald, M. and Wilson, H. (1990) State-of-the-Art Developments in Expert Systems and Strategic Marketing Planning, *British Journal of Management,* 1(3), p. 159-170.

Metwally, M. (1978) ESCALATION TENDENCIES OF ADVERTISING*, *Oxford Bulletin of Economics and Statistics,* 40(2), p. 153-163.

Minsky, M. (1963) Steps toward artificial intelligence, *Computers and thought,* 406450.

Montgomery, C. and Wernerfelt, B. (1991) Sources of superior performance: market share versus industry effects in the US brewing industry, *Management Science*, p. 954-959.

Moorman, C. and Anne, S. (1998) The Convergence of Planning and Execution: Improvisation in New Product Development, *Journal of Marketing,* 62(3), p. 1-20.

O'Sullivan, T., Rice, J. and Saunders, C. (1994) *Research Interviews*, De Montfort University.

Pawson, R. (1995) The case for expressive systems, *Sloan Management Review*, p. 41–48.

Penrose, R. (1990) The New Emperors' Mind, *Ed. Vintage, London, ISBN 0,* 9(977170), pp. 5.

Piercy, N. and Giles, W. (1990) The logic of being illogical in strategic marketing planning, *Journal of Services Marketing,* 4(3), p. 27-37.

Pirow, P. C. (1990) *How To Do Business Research.*

Porter, M. (1998) *The competitive advantage of nations: with a new introduction*, Free Press.

Poulsen, C. (1993) 'Artificial intelligence applied to computer aided interviewing'.

Ramaswami, R. (2009) Is the future NOW for A. I.?, *T H E Journal,* February 2009(36-2), p. 42-47.

Rangaswamy, A., Eliashberg, J., Burke, R. and Wind, J. (1989) Developing marketing expert systems: an application to international negotiations, *The Journal of Marketing*, p. 24-39.

Rust, R., Ambler, T., Carpenter, G., Kumar, V. and Srivastava, R. (2004) Measuring marketing productivity: current knowledge and future directions, *Journal of Marketing,* 68(4), p. 76-89.

Schoemaker, J. and Russo, J. (1989) Decision traps, *The Ten Barriers to Brilliant Decision-Making and How to Overcome Them. New York: Fireside*.

Schon, D. (1987) The crisis of professional knowledge and the pursuit of an epistemology of practice. Reprinted in J. Raven & J. Stephenson(Eds)(2001), *Competence in the learning society*.

Searle, J. (1990) Analytic philosophy and mental phenomena, *Historical foundations of cognitive science*, pp. 243.

Sharp, J., Irani, Z. and Desai, S. (1999) Working towards agile manufacturing in the UK industry, *International Journal of Production Economics,* 62(1-2), p. 155-169.

Simchi, L., Kaminsky, P. and Simchi, L. (2000) Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies, *Ed. Irwin-Mcgraw Hill, USA*.

Simkin, L. (2002) Barriers impeding effective implementation of marketing plans-a training agenda, *Journal of Business & Industrial Marketing,* 17(1), p. 8-24.

Simon, H. (1957) *Models of man: social and rational; mathematical essays on rational human behavior in society setting*, Wiley.

Slater, S. and Narver, J. (2000) The Positive Effect of a Market Orientation on Business Profitability A Balanced Replication, *Journal of Business Research,* 48(1), p. 69-73.

Smith, G. (2009) Syndicate Interview of Strategy, In Andersen, D. v. N., Carmen (ed.), Johannesburg.

Song, L. and Nagi, R. (1997) Design and implementation of a virtual information system for agile manufacturing, *IIE transactions,* 29(10), p. 839-857.

Suh, E., Lim, S., Hwang, H. and Kim, S. (2004) A prediction model for the purchase probability of anonymous customers to support real time web marketing: a case study, *Expert Systems with Applications,* 27(2), p. 245-255.

Turing, A. (1950) Computer machinery and intelligence, *Mind,* 59(236), p. 433-460.

Van Bruggen, G., Smidts, A. and Wierenga, B. (1998) Improving decision making by means of a marketing decision support system, *Management Science*, p. 645-658.

van Bruggen, G. and Wierenga, B. (2000) Broadening the perspective on marketing decision models, *International Journal of Research in Marketing,* 17(2-3), p. 159-168.

