DOCTOR OF PHILOSOPHY

Strategy formulation and firms' performance : the case of high-tech SMEs in the UK

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Chapter 1

Introduction

1.1. Introduction

This thesis is an empirical study of strategy formulation process in high technology small and medium-sized enterprises (SMEs) in the UK. The aim of this chapter is to provide an overview and introduction of the current research. In this chapter, the research background will be discussed. Then the rationale of the research and a brief discussion on performance will be provided. The research objective and questions will be introduced. The chapter will be providing a broad discussion on the employed methodology. Finally, the chapter will end with the structure of the thesis.

1.2. The Research Background

Strategic management has been recognised as an important factor that contributes to business success (Hill and Jones, 2004; Jarzabkowski and Paul Spee, 2009; Othman et al., 2011; Arefin et al., 2011). It is increasingly recognized that thinking strategically and using strategic management tools and techniques increase the firms' performance. Many writers (Pearce and Robinson, 2000; Joyce and woods, 2001; Harrison, 2003; Hunger and Wheelen, 2010; Othman et al., 2011) agree that thinking strategically and practicing strategic management have positive effects on the organizations' performance.

Recently a great deal of attention has been made to the research into strategic management in SMEs (Ferreira, 2010; Acquaah, 2011; Heavin and Adam, 2012). Perhaps this is because, the key role of SMEs is to generate employment, promote innovation, create competition and

generate economic wealth (Bridge and Peel, 1999). It has been discussed (Anchor and Dehayyat, 2010; Acquaah, 2011; Arefin et al., 2011) that the dominant paradigm in strategic management is a perspective, rational and analytic model characterised by two principle functions: formulation and implementation (Analoui and Karami, 2003). Strategy formulation is how the firm chooses to define strategy and how it approaches implementation through strategic management (Collin, 1995; Bowman, 1998; Brews and Purohit, 2007; Kock and Ellstrom, 2011).

It is believed that small firms do not commonly practise strategic management (Gable and Topol, 1987; Harrison and Leitch, 2012). However there have been several studies that have found a positive relationship between strategic management and performance in these companies (Robinson, 1982; Fernandes, 2006; Wohrl et al., 2009; Kock and Ellstrom, 2011). For example, Robinson (1982) found that small businesses that employed consultants to help with strategic planning performed better than firms that did not. It has also been found that those small and medium enterprises that engaged in sophisticated strategic management process performed better than unstructured strategic planners (Bellamy, 2009; Brinckmann et al., 2010; Nandakumar et al., 2011).

It has been discussed that in business, preparation comes through strategic planning (Analoui and Karami, 2003). Many owners and managers of SMEs routinely plan their day-to-day operations, but do not believe that strategic planning applies to them (Simsek and Harvey, 2011). However, it has been suggested that no business is too small to require a sound strategy and few strategies are so simple that they need not be developed by a business (Robinson and Pearce, 2001; Veettil, 2008; Haase and Franco, 2011).

While the fields of strategic management in general and strategy formulation in particular and small businesses have developed largely independently (Hitt and Ireland, 1985; Acquaah, 2011), of each other, they have both focused on how firms adapt to environmental change and how they exploit opportunities created by uncertainties and discontinuities in the creation of wealth (Venkataraman and Sarasvathy, 2001; Aragon-Correa et al., 2008; Bellamy, 2009; Parnell et al., 2012). The traditional concept of strategy is to define it in terms of planning to arrive at the appropriate strategy for a given context (Acquaah, 2001; Greiner and Cummings, 2009; Bastiaenssens, 2011). Plans are naturally based on a linear model of decision-making (Chaffee, 1985; Andrew et al., 2011), and the planning process (Hill and Jones, 2004) is divided into two main stages: strategy formulation and implementation (Johnson et al., 2011). The formulation of strategy is seen as the prerogative of top management (Nandakumal et al., 2011) and more importantly it is seen a rational exercise, involving the objective analysis of company resources and the external environment in which the company operates (Wheelen and Hunger, 2010). It has been argued that strategic planning loses its meaning in a dynamic environment, where innovation, flexibility and responsiveness to opportunity are key conditions for survival (Zheng et al., 2009; Ahlstorm, 2010; Parnel et al., 2012).

Early scholars (Ansoff, 1965; Andrews, 1971) in the field of strategy regarded strategy as a rational decision-making process by which the organisation's resources are matched with opportunities arising from the competitive environment. Other researchers (Liao et al., 2008; and Oldmade et al., 2011) have stated that, environment has a strong deterministic influence on the strategy making process in an organisation. A wide range of conceptual frameworks exists for strategy in small and medium size enterprises (Thompson, 1999; Hill et al., 2007; Karami, 2007;

Kraaijenbrink, 2009; and Kock and Ellstrom, 2011). Some writers argue that most SMEs use neither formal planning nor strategy. Some researchers, such as Thompson (1999), suggest that SMEs require the ability to think and act strategically. While the majority of researchers share the view that formal planning is a necessity, they also acknowledge that planning in small firms tends to be different to that of large corporations (Karami, 2007; Kock and Ellstrom, 2011). Within the rational planning school of thought, attempts have been made to identify the types of strategy associated with high growth SMEs (Hoque, 2004; Lie and Wang, 2010). In summary, the treatment of strategy in the literature relating to SMEs has lagged behind that of mainstream strategic management. Recent studies suggest that an optimal strategy for all firms in a given context does not exist.

1.3. The Rationale of the Study

Developing strategy and thinking strategically becoming as a major concern in high-tech small and medium-sized enterprises (Aragon-Correa et al., 2008; Kock and Ellstrom, 2011). The review of the literature (chapter two) will reveal that strategy in high-tech SMEs has been under researched. This study is a direct response to this gap in literature and it focuses on the phenomenon of strategy formulation process and associated factors namely environmental scanning, mission statement, knowledge-based orientation and performance in high-tech SMEs. However, recognising the importance of small businesses as major contributors to job creation and economic growth, especially during the past decade, academic research on small business management practice has grown dramatically in the recent past (Aragon-Correa et al., 2008). In

particular, topics involving the strategic growth of small businesses have received much attention from researchers (Wohrl et al., 2009; Peteraf, 2011). Some researchers believe that SMEs can have positive points in their nature such as innovation in products and services, job creation and employment (Wheelen and Hunger, 2010). Although this is believed to be generally correct, every year some SMEs fail. In addition, there are some SMEs, which have not failed, but they are not improving their business; they are neither growing nor declining. It is estimated that these amount to about 40 percent of SMEs (Karami, 2007). A variety factors are related to SMEs lack in growth, for example, owner-managers, no plan for growth and financial factors (Binks and Ennew, 1996; Devins, 1999; Bellamy, 2009). This lack of strategic plan means no existing strategic approach in enterprise. A non-strategic approach means, starting with an inability to design a plan as a framework for strategy and then failing in reach company targets, such as customer satisfaction (Prevos, 2005), innovation, winning competition and, finally, a lack of a good scale for control (Brews and Purohit 2007; Ahlstorm, 2010).

Studying strategy in high-tech SMEs is also important due to their role in generating innovation and new technologies. Theoretically, innovation economists (Antonelli, 2003) believe that what primarily drives economic growth in today's knowledge-based economy is not accumulation, but innovative capacity spurred by appropriate knowledge and technological externalities (Antonelli, 2003). In the context of strategic management in high-tech SMEs sector, Ahlstom (2010) has discussed that "the main goal of business is to develop new and innovative goods and services that generate economic growth while delivering benefit to society" (Ahlstrom, 2010, p.10). The high-tech SMEs play a significant role in developing the technological system which is a basis for successful innovative business strategies (Chen and Karami, 2010). The technological system

is a concept developed within the scientific field of innovation studies. There are two features that set the technological system approach apart from other innovation system approaches (Ahlstrom, 2010). Firstly, the technological system concept emphasises that stimulating knowledge is sufficient resource to induce economic performance if exploit this knowledge in order to create new business opportunities (Hekkert et al., 2007). Secondly, the technological system often focuses on system dynamics. The focus on dynamic action has encouraged scholars to consider a technological system as something to build up over time (Suurs, 2009). New and improved technologies will continue to reshape manufacturing by creating the capability to adapt more processes that are efficient and develop new and better products to supply for new and changing market demands (Rogers, et al. 1999; McGee and Sawyerr, 2005; Arend and Levesque, 2010). The UK is well place to take advantage of this growing market. The UK is the world's sixth largest manufacturer measured by output, and has a well-developed infrastructure of manufacturing companies and supply chains. The UK is a leading exporter of high-tech goods, with 25% of UK goods exports defined as high-tech (BIS, 2009). Many UK firms have used information and communication technology, new materials and processes such as nanotechnology and biotechnology, to transform the way they work. Since 2009, some industries such as; industrial biotechnology, composites and silicon electronics have been identified by the Department for Business, Innovation and Skills (BIS) as having significant opportunities (BIS, 2009).

To sum up, at the very beginning of the twentieth century, the focus of business research was on size. Big was fashionable. Everything was big, including economic of scale, mass production. 'Big' was a twentieth century phenomenon. Most of the awards and prizes were going to

researchers who were studying large companies. Most of the schools concentrated on large companies and forgot the art of running a small business (Crainer and Dearlove, 1998). However, nowadays, the need for studying business strategy in the context of small and medium enterprises is growing. Despite the fact that there is some research into strategic management in SMEs, there are some significant gaps in the literature, which still need to be researched. This research is a direct response to this gap and it focuses on the formulation element of strategic management including environmental scanning, mission statement, knowledge-based orientation, strategy formulation approaches and performance in high-tech small and medium-sized enterprises.

1.4. Performance

Strategic management is primarily concerned with exploring central issues of what produces better performance among competitors (Rumelt et al., 1994; Wheelen and Hunger, 2010, Johnson et al., 2011). A great amount of research has been devoted to establish a relationship between strategy and business performance (Prevos, 2005). The spectrum of conclusions ranges from strong positive associations to claims that the role of formal planning systems in business management is only informational (Rogers et al., 1999). In this debate, some researches (Hill et al., 2004) stated that "strategic planning, on average, has a positive impact on company performance" (Hill et al., 2004, p.23). It is evident that researchers (Prevos, 2005; Veettil, 2008; Arend and Levesque, 2010; Johnson et al., 2011) have acknowledged that there is a relationship between strategic management and firm's performance.

Before the 1980s, in most companies particularly in large firms, performance was measured by focusing on the achievement of some key financial measures and ratios (Johnson and Kaplan, 1987; Ghalayini and Noble, 1996). But after the 1980s, due to the increasing complexity of organisations, markets and business environments, just measuring financial indicators as the sole criteria for assessing success was no longer suitable for the new conditions (Kennerley and Neely, 2002; Cardinaels, 2010). According to Olve et al. (1999), the traditional financial measures were suitable for the industrial era, but they cannot conform to the demand of the companies today, for they can offer misleading signals for the development and innovation of the companies. Therefore, the balanced scorecard (BSC) was proposed by Kaplan and Norton (1996) that was used to measure firms performance in this study. Reviewing the literature reveals that the balanced scorecard method has been used widely by the researchers in SMEs subject field to measure firms' performance. There are also several studies reporting the use of this technique in SMEs (Hvolby and Thorstensen, 2000; Kaplan and Norton, 2001; Fernandes et al., 2006; Bhagwat and Sharma, 2007; Manville, 2007). The principles of the BSC are based on assisting managers at all levels to observe results in their key areas. BSC measures a business's performance from four important perspectives: financial, internal business processes, learning and growth perspective and customer (Wu, et al., 2009).

The balanced scorecard translates strategy and mission (Bart et al., 2001) into goals and measures. These goals and measures are organized into four different perspectives: financial, customer, internal business process and learning and growth (Bhagwat and Sharma, 2007). The balanced scorecard offers a framework to state mission and strategy. It employs measurement to tell employees the drivers of current and future success (Biazzo and Garengo, 2012). The four

perspectives of the balanced scorecard keep a balance between short and long-term goals and between desired outcomes and the performance drivers of those outcomes (Cardinaels et al., 2010). The balanced scorecard keeps financial perspective because financial measures are important in summarizing the economic outcomes of actions already taken. Financial measures show whether the strategy, implementation, and execution of a company are helping to bring out bottom-line improvement (Fernandes et al., 2006). The core outcome measure in this perspective consists of customer satisfaction, retention, and profitability, new customer acquisition and market share in targeted segments. It also consists of particular measures of the value propositions which the company will deliver to the targeted customers (Gimbert, 2010). This perspective emphasizes processes which will greatly influence the customer satisfaction and the attaining of an organization's financial goals and identifies wholly new processes at which a company has to excel to satisfy customer and financial goals (Manville, 2007; Biazzo and Garengo, 2012). This perspective also combines goals and measures for not only the short-wave operations cycle but also the long-wave innovation cycle (Hit et al., 2007; Jusoh and Parnell, 2008). The balanced scorecard perspective identifies the permanent base which the organization has to build to create long-term growth and improvement (Fernandes et al., 2006; Johnson et al., 2011). It emphasizes the continual improvement of their capabilities for delivering value to customers and shareholders. In the next chapter, a wide range of literature will be reviewed to provide a detailed and comprehensive discussion on application of the balanced scorecard in measuring the performance of small and medium sized firms.

1.5. Objective of the Study and Research Questions

The main objective of this research is to investigate the relationship between associated factors with effective strategy formulation and firms' performance in high-tech SMEs in the UK. In order to achieve the main objective of the study, after reviewing the literature (chapter two), the following questions have been posed in an attempt to highlight the importance of the role of the factors associated with strategy formulation and firms' performance. These questions are:

Q1. What is the influence of different types of environmental scanning on the SMEs performance?

Q2. What is the effect of mission statement on the SMEs' performance?

Q3. What is the relationship between the types of competitive strategy and the SMEs performance?

Q4. Is there any relationship between a knowledge-based view (KBV) to formulation of strategy and the SMEs performance?

Q5. What is the relationship between the characteristics of SMEs and their strategy formulation approach?

Q6. What is the association between different approaches to strategy formulation and the SMEs' performance?

The details of the formation of the research questions and the relevant hypotheses will be discussed in chapter three.

1.6. Research Methodology

In this research a hypothetive-deductive methodology has been used. The first step in designing the methodology of this research is to develop a conceptual framework of the study. In order to develop the conceptual framework of the research, a wide range of literature has been reviewed and synthesised. The detailed conceptual framework of this research will be discussed in chapter three. The research design employed in this research is survey and the data-gathering method is questionnaire. In terms of the research approach, in this research a quantitative approach has been adopted. There are several reasons for employing quantitative research approach in this project. First, the quantitative research method relies mainly on a hypothesis, which is derived from theory deductively. The objective is to test the theory by way of data collection, the findings of which, following analysis, would confirm or reject the theory. So in this research an attempt has been made to test the strategy formulation theory in the high-tech SMEs research context. Second, another aspect of quantitative research is that, the result of a particular investigation can be generalised beyond the confines of the research location. Therefore, in this research the employed quantitative research methodology enabled the researcher to generalise the findings from the selected sample to the entire population of the study. The quantitative research methodology has been widely used in strategic management research (Berard and Delerue, 2010; Nandakumar, 2011; Parnell, et al. 2012). Companies those have been selected for this empirical study are SMEs, operate in high-tech industries in the UK.

The rationale for that is the significant role of the SMEs in the UK economy and the dynamic nature of the high-tech industry which will be discussed later in chapter three. The sample includes high-tech companies located in Science Parks across the UK. The sample has been framed based on the UK Standard Industrial Classification (SIC) and includes firms which are operating in subsection of biotechnology and pharmaceutical industry. The size of the companies varies from small to medium-sized, based on the number of employees (as European Commission's definition of SMEs, 2003).

In this study, the data has been collected using questionnaire from the firms' managers' particularly managing directors, since they were the most appropriate source for gathering accurate data relating to strategy formulation processes in a small and medium sized business context. A total number of 378 completed questionnaires were returned. Out of these completed questionnaires, 21 questionnaires were removed because of substantial missing data in the questionnaires. Therefore among the returned questionnaires, 357 questionnaires were used to create the database and test the hypotheses. SPSS statistical package has been used to analyse the data. To prepare the collected data for analysis, the raw data in the questionnaire has been coded and transferred into the computer, and consequently research variables were defined and computed. Finally the data has been analysed by using descriptive analysis, spearman correlation analysis and standard multiple regression methods. The details of the methodology of the research will be discussed in chapter four.

1.7. Structure of the Thesis

This thesis is organised into seven chapters. Chapter two provides a critical review of literature in strategy formulation. This chapter discusses the strategy formulation process elements including environmental scanning, SMEs mission statement and types of competitive strategy, strategy formulation approaches and knowledge-based view to strategy formulation and performance in small and medium-sized enterprises.

Chapter three provides an overview of high-tech SMEs in the UK. The biotechnology and pharmaceutical sector, from which the sample firms of this study are derived, are specified. Consequently, the chapter builds up a research conceptual framework by proposing research questions and hypotheses.

Chapter four presents research design and methodology in details. This chapter states the research design, presents the questionnaire for this study, describes the sample design for data collection, and defines research variables and their measurements used for data analysis in the following chapter.

Chapter five presents the entire process of data analysis and hypothesis testing. Furthermore, the chapter presents the statistical, descriptive and correlation analysis of what makes differences in level of performance in SMEs. The chapter provides detailed data analysis results and tests the hypotheses.

Chapter six discusses the results of the data analysis and interprets the implications of research results. This chapter describes the research questions in six separate sections respectively. The results of this study are compared with results of prior studies. While consistent results are confirmed, inconsistent results are highlighted in an attempt to provide new insight into strategic management.

Chapter seven concludes the whole study by presenting findings, implications for theory and practice, limitations of the study and suggestions for future research.

Chapter 2

Literature Review

2.1. Introduction

This chapter provides a critical review of theories in relation to strategy formulation to establish the direction of the current empirical research. The chapter is divided into thirteen sections. The first three sections after the introduction discuss strategy, strategic management model and strategy formulation. The subsequent sections reveal environmental scanning, mission statement, competitive strategy, strategic capability, strategy formulation approaches and performance measurement.

In addition, this chapter reviews the literature on the strategy formulation framework and its components. This review is concentrating on empirical studies regarding the types of environmental scanning, mission statement, competitive strategies, the knowledge-based view to formulating strategy and approaches to strategy formulation.

2.2. Strategy

2.2.1. Definition of Strategy

What is strategy? Attempts to define strategy and to understand its dynamics have been a repeated topic of discussion among academics since the mid-1960s! Definition of strategy without looking at its origins and schools of thought is not meaningful. Strategy is a word with many meanings, all of which relate to attitudes stemming from different schools of thought. According to Chandler, the author of *Strategy and Structure* (1962), strategy is “the

determination of the basic long-term goals and objectives of an enterprise and the adoption of courses of action and the allocation of resources for carrying out these goals" (p.13). This definition of strategy refers to the military origins of strategy. According to Andrews in *The Concept of Corporate Strategy* (1971), strategy is "the pattern of objectives, purposes or goals and major policies and plans for achieving these goals stated in such a way as to define what business the company is or is to be in and the kind of company it is or is to be" (p.28). In this definition, some insight into the company in the future has been considered as an element of strategy.

Andrew (1980) later defined strategy in his updated book as, "the pattern of decisions in a company that determines and reveals its objectives, purposes or goals, produces the principal policies and plans for achieving those goals, and defines the range of businesses the company is to pursue, the kind of economic and human organization it is or intends to be, and the nature of the economic and non-economic contribution it intends to make to its shareholders, employees, customers, and communities" (p.18-19). This definition is very wide in that it can contain all kinds of organisations and their environments. Michael Porter, in his book, *Competitive Strategy (1998)*, defined competitive strategy as "a broad formula for how a business is going to compete, what its goals should be, and what policies will be needed to carry out those goals" (p. xxvi). In contrast to Andrew's definition, Porter's definition is much narrower, focusing as it does on the basis of competition. Bryson et al. (1995) defined strategy as "a pattern of purposes, policies, programs, actions, decisions, or resource allocations that define what an organization is, what it does, and why it does it" (p.32).

Considering the origins of strategy and a number of definitions regarding strategy, it is clear that there are four critical streams of thought, which should be highlighted as follows:

Firstly, the main stream of thought is related to useful interpretations given by the classic approach (Ansoff, 1965, 1969, 1988; Andrews, 1971, 1987). The classic approach began with 'the Design school'; its scientists saw strategy as a process. In their view, strategy was a procedure of formal design. In this school of thought, formation of strategy was a deliberate and conscious process. A fundamental objection to this view of strategy is that the reasonable and definitive patterns of strategy formation do not allow for environmental ambiguity (Dunphy et al., 1997). Also, it has been posed by this school of thought that formation of strategy should be clear, simple and informal (Mintzberg et. al, 2005).

Secondly, intricacy of strategic thinking, strategy formulation and implementation processes, make it difficult to understand the dynamic nature of the concept, which classical schools of thought do not mention when discussing strategy. For example, according to Evered (1983), strategy is an uninterrupted process of determining goals, allocating resources, and a model of interconnected actions is promoted by the organisation in developing competitive advantages. According to Ansoff (1988) "Strategy is one of several sets of decision-making rules for guidance of organizational behaviour" (p.78). Andrews (1987) also considered time and the fact that a strategy could be very specific; he argued that "as its meaning has dispersed throughout recent usage, the word strategy still retains a close connection to a conscious purpose and implies a time dimension reaching into the future. At its simplest, a strategy can be a very specific plan of action directed at a specific result within a specific period of time" (p. xi). Mintzberg (1987),

in turn, although agreeing about the dynamic nature of strategy, has argued that an eclectic definition resulting from several different meanings of strategy should be accepted because a strategy is a plan, a ploy, a pattern, a position, or a perspective. Mintzberg (1994) has also characterised different kinds of strategy formulation processes, highlighting that a *realised strategy* is "deliberate" and "emergent". Consequently, managers' styles and levels of commitment, or people's cognitive frameworks play critical and determinant roles. To find the answer to the dualism of the subjective and objective nature of strategy, Knights and Mueller (2004) have suggested that strategy is as an endless project as it is a mechanism used to respond to many stakeholders' demands and involvements.

Thirdly, whilst strategy is firmly embedded in competitiveness and is performance based, the attainment of goals and strategic purposes do not ensure firm success. The importance of strategy extends far beyond simply achieving set goals. In this regard, Porter (1990), one of the most eager defenders of strategy, has identified that in a constantly changing business environment, it is not easy to consider a fitting strategy. As stated by Porter (1990), strategy is making deliberate options, and exchange is intended to offer stability and also long-term continual direction to organisations. For Porter (1990), "strategy guides the way a firm performs individual activities and organises its entire value chain" (1990, p. 41); he has also argued that analysis of an industry's competitiveness is critical and that clear success, or failure, "is perhaps the central question in strategy" (Porter, 1991, p. 95).

In contrast to Porter's strategic framework, Hamel and Prahalad (1995) have stated that comprehending the structure of industry by traditional competitive analysis is not helpful in

discovering the "why" of competitiveness. It has been put forward by them that the characteristics of both competitiveness and organisation are equally significant in determining strategy. On this basis, Hamel and Prahalad (1995) have indicated that there is a differentiation between ''standard'' strategic planning approaches and "architectural" strategic crafting approaches. These two approaches both have an effect on the way in which a strategy is planned.

Fourthly, today's business environment has become increasingly dynamic, networked and complicated, so the process of strategy is geared towards change (Johnson et al., 2011). A review of relevant literature (Ambrosini and Bowman, 2003; Johnson et al., 2011) indicates that current publications have described this process in a many appealing ways, emphasising its complexity or its simplicity through the acceptance of best practices. Some agreement and disagreement among executives about corporate strategy has been reported by Ambrosini and Bowman (2003). They reveal an uncertainty and, quite clearly, a vagueness in communicating strategies throughout an organisation. Instead, it has been evidenced by Beinhocker and Kaplan (2002) that a lack suitable efforts result in disappointing outcomes in strategic planning. They argue in favour of two new goals, the first one begin "to make sure that decision makers understand the business, its strategy and the assumptions behind its strategy" (p. 49) and the second one, to boost innovation. In the same way, for knowledge-based firms, the need for far-reaching vision and value-based strategy, through to intellectual capital and organisational characteristics, has been recommended by Rylander and Peppard (2003). Strategic management literature indicates that, despite more than five decades of activities, both theoretical and practical, discussions about strategy are still on-going. It has been clarified that the perception of the nature of strategy depends on a "firm's strategic goals and priorities" (Cousins, 2005, p.403).

In summary, what is the final or definitive definition of strategy? There is not much agreement about strategy (Whittington, 2001), so it should not be surprising that summarising a comprehensive definition of strategy in a simple phrase presents a number of challenges. For this reason, it is better to mention the most important characteristics of strategy, instead of searching for a firm definition. Bearing in mind the schools of thought on strategy and their four main dimensions described earlier, the characteristics that are usually associated with the word "strategy", are:

❖ A strategy process tends to be a knowledge-based combination of deliberate, emergent-deliberate in overall vision, and emergent in the way in which people deal with environmental factors.