Van Hoek, R. (2005) 'Mitigating the minefield of pitfalls in creating the agile supply chain'.

Walker, R. (1985) *Applied qualitative research*, Gower Pub Co.

Weiber, R. and Kollmann, T. (1998) Competitive advantages in virtual markets-perspectives of" information-based marketing" in cyberspace, *European Journal of Marketing,* 32(7/8), p. 603-615.

Widman, L. and Loparo, K. (1990) Artificial intelligence, simulation, and modeling, *Interfaces*, p. 48-66.

Wierenga, B., Van Bruggen, G. and Staelin, R. (1999) The success of marketing management support systems, *Marketing Science*, p. 196-207.

Wong, V. and Saunders, J. (1993) Business orientations and corporate success, *Journal of Strategic Marketing,* 1(1), p. 20-40.

Yusuf, Y., Gunasekaran, A., Adeleye, E. and Sivayoganathan, K. (2004) Agile supply chain capabilities: determinants of competitive objectives, *European Journal of Operational Research,* 159(2), p. 379-392.

Zadeh, L. (1965) Fuzzy Sets, Information and Control, Vol. 8, *No,* 3, p. 338-353.

APPENDIX A

Actual Research Instrument

MBA Research title:

The use of artificial intelligence to improve the agility of tactical marketing plans in South Africa.

Artificial intelligence concept:

The science of designing machines that can simulate human intelligence.

Marketing tactical plan concept:

The marketing plan is the central instrument for directing and coordinating the marketing effort. The marketing plan operates on two levels: strategic and tactical. The tactical marketing plan specify the marketing tactics, including the product features, promotion, merchandising, pricing, sales channels and service.

Agility is the ability to efficiently change operating states in response to uncertain and changing market conditions.

Context of questions:

Planning is essential when we consider the increasingly hostile and complex environment where hundreds of external and internal factors interact in a baffling and complex way to affect our ability to achieve profitable sales.

The assumption for the interview is that there is a need for agility in marketing tactics

Examples of AI:

- Fuzzy logic in appliances to detect and adjust operating conditions. (eg: air conditioners)
- Real time strategy games that learn from the player's behaviour and adjust the appropriate response.
- GoogleAdwords detects your context (time and location) and responds with an intelligent result.
- IBM's DeepBlue was able to learn from Gary Kasporov to play chess creatively and beat him.

Requirements from you: Approximately 30 to 45 minutes for the interview

Interview record:

- Voice recording, additional notes and mind maps.
- **Strict confidentiality. Neither your name nor the company you represent will be identified.**

Open-ended discussion:

1. Can the specifics of the marketing mix be modelled?
2. Discuss the need for agility in tactical marketing plans
3. Can AI technology be used in the implementation (modelling) of the marketing mix?
   - What can be modelled?
   - What is the benefit of agility?
4. What would the shortcomings be to agility if marketing tactics are assisted by AI technology?
5. Can you describe you past experience with intelligent systems?

APPENDIX B

Consistency matrix

The research problem is to identify what aspects of the tactical marketing plan can have improved agility by deploying artificial intelligence technology					
Propositions	**Literature Review**	**Research question**	**Source of data**	**Type of data**	**Analysis**
Proposition 1: the marketing mix can be modelled	• Marketing mix can be modelled (Kotler and Keller 2006) using a software package (McDonald 2005)	Research question 1: Can AI technology be used in marketing, specifically in the implementation of the marketing mix?	Actual interview	Narrative	Semi structured interview
Proposition 2: AI technology can be used to deliver agility in tactical marketing plans	• AI technology can deliver systems that provide agility (Dalziel et al. 1996; Clocksin 2003; Ramaswami 2009)	Research question 2: Discuss the need for agility in tactical marketing. Research question 3: Can exiting AI technology be used to increase agility of the marketing mix? What can be modelled? What are the benefits of agility?	Actual interview	Narrative	Semi structured interview
Proposition 3: there are short comings of existing AI technology in the marketing field	• Clocksin (2003) has enumerated some of the advances and shortcomings of the existing range of AI systems	Research question 4: What would the shortcomings be to agility is marketing tactics are assisted by AI technology? Research question 5: What are the current implementations of AI technology?	Actual interview	Narrative	Semi structured interview