❖ Strategies are identifiable in the marketplace.

❖ The selection of a strategy depends on analytical calculations about the environment.

❖ Market structure and industry structure drives strategies.

❖ Strategy formation is a cognitive, malleable vision of the organisation's future, especially with regard to its sense of long-term direction.

❖ The central variable in the strategy process is environment.

❖ Strategy formation is shaped by power and politics, whether as a process inside the organisation or as the behaviour of the organisation itself in its external environment.

❖ Strategy formation is a process of social interaction, based on the beliefs and understanding shared by the members of an organisation.

Strategies can take the form of a plan, pattern, position, perspective or ploy, but each should be considered in its own time and matched to its own situation.

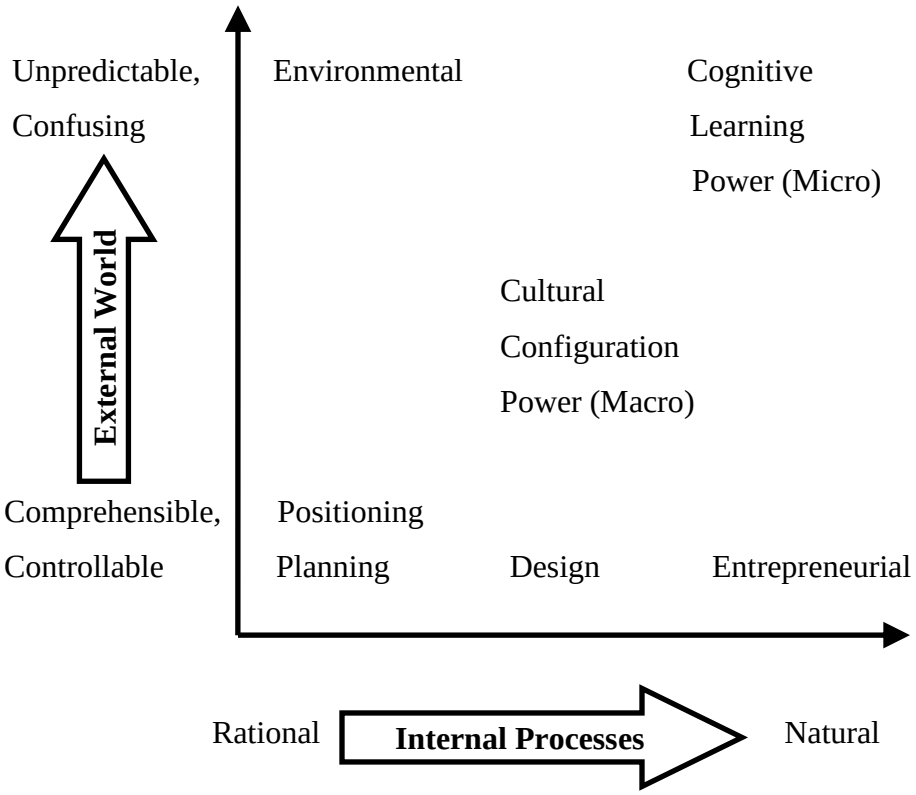
2.2.2. Origins of Strategy

Reviewing the relevant literature reveals that schools of thought pertaining to strategy can be categorised into ten separate schools of strategy. Each school focused on a particular method of strategy-making (Bodwell and Chermack, 2010). These schools fall into three groups perspective, descriptive and configurative (Walker et al., 2008). Prescriptive group is included in three strategic schools, the Design, Planning and Positioning Schools, which are more concerned with how strategy should take place than with how it does take place. Descriptive group set of six strategic schools, the Entrepreneurial, Cognitive, Learning, Power, Cultural and Environmental Schools, that are more concerned with describing how strategy does in fact take place. Configuration group just contains the configuration school that is concerned with strategy as a process of configuration and transformation (Walker et al., 2008). Brief definitions and the pioneers of these schools are as follows (figure 2-1):

1. The Design school: strategy formation as a process of *conception,* (Selznick, 1957; Andrews, 1965).
2. The Planning school: strategy formation as a *formal process,* (Ansoff, 1965).
3. The Positioning school: strategy formation as an *analytical process,* (Porter, 1980).
4. The Entrepreneurial school: strategy as a *visionary process,* (Schumpeter, 1950; Cole, 1959).

5. The Cognitive school: strategy formation as a *mental process,* (Simon, 1947).
6. The Learning school: strategy as an *emergent process,* (Lindblom, 1959; March and Cyert, 1963; Weick, 1979; Quinn, 1980; Prahalad and Hamel, 1980).
7. The Power school: strategy formation as a *process of negotiation,* (Salancik and Pfeffer, 1978; Astley, 1984).
8. The Cultural school: strategy as a *collective process,* (Rhenman and Normann, 1960).
9. The Environmental school: strategy as a *reactive process,* (Hannan and Freeman, 1977).
10. The Configuration school: strategy as a *process of transformation,* (Chandler, 1962; Miles and Snow, 1978).

Figure 2-1: illustrates the correlation between the ten dominant strategy schools



Source: Mintzberg, et al, (2005).

Although there are ten schools in strategy, they conclude in four approaches to strategy. These four approaches differ fundamentally along two dimensions: the outcomes of strategy and the processes by which it is made. These four generic approaches to strategy are Classical, Evolutionary, Processual and Systemic (Whittington, 2001).

The classical approach suggests that strategy is formed through a formal and rational decision-making process. The key stages of the strategy-making process emphasise on a comprehensive analysis of the external and internal environment, which then enables an organisation to evaluate and choose from a range of strategic choices, which in turn allows plans to be made to implement the strategy (Golding et al., 2010). For the classical approach, profitability is the main goal of organisations and the firms use rational planning to achieve their goals and objectives (Analoui and Karami, 2003). This approach tends to separate out operational practices from higher-level strategic planning (Boxall and Purcell, 2003). Whittington (2001) states that "the rigid separation of strategy from operations is no longer valid in a knowledge-based age" (p.107). This view centres upon finding a path between organisation capabilities and opportunities within the competitive environment. According to this approach, a corporation endeavours to differentiate itself positively from its competitors (Analoui and Karami, 2003).

An alternative view of the strategy-making process is the evolutionary approach. This approach suggests that strategy is made through an informal evolutionary process in which managers rely less upon top managers to plan and act rationally and more upon the markets to secure profit maximisation (Golding et al., 2010). The proponents of the evolutionary approach believe that

high profitability and efficiency are essential for the survival of the firm (Analoui and Karami, 2003). They stress the unpredictability of the environment that makes irrelevant much of what is traditionally regarded as strategic analysis (Teece et al., 1997). In evolutionary approach to strategy, the focus is transferred from managers to market behaviour (Whittington, 2001).

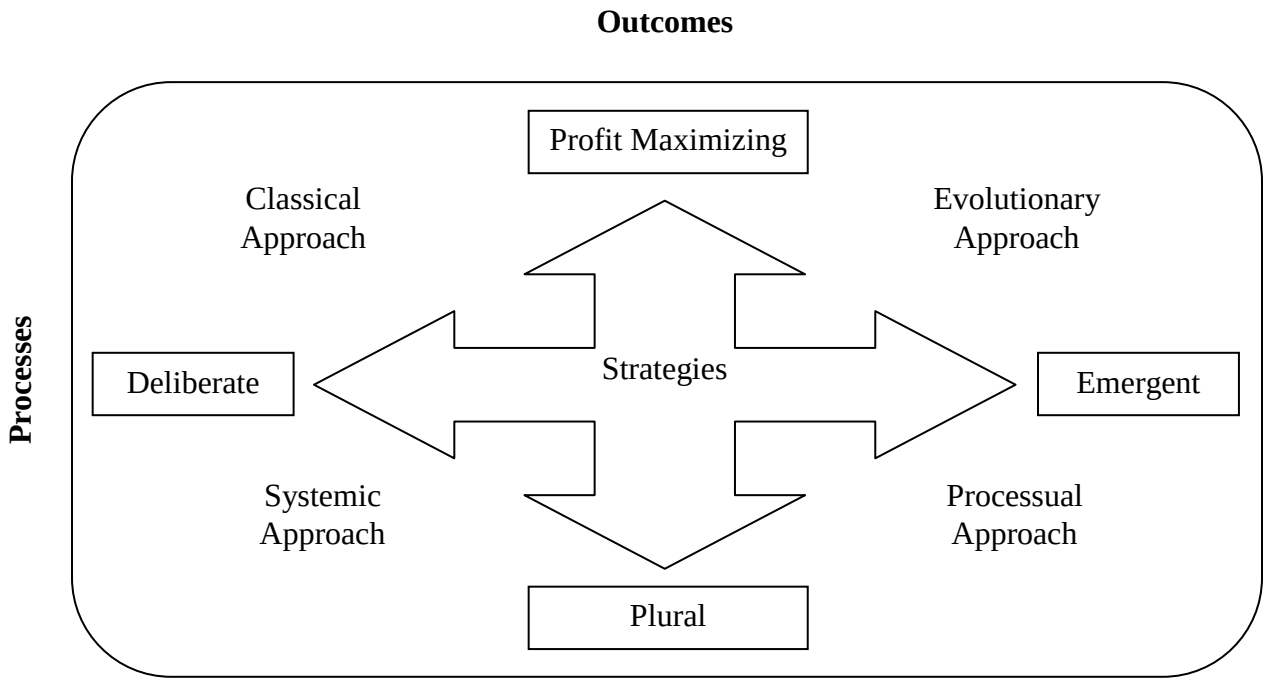
The Processual approach to strategy was developed during the 1970s by Cyert and March (1963) and Mintzberg (1978). This approach generally shares the evolutionary uncertainty about rational strategy making, but is less confident about markets ensuring profit-maximising outcomes (Analoui and Karami, 2003). Processual theorists too dismiss classical formality, viewing strategy as 'crafted'; its goal are vague and any logic often emerges in retrospect (Whittington, 2001).

The systemic approach is based on the classical philosophy, which places stress on the rational approach and the value of the analysis. The systemic approach suggests that strategy is shaped by the social system within which it operates (Golding et al., 2010). Therefore, the cultural and institutional interests of a broader society shape strategic choices. Consequently, organisation's choices are in reality embedded in a network of social relations (Whittington, 2001).

The differences between these approaches can be depicted according to the intersection of the axes in figure 2-2 (Whittington, 2001; Analoui and Karami, 2003). The vertical axis measures the degree to which strategy either produces profit maximizing outcomes or deviate to allow other possibilities to intrude. The horizontal axis considers processes, reflecting how far strategies are the product of deliberate calculation or whether they emerge by accident, muddle

or inertia. In short, two axes reflect different answers to two fundamental questions: what is strategy for; and how is strategy done (Whittington, 2001).

Figure 2-2: Approaches to strategy



(Whittington, 2001, p.10)

2.2.3. Perspectives on Strategy

Through examining the different views of strategy, and by paying attention to the development and management of strategy, it can be posited that there are four perspectives of strategy, *design*, *experience*, *ideas* and *discourse* (Johnson et al., 2011).

Some people define strategy as planning, setting objectives, analysing and maybe evaluating objects (Hatchuel et al., 2010; Johnson et al., 2011). These are words connected to a 'design' view of strategy. The 'design' approach views strategy development as the intentional positioning of the organisation through a rational, analytic, organised and directed process (Hatchuel et al., 2010; Johnson et al., 2011). However, although this approach is useful, it is not sufficient.

As strategy is about the long-term direction of an organisation, it is foreseeable that it might be thought of in terms of major decisions about the future taken at a point in time at the top of an organisation and resulting in one-off major changes (Chew and Osborne, 2009; Johnson et al., 2011). The 'experience' approach views strategy development as the result of both the individual and collective experience of individuals and the taken-for-granted assumptions represented by cultural influences (Johnson et al., 2011).

The 'ideas' view sees strategy as the emergence of order and innovation from the variety and diversity, which exists in and around an organisation (Johnson et al., 2011; Hopp et al., 2011). The 'ideas' attitude draws on the principles of evolutionary theory and complexity theory because they help in the understanding of innovation and change. Both complexity and evolutionary theories emphasise the importance of variety and diversity and place a great deal less emphasis on top-down design (Johnson et al., 2011; Hopp et al., 2011).

In some ways, management is about 'discourse'. About 75% of managers' time is devoted to actions such as communication, collecting information, monitoring and following up

decisions and so on (Johnson et al., 2011). This means that the management of strategy is a discursive activity. In this view strategic management, whether formal or dynamic, is fundamentally discursive. The ability to use discursive resources efficiently can be an idiosyncratic advantage and a competence for an enterprise (Hatchuel et al., 2010; Johnson et.al, 2011).

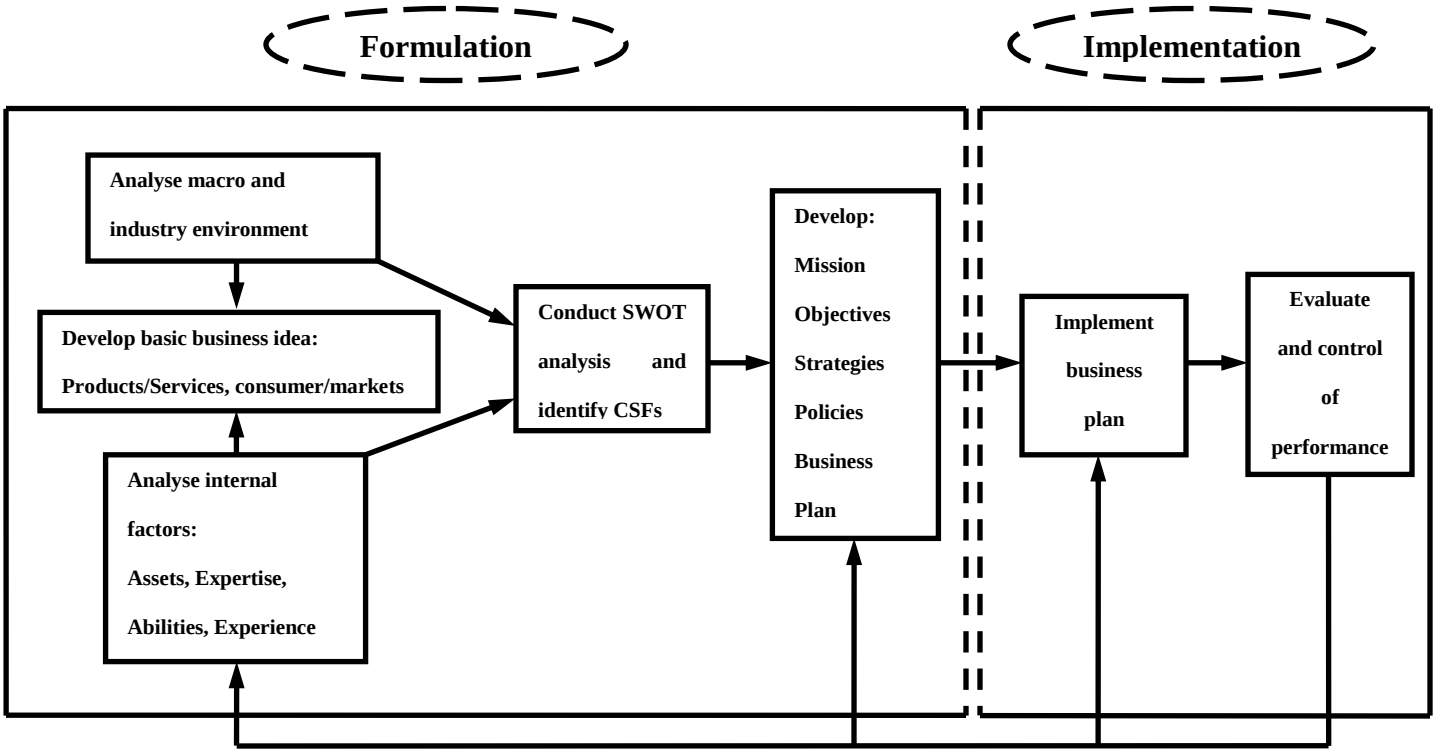
Distinguished writers in the 1980's such as Mintzberg et al. (1982) see strategy not so much as the outcome of point-in-time planning exercises but more as a pattern in a stream of decisions made over time. Process theorists have argued that a clear distinction between strategy formulation and implementation does not really exist. The non-liner nature of the strategy process has been highlighted (Karami, 2007). Some researchers argue that the development of strategies is a process of "logical instrumentalism", where managers implement strategies in a purposeful but gradual manner in order to minimise risk, hence the need to remain opportunistic, experimental and willing to learn and fashion a broad consensus for change (Andres et al., 2009; Clayton, 2009).

2.3. Strategic Management

Fundamentally, strategic management is about setting the underpinning aims of an organisation, choosing the most appropriate goals to achieve these aims, and fulfilling the art and science of formulating, implementing and evaluating cross-functional decisions that enable an organisation to achieve its objectives (Ndara, 2009). Strategic management is a set of managerial decisions and actions that determines the long-term performance of a corporation (Wheelen and

Hunger, 2007). Strategic management is a process that needs to be understood; it is more than just a discipline. It is the process through which organisations determine their purpose, objectives and desired levels of achievement. According to Thompson (1996), the strategic management process includes environmental scanning, strategy formulation, strategy implementation and evaluation and control (Wheelen and Hunger, 2007). Some studies believe there is a close relationship between strategy formulation and strategy implementation, and success of any strategy depends on how the particular strategy is formulated, monitored and managed (Feurer and Chaharbaghi, 1995; Ndara, 2009). This process has been illustrated in figure 2-3.

Figure 2-3: Strategic management process



Source: Adopted from Karami (2007)

2.4. Strategy Formulation

According to a 'planning' view of strategy, it has a linear structure of decision-making (Chaffee, 1985) which includes two main stages; formulation and implementation (Ansoff, 1965).

Strategy formulation, as the first stage of strategic management, gives structure and direction to a firm (Pearce and Robinson, 1991; Collins and Porras, 1995 and 1996; Harari et al., 1995; Andrews et al., 2009; Pantelic, 2009). Strategy formulation sets the direction of the company by defining the vision, mission and values of the organisation with attention to internal and external environments (Galbraith and Nathanson, 1978; Harari et al., 1995). Vision, mission and values set the ideals and priorities and they draw a picture of the present and future status of the company. Also Mintzberg et al. (1991, p. 45-46) state that strategy formulation is making decisions about what to do, and: "… [strategy formulation] includes identifying opportunities and threats in the company's environment and attaching some estimate or risk to the discernible alternatives. Before a choice can be made, the company's strengths and weaknesses would be appraised together with the resources on hand and available. Its actual or potential capacity to take advantage of a perceived market". Bordean et al. (2010), by a survey research among 35 companies, found " today, firms need to cope with competitive challenges related to innovation, dynamic responses and knowledge sharing by means of effective and dynamic strategy formulation" (p.26).

As discussed earlier the early scholars (Ansoff, 1965; Andrews, 1971) in the field of strategy regarded strategy as a rational decision-making process through which the organisation's

resources can be matched with opportunities arising from the competitive environment. Others have stated that, environment has a strong deterministic influence on the strategy formulation process in an organisation (Nandakumar et al., 2010; Ferreira, 2010; Tan, 2010).

The study about evolution of strategic management leads us towards exploring the key characteristics and stages in its process. Literature on this subject, especially from the Rationalist school and the Emergent school, shows us that, based on the fact that environment is unpredictable, a 'planning' approach (rationalist) to strategy does not work effectively in practice (Mintzberg, 1994).

According to Steiner (1969), there are nine major steps in the strategic management process, which are as follows:

(1) formulation of goals; (2) analysis of the environment; (3) assigning quantitative values to goals; (4) the micro-process of strategy formulation; (5) gap analysis; (6) strategic search; (7) selecting the portfolio of strategic alternatives; (8) implementation of the strategic programme; (9) measurement, feedback, and control.

Seven of these steps relate to strategy formulation. However, the question is: can we draw a definite boundary between the formulation and implementation of strategy?

Some scientists, such as Ansoff and Mintzberg, believe that the task of the strategists in organisations has been changed by the highly dynamic environment, so they have to be strategy

finders, knowledge generators and organisers of change, instead of planners and creators of strategy. Therefore, managers need to be, instead of strategic planners, strategic thinkers (Ansoff, 1991, Mintzberg, 1994). So strategy formulation is not only a separate phase in which strategies are planned but, nowadays, based on its strategy-finding task and its readiness to change, its relation to strategy implementation is more significant than before because of the speed of change in organisations' environment, which is necessary to exploit opportunities in the competitive environment (Feurer and Chaharbaghi, 1995; Analoui and Karami, 2003; Anchor and Dehayyat, 2010; Acquaah, 2011; Arefin et al., 2011). So, based on these approaches, there is a very strong correlation between formulation, as the formation stage of strategy, and implementation, as the application stage of strategy.

To achieve a suitable strategy formulation, we need a model for analysing elements of success or failure of strategy formulation, which is the gap in the literature on strategy. Therefore, this research is concentrating on achieving an appropriate strategy formulation process applicable in high-tech SMEs. In addition, high-tech is the selected industry for this research because of their importance for the economy, as discussed in chapter three.

2.5. Environmental Scanning

Parnell et al. (2012), who carried out a survey among 107 manufacturing and service companies, found the most common process for understanding environment is through analysing the business environment. Organisations are constantly trying to adjust themselves to environmental changes on several fronts, including customer priorities, competitor tactics,

technological developments, government policies and legislation, and social, economic and environmental circumstances (Choo, 1993). Companies are increasingly faced with complication, instability and uncertainty. So that they can thrive in such situations, firms must find new solutions with which to respond and adjust. Also, according to Berard and Delerue (2010) research with survey data from 123 biotechnology SMEs located in 14 countries, it has been showed environmental scanning appears to be an important step in the intellectual property strategy, as it enhances the firm's capacity to protect its intellectual assets. Therefore, successful environmental scanning is a crucial and fundamental managerial activity.

In general, it has been accepted that environmental scanning supports organisational adjustment to the competitive environment. The performance of environmental scanning might differ with the level of environmental change and uncertainty. Hough and White (2004) found that there was a positive relationship between scanning activity and environmental ambiguity; when environmental uncertainty was increasing, then scanning activity was also increasing.

Thus, an organisation's development and existence is reliant on the nature of the encountered environment. It is worthwhile, then, for all organisations to be conscious of their industrial environment, which they will face both now and in the future (Choo, 1993; Berard and Delerue, 2010; Olamade, 2011). In line with this view of strategic planning, both professionals and academics have been paying attention to 'environmental scanning and forecasting' as a main component of strategy formulation. Some of them even believe that scanning activity is intrinsic to the formulation of options and the selection of the 'best' approach (Fredrickson, 1984; Bourgeois and Eisenhardt, 1988; Dean and Sharfman, 1993). Environmental scanning describes

the process of gathering, analysing and assimilating information about a company's external environment in order to support the company's strategic planning (Olamade, 2011). Although environmental scanning is a basic requirement of strategy planning and is needed for the growth of any business, however it is not the only requisite (Hambrick, 1982; Muhammad et al., 2009; Pelham et al., 2011).

The acquisition of precise and perfect information for effective environmental scanning is crucial to all managers, especially those of companies in high-tech industries because of the speed of technological turnover, internationalisation and severe competition. The conditions have increased the level of ambiguity that these industries are facing (Bourgeois 1985; Zahra and Bogne 2000). Therefore, environmental scanning has become one of the main success factors for all sorts of enterprises including; large, medium or small-sized organisations and those involved in high and low levels of technology (Pollard and Hayne, 1998; Raymond et al., 2001). Despite the fact that environmental scanning is important and crucial for all industries, however, the relationship between the type of environmental scanning and the performance of high-tech SMEs is under researched in the current literature.

2.5.1. Typology of Environmental Scanning

Most studies about environmental scanning, so far, have been carried out on two dimensions 'generic' and 'informational' (Hambrick, 1982; Daft et al., 1988; Kuhn and Freitas, 2008; Muhammad et al., 2009; Pelham et al., 2011). These studies vary because of their attempts to move towards several scanning and forecasting models, and also domain, procedure and

operative details. So, according to these various differentiations, different research has expressed different levels of impact for monitoring the environment on strategy formulation (Berard and Delerue, 2010; Kumar et al., 2011; Danneels, Sethi, 2011; Karami, 2012). Only some studies, thus far, have systematically investigated the relationship between environmental scanning and forecasting ability and their influence on a company's performance. Senior managers must be well informed about their company's environment and monitor it, if they are to be responsible for their organisation's survival and best performance. Environmental scanning consists of information about events and tendencies relating to the internal and external environments of an organisation, or, in other words environmental scanning is the knowledge which enables management to plan the organisation's direction in the future, according to real conditions (Auster and Choo, 1993; Aguilar et al., 1997; Abebe et al., 2010; Othman and Hamedon, 2011). Environmental scanning is a process used to search for and gather information about a particular subject, as well as monitoring environments without any specific requirements (Aguilar, 1997; Abebe et al., 2010).

Further research into environmental scanning; to date, tends to focus on general aspects of scanning rather than taking an informational view to examine actual monitoring behaviour. Regarding the general side of research into environmental scanning, managers have been asked questions such as, "Tell us how often you generally receive useful information from external written sources" (Daft et al., 1988, p. 129), or "Rate the approximate frequency with which each type of information comes to your attention" (Hambrick, 1982, p. 172). This kind of general information tells us something about the scanning behaviour of managers. However, we need

more information concerning the strategic type of environmental scanning associated with different types of industry.

According to the literature, much research has been carried out about the complexity of environmental scanning (Stewart, 2008; Berard and Delerue, 2010). Based on this research, there seem to be at least three types of scanning complexities which depend on the type of enterprise, its industry and its level of development. Aguilar (1967) carried out one of the earliest studies. He pointed out four types of environmental scanning in his book:

(1) "Undirected viewing": gathering information without a specific purpose,
(2) "Conditioned viewing": gathering information with a specific purpose but in an unorganised fashion,
(3) "Informal search": gathering information with a specific purpose with a somewhat partial search activity,
(4) "Formal search": an organised gathering of information with procedure, impetus, scope, temporal nature and methodology to access a specific purpose.

In accordance with another study, in the same way, Jain (1984) found four different types of environmental scanning. These are as follows:

(1) "Primitive phase": lack of awareness about the importance of environmental scanning and therefore no particular attempt for scanning,

(2) “Situational phase”: awareness of the importance of environmental scanning but no serious attempt and process for scanning,

(3) “Reactive phase”: awareness of the importance of environmental scanning and gathering information with minimal unscheduled and unorganised activities,

(4) “Proactive phase”: awareness of the importance of environmental scanning and gathering information with precise scheduled and organised activities.

Fahey et al. (1981) carried out the third major study about environmental scanning. In this study researchers tried to identify three types of environmental scanning with a combination of general and informational perspectives, as follows:

(1) “Irregular scanning”: understanding the importance of environmental scanning but a partial attempt and selected events with a simplistic forecasting methodology,

(2) “Intermittent scanning”: knowing the importance of environmental scanning, so periodically and more carefully analysing the environment with statistical orientation,

(3) “Continuous scanning”: constantly focusing on comprehensive environmental scanning in order to seek opportunities while employing futuristic methodology.

Irregular systems are used on an ad hoc basis and tend to be crisis initiated. These systems are used when an organisation needs information for planning assumptions and conducts a scan for that purpose only. Periodic systems are used when the planners periodically updates a scan, perhaps in preparation for a new planning cycle. Continuous systems use the active scanning

mode of data collection to systematically inform the strategic planning function of the organisation.

Research by Fahey et al. (1981) is important in two aspects. Firstly, in this study researchers tried to identify types of environmental scanning according to a combination of general and informational perspectives. Secondly, this research tried to study the behaviour and motivation of managers to carry out environmental scanning. This study, in line with the 'general' perspective, based on the frequency of scanning, has categorised environmental scanning into three types: irregular, periodic and continuous. Also according to the 'informational' perspective, each type of classified environmental scanning has included some information about motivation for environmental scanning, scope of scanning, its temporal nature, the types of forecasts and its forecasting method.

2.5.2. Environmental Scanning and High-Tech SMEs

Small and medium-sized enterprises' engagement in formal environmental scanning activities has not been documented extensively in strategic management literature. For example, Hambrick (1982) and Johnson and Kuehn (1987) have remarked that SMEs show little tendency to engage in such practices. Franco et al. (2011) by obtaining data from 165 Portuguese firms indicates that SMEs do not scan as broadly and as frequently as large-sized enterprises (LEs). Olamade (2011), based on a survey from 84 manufacturing companies drawn from southwestern Nigeria, showed while all large companies employed the active mode of environmental scanning, only about 85% of small and medium sized companies adopted a systematic and structured

approach to environmental scanning. Raymond et al. (2001) identified a follower role for SMEs; they stated that there is "one best way" for SMEs to monitor their environment (Baumard, 1991), and that is by using large companies' viewing models.

Today we know that these kinds of views are not only simplistic (Boynton et al., 1993; Liao et al., 2008; Othman and Hamedon, 2011; Parnell et al., 2012) but also pessimistic. The source of these opinions contains a lack of knowledge about SMEs and their process of environmental scanning, which includes selecting, gathering, interpreting and analysing external and internal information when considering strategies and improving activities. Argyris (1965) and Sanzo et al. (2011) believe that collecting information in SMEs is a procedure which is mostly personable, collective and compound, so we know a small amount on the subject of how information becomes knowledge for best practice and performance, especially in an unstable environment. In addition, it has been identified by Shrader et al. (1989), Matthews and Scott (1995) and Haase and Franco (2011) that there is normally a lack of adequate information-gathering infrastructure in high-tech SMEs which they crucially need to manage their dynamic environment.

It is not necessary for SMEs to develop their environmental scanning phase by phase from an unorganised to an organised information collection process, because overtime, firms are changing the way they scan their business environment and are increasingly engaging in targeted information seeking (Daft and Weick, 1984; Milliken, 1987; Raymond et al., 2001; Alam, 2011). In order to develop and sustain competitiveness, the availability of timely and relevant information through effective environmental scanning is equally important for SMEs (Liao et al., 2008). Environmental variables such as the level of technological improvement (Raymond et al.,

2001), different views and the quality of managers and their kind and level of education (Julien, 1993; Abebe et al., 2010; Pelham and Lieb, 2011) and their willingness and capacity to participate in the societies and associations for gathering information, in addition to other benefits can have an effect on decision-making about types and levels of environmental scanning by SMEs (Alam, 2011). Other environmental variables must, however, be taken into account by SMEs, for instance, the type of competitive advantage (Aaker, 1989; Adema and Roehl, 2010).

Environmental scanning behaviours of organisations most rely on to deal with environmental instability and importantly, these are strongly associated with superior organisational performance (Brews and Purohit, 2007). Managers of high-tech companies, because of their dynamic environment and changeability, need to gather extra information and to take a different attitude to environmental scanning. An information processing perspective to environmental scanning can help managers to identify strategic types of environmental scanning and to apply other choices for action (Dutton and Jackson, 1987; Abebe et al., 2010; Pelham and Lieb, 2011). The information processing perspective can be used to renew and develop decision foundation and criteria (Walsh, 1995; Berard and Delerue, 2010) and can also organise supplementary information which can be used by managers to speed up the decision-making process and subsequently produce better performance (Eisenhardt, 1989; Santos and Eisenhardt, 2009).

Managers who are working in low-tech industries with more certainty and stability than their high-tech counterparts often need a more restricted approach to environmental scanning. As a result, from an information-processing perspective, the amount of endeavour required for environmental scanning is positively and linearly associated to the degree of environmental

uncertainty and dynamism. A positive relationship between an unstable environment and the frequency of environmental scanning has been investigated in Nigeria by Sawyerr (1993) and Abiodun (2009), in Hong Kong by Ebrahimi (2000) and Brew and Purohit (2007) in America and South Africa. Also, the result of a survey by Anchor and Aldehayyat (2010) from 83 Jordanian SMEs found similar results regarding to the relationship between unstable environment and strategic planning, also they stated that there are considerable similarities between strategic practice in Jordan and those which have been found in earlier studies in developed countries. The idea has generally been accepted that firms do not have access to unlimited capacity and resources for environmental scanning (Daft et al., 1988), and so due to this limitation not only in SMEs but also in LEs, managers are selectively scanning parts of their environment, depending on the situation within the enterprise and industry. Hence, the information-processing perspective recommends that enterprises move towards flexibility and tailoring when gathering information, based on the degree of information importance and the level of environmental ambiguity. It has been found that three main components of strategic environmental ambiguity are unpredictability, complexity and importance (Boyd and Fulk, 1996; Marcel et al., 2011). Specifically, it has been shown that directors' scanning activity increased when environmental unpredictability, importance and frequency of change increased (May et al. 2000; Teece, 2009). In contrast, managers' environmental scanning activity declined when complexity increased (Hough and White, 2004). Therefore, unpredictability, importance and frequency of change can increase environmental scanning activities whilst complexity might have a reducing impact.

As a result, the best environmental scanning system, gathering effective and sufficient information, lets SMEs retain or boost their levels of competitiveness and performance (Raymond et al., 2001; Gibbons and O'Connor, 2005; Wang et al., 2010). Thus, it does not matter whether one uses a simplistic or a sophisticated environmental scanning type, or a 'primitive' or a 'situational' scanning system (Aaker, 1989; Gassmann and Becker, 2006). The important point, which is central to this selection, is the cognition of environment and the selection of a perfect scanning system in line with the organisation's situation and its targets.

Since, types of environmental scanning which identify with Fahey et al. (1981), because of their general and informational perspectives, therefore this research has used similar types of environmental scanning to explore the relationship between the type of environmental scanning and high-tech SMEs performance.

2.6. Mission Statement

A crucial requirement for effective formulation, implementation and evaluation of strategy is a unique and well-designed mission statement (David, 2001; Kemp and Dwyer, 2002).

A mission statement communicates goals that are in line with the values of the organisation and the needs of the stakeholders (Kemp and Dwyer, 2002; Kirk and Beth Nolan, 2010). A good mission statement is a map that shows an organisation the path to reach its future goals. A mission statement covers a broad series of topics such as: markets, services, organisation, management, personnel, technology, facilities and equipment, external affairs and relations

(Bart, 1998; Ackoff, 2001; Kemp and Dwyer, 2002; Bartkus et al., 2004). Without a mission statement, the organisation has no way of determining whether it is making progress. According to a very interesting definition by Ackoff (1987), "An organisation without a shared vision of what it wants to be is like a traveller without a destination". Or based on another understanding by Baetz and Kenneth (1998), "A mission statement provides organisational members with a *meaning for their existence*". A mission statement can create a shared understanding between people across the organisation and this common sense of purpose will help all to coordinate activities to achieve corporate objectives (Daniel and Davis, 2009). So according to many researchers such as David (2001), the development of a proper mission statement is a core process in strategic management.

An accurate mission statement is fundamental to the sound strategic management of an organisation for a number of reasons:

Firstly, without a suitable mission statement, development formulation, implementation and evaluation of strategy are futile because only a straightforward and correct description of an organisation's missions and targets can be effective to develop realistic strategies (Drucker, 1974; Wysocki et al., 2010), and it can be a criterion for selecting the right strategy among many.

Secondly, an appropriate mission statement can offer a standard for optimal allocation of corporate resources (Whitbred et al., 2010; Grunig and Kuhn, 2011). With this common standard map one can estimate stable and transitory, short and long-term organisational needs. So this optimal allocation can allow an organisation to easily control cost, time and performance

parameters (Chew, 2009). Pearce and David (1987), by comparing mission statements of high and low performance firms', determined that high performance companies have more comprehensive mission statements than low performers. Thereby, the positive relationship between an organisation's performance and its comprehensive mission statement is clear and strong.

Thirdly, as has been discussed, a proper mission statement is a common standard map which can show organisational values and priorities to all stakeholders. Therefore, it can help all members of an organisation to have a general idea about organisational purpose(s) and the direction needed to attain these targets (Klemm et al. 1991; Williams, 2008).

Finally, a comprehensive mission statement is responsive to the various demands of a wide range of stakeholders, externally or internally - such internal groups as employees, including managers and staff, and such external groups as customers, suppliers, shareholders and governmental and public agencies (David, 2001; Williams, 2008).

But the question is, what are the components of a comprehensive mission statement which will bring about improved performance?

Today, most managers, though aware of the importance of a mission statement, are critically concerned about the contents of their firm's mission statement and its relation to their company's performance (Daniel and Davis, 2009; Wysocki et al., 2010). Thus far, many research studies have investigated mission statement and its characteristics and contents (Williams, 2008; Khalifa, 2011). However, they have studied mission statement as an abstract, without any

connection to other organisational elements and specific performance-related results (Campbell, 1989; Campbell and Yeung, 1991; Coats et al., 1991; Collins and Porras, 1991; Klemm et al., 1991; McGinnis, 1981; Pearce, 1982; Pearce and David, 1987; Williams, 2008; Khalifa, 2011). Based on these researches, a mission statement should encompass the following details:

- identify the path(s) by which the company can be unique and successful,
- unite various stakeholders to achieve one or more common goals,
- draw basic differences in enterprise activities (in comparison with its competitors),
- create areas of development toward the organisation's measurable and non-measurable goals.

If the mission statement fails to do its jobs properly, it is not valid and has no efficiency for the enterprise.

It has been discussed (Williams, 2008) that the researches into mission statement have largely concentrated on its details and contents as an abstract and less attention has been paid to exploring the relationship between the mission statement and other elements of management. But Bart and Baetz (1995) created an innovative view of mission. Their perspective paid less attention to the general aspects of the mission statement. In their research, they linked the mission statement to the firm's type (high-tech or low-tech) and its performance indicators. For instance, Ingenhoff and Fuhrer (2010) showed that managers should not predominantly orient the formulation of their mission statement to the norms of their industry, or to their stakeholders in order to demonstrate responsiveness.

Since a mission statement is developed by a company to access its best level of performance, if the mission statement is unable to help that company access its best performance, then, at best, we can say that the mission statement is very weak (Ackoff, 2001; Williams, 2008; Alavi and Karami, 2009). Although the relationship between the mission statement and the firm's performance has been studied by many researchers (Bart, 1998; Williams, 2008) over many years, still the question about the impact of measurable and non-measurable elements of a mission statement on a firm's performance remains and has not been widely studied in the literature. On the one hand, some studies have emphasised non-measurable elements of mission statement to improve performance; for instance, Falsey (1989) stated that firms with a mission statement stressed phrases that expressed their organisation's philosophy with regard to reaching higher performance levels. On the other hand, other research emphasises measurable elements. This research states that the content of a mission statement should not include what the organisation must do to continue its existence, but instead the mission statement should explain what the firm must do to be prosperous. For example, Ackoff (2001) explained that "if we say [that a] company looks 'to make an adequate profit,' it is like saying that a person's mission is to breathe enough air" (Ackoff, 2001). In most of the literature about the relationship between the mission statement and a firm's performance, it can be concluded that the research which emphasises measurable elements has more weight than the research which stresses non-measurable elements.

Although many studies have been carried out about the content of a mission statement (Pearce and David, 1987; Davies and Glaister, 1997; Bart, 1996, 1997, 1998, 1999; Williams, 2008; Arefin et al., 2011), still, because of the varying definitions and concepts of a mission statement,

there are no universal and standard characteristics on this issue. But, generally, based on the shared views of these various studies, it can be assumed that the contents of a mission statement should include nine dimensions: customers, products/services, location/markets, technology, growth and profitability, the Firm's philosophy, self-concept, public image and employees, (Pearce and David, 1987; Kirk and Beth Nolan, 2010; Khalifa, 2011, Wang, 2011).

So, based on these dimensions, some researchers (Pearce and David, 1987; Bart, 1998; Williams, 2008; Alavi and Karami, 2009; Arefin et al., 2011) have identified several components of the mission statement, the most important of which are as follows:

- purpose
- philosophy
- specific financial objectives
- non-financial objectives
- specific product offered
- general definition of production
- specific market served
- general market definition
- one big goal for the company
- general company goals
- distinctive competitive position
- general competitive position
- self-concept
- location of business

- technology defined
- concern for employees

Although many researchers (Ackoff, 2001; Bartkus et al., 2006; Williams, 2008) have studied the relationship between a mission statement and a firm's performance but have investigated the general association between a mission statement and performance. Hence, there is still gap in this information regarding which parts of mission statement have a positive impact on a firm's performance; this has not been widely studied in the literature (Bart, 1998).

2.6.1. Mission Statement and Performance

Regarding the relationship between the mission statement and a firm's performance, there are two major views. The first one is the influence of a mission statement's financial goals on the firm's performance, and the second one is the impact of a mission statement on a firm's financial performance.

According to the first view, Falsey (1989) asserted that the inclusion of a series of principles to represent financial variables can assist companies to achieve higher levels of performance. But, on the other hand, Alavi and Karami (2009) concluded in their study that the existence of mission statements in the studied firms directly influenced a firm's performance, but the presence of financial goals in the mission statement were negatively associated with a firm's performance.

Consistent with this second view, Bartku et al. (2006) discussed that there is no perceived relationship between the parts of a mission statement and a firm's performance. They found that there is no significant evidence to show the impact of a mission statement on a firm's financial performance and also, that there is no significant difference between companies with or without mission statement on their financial variables (Bartkus et al., 2006). Also, Desmidt et al. (2011) by reviewed literature showed a small positive relation between mission statements and measures of financial organizational performance. On the other hand, other studies believe that there is a relationship between a mission statement and a company's performance. Crott et al. (2005) found that for-profit organizations with a close fit between organizational mission statement and internal environment performed better than organizations with less fit. Bart (1998) in a study found a relationship between a firm's financial performance and its formal mission statement. It also has been found that having a mission statement could considerably increase a shareholder's equity (Rarick, 1995).

So, firstly, the contents of most mission statement have no direct relationship with a firm's financial performance (Falsey, 1989; Alavi and Karami, 2009). And, secondly, there is a strong relationship between the contents of a mission statement and a firm's non-financial performance such as customer satisfaction, organisational behaviour and so on (Bart, 1998; Crott et al., 2005; Bartku et al., 2006; Desmidt et al., 2011). Hence, just to focus on the relationship between the mission statement and a firm's financial performance would not only divert the investigation, it would also distract from the relationship between a comprehensive mission statement and a firm's overall performance.

Also, from the perspective of various firms, including high-tech or low-tech firms and SMEs or large enterprises, there are many different views. Due to the importance of high-tech SMEs in economies, which was described earlier, some questions arise. What role does a mission statement play in high-tech SMEs in relation to their performance? And which parts of the mission statement help high-tech SMEs to perform better?

In spite the relationship between the mission statement and a firm's performance, still the nature of this relationship, particularly in high-tech companies, is not apparent (Bart, 1996). Although there is much research regarding the relationship between strategy and technology, research, relating to the scope of the relationship between technology and the mission statement is very limited. The most significant research has been carried out by Bart (1996). He concluded that the differences between high and low-tech firms' mission statement are in three axes: "definition of success, definition of the firm's business and selected behaviour standards" (Bart, 1996, p. 221).

Regarding the importance and content of mission statement for improving performance in SMEs, there are different opinions. Toftoy and Chatterjee (2004) believe that having a mission statement is among the first necessities that SMEs should have in order to perform better. But O'Gorman and Doran (1999) believe that there are no considerable distinctions between the content of mission statement and the high or low performance of SMEs. Also, high performance SMEs do not have more comprehensive mission statement than low performance SMEs (Churchill and Lewis, 1983; Hashim et al., 2001).

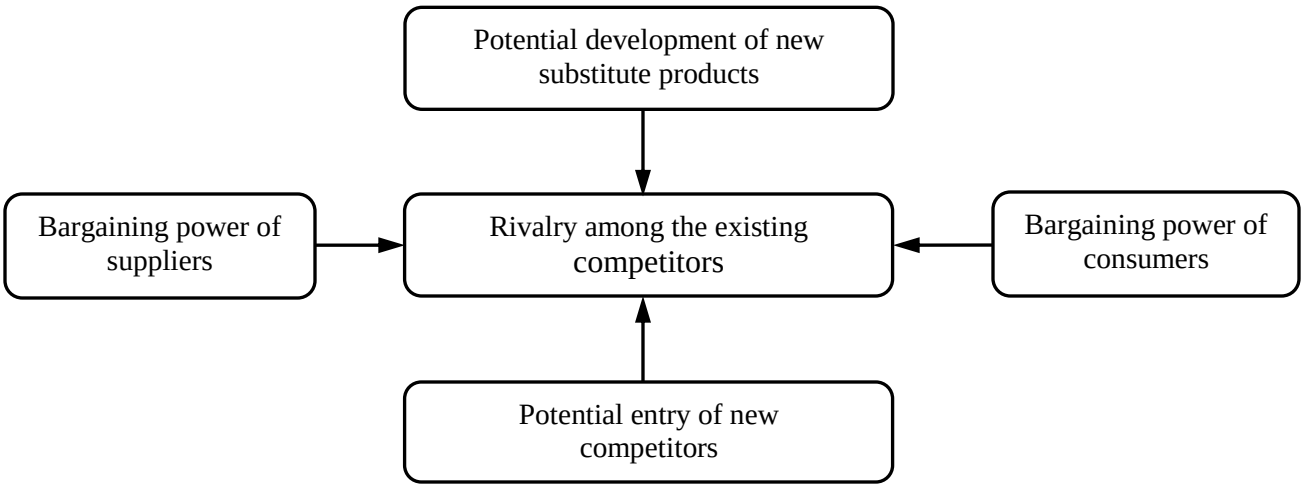
Managers, especially today in such a competitive environment, are concerned about their company's performance. Many researchers have just studied the general association between a mission statement and performance. Hence, there is still gap in the literature regarding which parts of mission statement have a positive impact on a firm's performance. Therefore, the relationship between measurable and non-measurable contents of mission statement and firm's performance is investigated by relevant hypothesis in this study.

2.7. Competitive Forces and Strategy

It has been argued by Porter (1985) that in any industry the role of competition is embodied in five competitive forces (figure 2-4):

- Potential entry of new competitors
- Potential development of new substitute products
- Bargaining power of consumers
- Bargaining power of suppliers
- Rivalry among existing competitors

Figure 2-4: Porter's Five Forces Model of Competition



Source: Porter (1985, p.11)

The five-force framework allows a firm to see through the complexities and to pinpoint those factors, which are critical to competition in its industry as well as identifying those strategic innovations that would most improve the industry's profitability.

To understand how to achieve competitive advantage and how to generalise about the relative position of individual firms within an industry, Porter (1985) developed the concept of generic strategies, categories of strategy that follow a particular pattern. There are two basic types of competitive advantage, which the firm can process: cost leadership or differentiation. These two basic types of competitive advantages could be combined with the scope of activities that a firm seeks to achieve (Porter, 1985), and lead to three generic strategies for achieving an average performance in an industry. Each generic strategy requires a specific set of characteristics and resources. Cost leadership requires the aggressive construction of facilitates for high production volumes, the pursuit of cost reductions through learning and experience, a strict control of costs

and general expenses and other areas. In differentiation, the firm's reputation as a quality or technology leader, strong cooperation from channels, great marketing skills, product engineering and basic research are very important (Weber and Polo, 2010). Also, The result of a survey by Nandakumar (2011) from 124 organisations indicates that firms adopting one of the strategies, cost leadership and differentiation; perform better than "Stuck-in-the-middle" firms which do not have a dominant strategic orientation.

While Porter's conceptualisation recognises that firms can and do influence their industry, the primary impact on performance comes from the industry itself (Liang et al., 2007; Metts, 2007). Industry competitive forces directly and indirectly affect firm's performance (Spanos and Lioukas, 2001; Liang et al., 2007; Metts, 2007). The indirect impact of industry competitive forces is through strategy-making activities within the firm (Metts, 2004, 2007; Low and Cheng, 2006; Liang et al., 2007).

2.7.1. Cost Leadership

This assumes that costs can be reduced, for example through economics of scale and this is important to customers. This is an inherently unattractive alternative for smaller firms as they cannot achieve the economics of scale of large firms and seldom have the capital to invest constantly in new technology (Porter, 1985, Karami, 2007).

2.7.2. Differentiation

A company with this competitive strategy likes to be unique in its industry and it takes into consideration aspects which are widely valued by customers (Johnson et al., 2011). This is called developing a unique selling proposition (USP). The firm sets out to establish itself as unique and different from its competitors in some ways (Kumar et al., 2011). It can then charge a premium price. The risks associated with this are that the differentiation cannot be sustained as competitors imitate or the USP becomes less important to customers, or, if the premium charged is too high, customers may decide not to purchase. A differentiation strategy focuses on developing a product or service that is unique or perceived to be unique in the mind of customers to create competitive advantage (Acquaah, 2011). A firm implementing a differentiation strategy is able to achieve a competitive advantage over its rivals because of its ability to create entry barriers to potential entrants by building customer and brand loyalty through quality offering, advertising and marketing techniques (Acquaah, 2011). Porter, 1985, Karami, 2007 believe this is an attractive strategy for smaller firms, particularly when combined with the third generic strategy. Also Gomes et al. (2009) by a survey from a sample of 68 Portuguese manufacturing organisations, showed that organisations, which followed a differentiation strategic choice tended to achieve higher performance, relative to organisations which did not.

2.7.3. Focus

Where the firm focuses on a narrow target market segment combined with either of the other strategies it can chose to focus on competitive strategy. The focus strategy has two

variants: cost leadership-focus and differentiation-focus (Porter, 1991). If the firm adopts a strategy of differentiation-focus, it is said to pursue a niche strategy. This is a very attractive strategy for SMEs. Focus can also be placed on cost leadership, where concentrating on certain market segments offers some cost advantages. Figure 2-5 illustrates generic competitive strategies and their attraction to SMEs (Karami, 2007).

Figure 2-5: Generic competitive strategies and their attraction to SMEs

Competitive scope	**Competitive Advantage**	
	Cost leadership (not attractive)	**Differentiation** (attractive)
	Cost focus (possibly attractive)	**Differentiation focus** (very attractive)

Source: Karami (2007, p.51)

Cost leadership and differentiation strategies seek competitive advantages in a broad range of industry segments, while focus strategies vary widely from industry to industry, as do the feasible generic strategies in a particular industry (Johnson et al., 2011).

As mentioned, cost leadership, differentiation and focus are generic competitive strategies and can be effective in any industry. However, the usage of them for achieving the best performance differs from industry to industry. The findings of a questionnaire survey from 104 family firms shows that the business strategies of cost leadership and differentiation were both positively related to return on performance (Acquaah, 2011). Although it is believed, there is a great interest in SMEs from a differentiation-focus and a cost leadership-focus (Karami, 2007). Emprical research by Plechero et al. (2012) among 925 companies from China and India, showed

that advanced organisational processes seem to facilitate the strategic movement away from pure cost leadership to either differentiation or focus strategies. However, this interest can be diverse in different industries and with different levels of technology. In the literature, less attention is paid to these differences, particularly in high-tech SMEs, which is the subject of this research.

2.8. Strategic Capability

Understanding strategic capability is an important element in the strategic management process. A definition of strategic capability is very important in researching strategic management.

Strategic capability is about providing products or services to customers that are valued or might be valued in the future (Levin et al., 1987; Johnson et al., 2011). The resources of an organisation underpin their strategic capability since these are deployed into the activities of the organisation to create competences, particularly those unique resources and core competences that competitors will find difficult to imitate.

The literature with regard to how firms can obtain competitive advantage is mainly based on two key viewpoints: the industrial organisation view and the resource-based view (RBV) (Caloghirou et al., 2004; Fernandez-Ortiz and Lombardo, 2009). In the1980s, the industrial organisation view stated that a firm's competitive advantage mainly relies on its strategic position in a competitive market and its aims regarding how the external environmental factors can affect a firm's benefits (Aaker, 1984; Coyne, 1986; Porter, 1985).

Next, a resource-based view grew in the 1980s (Wernerfelt's, 1984) and developed rapidly in the 1990s. It emphasises that resources and capabilities are the critical sources of competitive advantage, especially those that are diverse and unique. Therefore, the resource-based view enforces the fact that firms should attempt to develop their own special resources and capabilities and, in that regard, should formulate their own strategies (Aaker, 1989; Prahalad and Hamel, 1990; Grant, 1991; Barney, 1991; Javidan, 1998; Paiva et al., 2008; Lockett et al., 2009). The resource-based view combines strategic resources and capabilities, which can help to improve enterprises in relation to two environments, external and internal (Collis and Montgomery, 1995; Kraaijenbrink et al., 2010; Barney, 2012).

In the last decade, researchers have paid more attention to the resource-based view, especially in the fields of strategic management, economics and organisational theories (Galbreath, 2005). According to Grant (1991), the main reason that the resource-based view is interesting to researchers is based on two premises. Firstly, the resources and capabilities within a firm offer precise strategic directions; secondly, sources and capabilities within a firm are the major sources of a firm's profits. Therefore, through identifying and assessing resources and capabilities, a firm can establish the foundations needed for obtaining competitive advantage. In other words, the resource-based view stresses that a firm can achieve differentiation and acquire competitive advantage via its resources and capabilities (Hoskisson et al., 1999).

Two branches of the resource-based view are identified in order to give it a wider application. First is the knowledge-based view (KBV); this regards a firm as a different knowledge production unit (Foss, 1996). KBV emphasises that knowledge, especially tacit knowledge, is an

extremely useful source of competitive advantage (Slater, 1996; Barney and Wright, 1997; Lubit, 2001; McEvily and Chakravarthy, 2002; Dehning and Stratopoulos, 2003; Nastase, 2009). Consequently, it seeks to develop knowledge creation and transformation models, and suggests that corporate culture, management systems, operational systems and resource management are the crucial sources of competitive advantage (Flamholtz and Hua, 2003; Gassmann and Keupp, 2007).

The other branch of a resource-based view is dynamic capabilities, which indicates why some firms still maintain a competitive advantage in a turbulent context. In such a market, dynamic capabilities become the main and critical source of a firm's competitive advantage (Teece and Grindley, 1997; Teece, 2009; Madhok and Osegowitsch, 2011).

With quickly changing environments, especially external environment, competitive advantage has become more unsustainable and unpredictable. So, in this turbulent environment, the theory of dynamic capabilities has grown in importance in its place (Eisenhardt and Santos, 2002; Cepeda and Vera, 2007; Teece, 2009). Dynamic capabilities are looking at the firm's ability to integrate, build and reconfigure internal and external competences to direct a fast reaction-changing environment (Teece and Grindley, 1997; Teece, 2009). The meaning of dynamic capabilities is capabilities which are specific and strategic, which help a firm gain new resource formations as markets emerge, collide, split, evolve and die (Eisenhardt and Martin, 2000; Teece, 2009).

It is believed that there is a relationship between dynamic capabilities and a knowledge-based view (KBV) (Easterby-Smith and Prieto, 2008; Ambrosini and Bowman, 2009; Hsu, 2012). Dynamic capabilities can also be measured as knowledge (Macpherson et al., 2004), and they are developed through gathering experiences, knowledge articulation and knowledge codification (Zollo and Winter, 2002). Zheng et al. (2011) by using a seven-point Likert questionnaire measured the relationship between knowledge-based dynamic capabilities and firm's performance from 218 Chinese manufacturing firms. They found a significant relationship between knowledge-based dynamic capabilities and firm's performance.

Most interpretations link dynamic capabilities to changing environments. Although this definition is true, it not only happens when an organisation faces high-ambiguity but also whenever it needs to reconfigure its resources and procedures; the same thing happens to a young firm when it experiences rapid growth (Zahra et al., 2006; Ambrosini and Bowman, 2009). Hence, dynamic capabilities are dynamic because of their environment and they can reconfigure an organisation's resources and processes; in a way, this changes between a firm's decision-makers estimations and their principles (Zahra et al., 2006; Teece, 2009). The relation between, and impact of dynamic capabilities is indirect. For this reason, most research models in this area are going to identify the outcome of dynamic capabilities on substantive capabilities and the enterprise's knowledge base, which in turn influences performance together with entrepreneurial activities (Zahra et al., 2006).

In summary, firms' attempts to pursue competitive advantage have led to a change of strategic view from the industrial organisation view toward a resource-based view and, this has recently

been segmented into a knowledge-based view as well as dynamic capabilities. In other words, the sources of competitive advantage have shifted from market factors to critical resources and now to knowledge assets. Most firms have come to realise that knowledge management programmes can be sources of competitive advantage (Ndlela and du Toit, 2001; Arrivals et al., 2005; Massa and Testa, 2009). In accordance with the knowledge-based view, in this study competitive advantage is looked at from the perspective of the knowledge-based view. The critical sources of competitive advantage in varied perspectives are presented in Table 2-1.

Table 2-1: Sources of Competitive Advantage from varied perspective

Perspective	Sources of Competitive Advantage	Literature
Industrial Organisation View	Positions in the market	Aaker (1984), Coyne (1986), Porter(1985)
Resource-Based View	Heterogeneous, inimitable resources and capabilities	Aaker (1989), Prahalad and Hamel(1990), Grant (1991), Barney (1991), Javidan(1998)
Knowledge-Based View	Heterogeneous, especially tacit knowledge	(Foss (1996), Hoskisson et al. (1999), Lubit (2001), McEvily and Chakravarthy(2002), Dehning and Stratopoulos (2003), Galbreath (2005)
Dynamic Capabilities	Specific, strategic knowledge routines	Teece et al.(1997), Eisenhardt and Martin (2000), Eisenhardt (2002)

Source: compiled by the author

2.8.1. Knowledge-Based View (KBV)

Today, knowledge is important to all organisations. Based on a knowledge-based view (KBV), the capability of individual organisations is critically underpinned by knowledge. Knowledge as capability can present two values to a firm (Marr et al., 2004; Schiuma, Lerro, 2008; Massa and Testa, 2009). Firstly, it shows the benefits of a firm's knowledge, which is termed its "usage value" and secondly, it has purchasing power, which is termed its "exchange value" (Rodgers, 2003; Li and Tsai, 2009). Some perspectives related to seeing knowledge as capability are summarized in Table 2-2.

Table 2-2: Perspectives of knowledge assets

Literature	Perspectives of knowledge assets
Wilkins et al. (1997); Liao (2003); Wu and Lee (2007)	Knowledge assets consist of facts, assumptions, and heuristics, which provide economic value to its possessor.
Nonaka et al. (2000), Chou and He (2004); Baskerville and Dulipovici (2007)	Knowledge assets are firm-specific resources that are indispensable to create values for the firm and they are the input, output and moderators of the knowledge-creating process.
Housel and Bell (2001); Tseng and James Goo (2005); Feng and Chen (2007)	Knowledge assets comprise patents, copyrights, databases, employees' brains, processes, and information in information systems.
Debowski (2006); Hemmings and Kay (2010);	Knowledge assets in a firm accrue from the adaptations and interpretations of information, expertise, experiences, errors and other inferences.

Source: compiled by the author

Knowledge is defined as awareness, consciousness or familiarity gained by experience or learning (Cepeda and Vera, 2007; Nonaka and Von Krogh, 2009). In a complex and dynamic environment, organisations that are able to create and integrate knowledge better than their competitors are likely to gain advantage. Knowledge creation can occur through different processes, and knowledge application will entail the integration of different types of knowledge and the ability to use different processes to achieve this. Firms create knowledge assets by themselves, and if they obtain knowledge assets from outside the firm, they should take additional time to embed these resources into the firm. Knowledge assets exist not only inside the firm but also in customers, suppliers and other collaborative partners (Edvinsson and Malone, 1997; West III and Noel, 2009; Laihonen and Koivuaho, 2010).

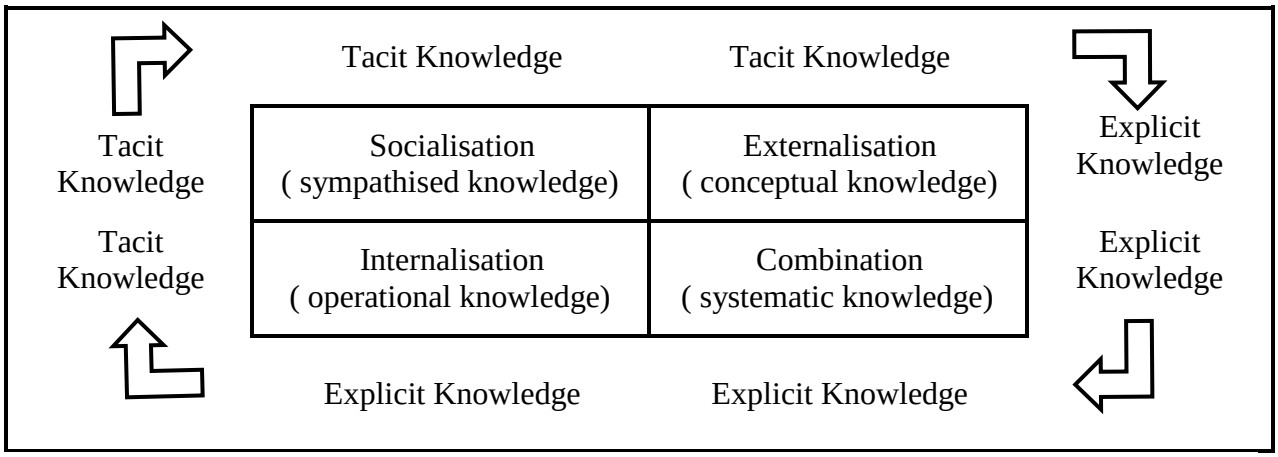
Although scholars state that a firm's competitive advantage stems from its ability to create knowledge and transformation (Kogut and Zander, 1992; Nonaka and Von Krogh, 2009; Teece, 2009), the result of these behaviours without social communities in a firm would be limited (Zander and Kogut, 1995; Teece, 2009; Argote and Miron-Spektor, 2011). In addition, some researchers argue that knowledge transfer is not an efficient approach to knowledge integration, so the axial job of management is to build up the coordination needed during the process of knowledge integration, which emphasises the importance of knowledge integration mechanisms in a dynamic environment (Grant, 1996; Nonaka and Von Krogh, 2009; Agarwal and Selen, 2009).

It is important to distinguish between two types of knowledge, explicit and tacit knowledge. Explicit knowledge is a kind of knowledge that is transmitted in formal systematic language. In

contrast, tacit knowledge is personal, context-specific and therefore hard to formalise and communicate (Nonaka and Takeuchi, 1995; Teece, 2009; Nonaka and Von Krogh, 2009). Usually, competence requires both kinds of knowledge. Scientists argue that truly innovative companies are ones that can modify and enlarge the knowledge of individuals to create a "spiral of interaction" between tacit and explicit knowledge through the four processes of the Socialization–Externalization–Combination–Internalization (SECI) model (Nonaka and Takeuchi, 1995; Lynch, 2003; Teece, 2009; Johnson et al., 2011). Nonaka has also noticed the importance of contextual issues with regard to knowledge creation and has proposed the SECI model (Nonaka et al., 2000; Nonaka and Von Krogh, 2009).

The SECI model mentions that knowledge is created through the conversion of tacit and explicit knowledge. Four modes of knowledge conversion are suggested which are shown in figure 2-6: (1) from tacit to tacit (Socialization), (2) from tacit to explicit (Externalization), (3) from explicit to explicit (Combination) and (4) from explicit to tacit (Internalization) (Nonaka, 1994; Nonaka and Von Krogh, 2009; Von Krogh et al., 2012).

Figure 2-6: Knowledge creation process



Source: Nonaka et al. (2000)

Certainly, firms' competitive advantage lies not in how much they know, but in how they use what they know (Haas and Hansen, 2005; Argote and Miron-Spektor, 2011). The knowledge-based view regards knowledge as the most important resource of a firm, and most of the knowledge in a firm is created by individuals and then stored in them. Hence people are the more important holders of knowledge. Knowledge management is a human-based process; we cannot disregard the human factor while examining the creation of high-quality knowledge (Nonaka and Toyama, 2002; Shaw and Edwards, 2006; Wu et al., 2009; Von Krogh et al., 2012). Additionally, knowledge management cannot work without technology. Technology has a great effect in helping a firm create and transfer knowledge (Sherif et al., 2006; Wu, 2009; Choe, 2011). A knowledge-based view suggests different ways of regarding strategies, organisational structures, management systems and inter-organisational relationships (Grant, 1997; Paiva et al., 2008; Williams, 2011).

Although the creation of interaction between explicit and tacit knowledge in every organisation is very important, it is believed that knowledge assets have two superior characteristics: tacit and dynamic (Nonaka et al, 2000; Nonaka and Toyama, 2002; Teece, 2009). Both of these characteristics are likely to be related to a firm's competitive advantage. In other words, the tacit characteristic of knowledge means that a firm's knowledge assets are not duplicated easily, so they play a critical role in enterprise and they should also lead to competitive advantage for that firm. In addition, the dynamic characteristic means that knowledge assets can help a firm in adjusting to new environments. Therefore, they have the ability to connect with a firm's strategies and acquire further competitive advantage. The primary goal of regarding knowledge as assets is to measure its creation value to a firm. Hence, these characteristics can create

competitive advantage for a company, and there is a positive relationship between a firm's performance and its competitive advantage. Simsek and Heavey (2011) surveyed 125 SMEs and indicated that knowledge-based capital is positively associated with performance. However, it is clear; more research needs to be done into the processes involved in knowledge creation. Therefore, research into the relationship between knowledge and performance, which indicates the creation of competitive advantage by KBV, can be significant.

2.9. Environment and Strategy Formulation Approaches

The characteristics of the organisation and the environment both have an effect on the strategic decision-making process (Rajagopalan et al., 1993; Sirmon et al., 2007). Some theoretical approaches have been used to find the impact of the environment on strategy formulation especially when considering the environment as an important variable or an intuitive phenomenon (Sharfman and Dean, 1991; Hmieleski and Baron, 2009; Farjoun and Levin, 2011). Six environmental dimensions have been identified; these are: concentration, heterogeneity, stability, turbulence, capacity, and consensus (Aldrich, 2007; Ngah-Kiing Lim et al., 2009; Kim and Rhee, 2009). However, these dimensions have been reduced to three using factor analysis: complexity, dynamism, and munificence (Dess and Beard, 1984; Baker and Sinkula, 2009). Complexity means the large number and the wide diversity of organisations with which a given firm has to deal. Dynamism refers to changes that are not easy to forecast, which therefore bring about uncertainty for managers. Munificence means the capacity of the environment to bear a certain number of organisations. In other words, "the scarcity or abundance of critical resources needed by (one or more) firms operating within an environment" (Castrogiovanni, 1991, p. 542).

When resources are not abundant then competition increases and it could have a negative effect on profitability (Dess and Beard, 1984; Porter, 1980; Rudawska, 2010; Baker and Sinkula, 2009).

There is a connection between dynamism and environmental uncertainty in the literature. It is claimed that dynamism is the main contributor to a manager's intuition about uncertainties in the environment (Duncan, 1972; Aldrich, 2007; Ambrosini et al., 2009). It is stated that environmental uncertainty is composed of three parts: lack of information about the environment which is needed to make decisions (response uncertainty); lack of knowledge about the outcomes of those decisions (effect uncertainty); and, finally, lack of ability to appoint likelihood about future events (state uncertainty) (Downey et al., 1975; Milliken, 1987; Aldrich, 2007; Subramaniam et al., 2011). However, as a general and simple definition, uncertainty is "an individual's perceived inability to predict something accurately" (Milliken, 1987, p.136).

Some researchers believe that the source of uncertainty is the organisation's external environment (Miles et al., 1978; Mintzberg et al., 2005; Wang and Ahmed, 2007). They define environmental uncertainty as "the (un)predictability of conditions in the organisation's environment" (p.195). Some elements of the external environment, which managers perceive as being related to the degree of predictability of the external environment, are: suppliers of raw materials, competitors' behaviour, clients, financial/capital markets, government regulatory agency actions, and the behaviour of labour unions (Ireland et al., 1987; Mom, et al., 2009; Yi et al., 2010; Sirmon, et al., 2011).

A firm's performance maybe influenced by environmental uncertainty (Chang, 2008; Schulz, 2010). It is dependent on managers' perceptions about uncertainty, with relation to levels of uncertainty, resources and time, and, therefore, time will be dedicated to monitoring and forecasting (Thau et al., 2009). Moreover, in this case, linear models of strategic management and strategy formulation may not be effective. In response to high levels of uncertainty, managers are perhaps going to choose market-led approaches in strategy formulation and will try to copy other successful competitors' strategies (Milliken, 1987; Aldrich, 2007; Subramaniam et al., 2011).

Hence, uncertainty is arguably the most relevant characteristic to take into account when studying the relationship between strategy formulation and performance (Chang, 2008; Schulz, 2010). Firms in this situation need to compete for accessible resources as well as considering the technological changes that can lead to new business opportunities (Eddleston et al., 2008). Changing technology has produced the ambiguity which is consequently found in the concept of environmental uncertainty.

2.10. Strategy Formulation Approaches

Strategy formulation is a combination of dimensions and elements that work together to define a logical pattern of action for the firm (Dess and Lumpkin, 2001; Covin and Wales, 2011; Hitt et al., 2011). The question we should ask about strategy formulation is what are these elements or dimensions?

Studies into styles of strategy formulation can be traced back to the early years of strategy research when the rational approach was generally held (Hart, 1992; Anand et al., 2009; Johnson et al., 2011). This concept has been developed by asking the question: "How do organisations make important decisions and link them together to form strategies?" (Mintzberg, 1973, p.44). Some researchers answered this question by identifying and describing three different types of firms, each with its own special approach to the strategy formulation process (Mintzberg, 1973; Mintzberg et al., 2005; Covin and Slevin, 2009; Covin and Lumpkin, 2011). Firstly, the entrepreneurial mode is described as one where "one strong leader takes bold, risky actions on behalf of the corporation"; secondly, the adaptive mode is one in which "the organisation adapts in small, disjointed steps to difficult environments"; and lastly, the planning mode is one in which "formal analysis is used to plan explicit, integrated strategies for the future" (Mintzberg, 1973, p.44). Each mode is a combination of elements, such as: types of decision-making motives, goals and objectives of the organisation, the style of evaluation of strategy, the person who is authorised to carry out evaluation and makes the choices, the decision horizon, the environment, flexibility, the degree of dynamism and stability, and the mission and vision of direction (Mintzberg et al., 2005; Covin and Slevin, 2009; Covin and Lumpkin, 2011). It is clear that each mode depends on the organisational situation, such as: size, age and level of technology as quantifying characteristics, and the type of leadership and the kind of environment as other qualifying characteristics (Mintzberg et al., 2005; Covin and Slevin, 2009). So, based on these approaches and the very strong correlation between formulation as the formation stage of strategy, and implementation as the application stage of strategy, two main types of strategy formulation are formed so far: these are formal and dynamic strategy formulation. Although other names such as deliberate and emergent strategies (Mintzberg, 1978; Mintzberg et al., 2005)

or centralised or decentralised strategy formulation (Anderson and McAdam, 2004) have been used to express these concepts, their function is the same.

2.10.1. Formal Strategy Formulation

Zhou and Uhlaner (2009) collected data from 496 SMEs responding to a questionnaire found, chief executives of Dutch SMEs believe that a written strategy can help them to implement their business strategies. It is believed a written strategic plan is representative of the explicit formal strategy of the organisation, derived from careful analysis of the organisation's external and internal environments (Denis et al., 1991; Zhou and Uhlaner, 2009). Although some managers argue for a formal strategy, a company has to use a top-down approach rather than a bottom-up approach (Acur et al., 2003; Acur and Englyst, 2006; Sirmon et al., 2011), but applying this idea may lead to the exclusion of some staff and managers from the process of decision-making in the company. A study of the literature about definitions and approaches to formal strategy formulation shows Bechtold's definition (1997) as a comprehensive definition and approach to formal strategy formulation which adheres to most researchers' views on this subject (Theodoridis and Bennison, 2009; Kloviene and Gimzauskiene, 2009; Nikora, 2010). According to his point of view the rapidity of change, ambiguities and fluctuations in the environment, means that formal strategic planning needs to be a continuing process. This constant process helps to increase organisational knowledge, flexibility and adaptation and these are indeed the targets of strategy. According to this view, some events such as sudden environmental opportunities or remarkable environmental shifts are some of the important factors, which can activate this process. That is why many modern theories about strategy are the

same as scenario planning (Van der Heijden, 1996; Smith, 2011), and they have been created based on a certain degree of vagueness.

In addition, some researchers have tried to explain features of the formal strategy formulation mode. Some of these characteristics are: external orientation (a view from outside to inside), a resource-based view, using strategy as a control mechanism, strategy for the elimination of potential barriers, a written document and an instrument for staff creativity (O'Regan and Ghobadian, 2002; Bellamy, 2009; Aldehayyat, 2011).

Updating a formal strategy formulation process, as a continuous process, needs the involvement of all members. All members within the organisation, including staff, managers and owners at all levels must work together to improve the flexibility of the organisation (Bechtold, 1997; Kloviene and Gimzauskiene, 2009; Nikora, 2010). Members of an organisation with their different kinds of knowledge, skills and experience can develop an organisation's strategy formulation process. But increasing employees' participation and collaboration is strongly related to their understanding of the strategy formulation process, recognising how they can offer their ideas and knowledge and identifying their impact on the firm's strategies. Some researchers examined the interaction between aggregate organisational actors "for example, comparing the formal and informal interactions between middle and senior managers and the way that these interactions enabled middle managers to have their ideas incorporated into the organisation's strategy" (Jarzabkowski and Spee, 2009). This view can result in a very democratic process of formulating organisational strategies. Having a formal strategy formulation process with these characteristics needs strategic thinking to allow it to prevail throughout all organisational

operations and systems such as: culture, knowledge, environmental orientation, confrontation with barriers and control systems (Bechtold, 1997; Kloviene and Gimzauskiene, 2009; Nikora, 2010).

2.10.2. Dynamic Strategy Formulation

The dynamic strategy formulation mode is considered to be effective in dynamic environments (Andersen, 2004). The sustainable survival of a business is difficult to achieve without the ability to make effective strategies for dynamic business environments (Koyana, 2009; Hitt et al, 2007, 2011). Although many studies have been done about dynamic approach to strategy formulation, it is still at an early stage of development, and it is hope that future scholars, consultants and managers will refine and improve it with new approaches and methods (Greiner and Cummings, 2009). Scientists such as Ansoff and Mintzberg believe the task of the strategists in organisations has been changed by the highly dynamic environment, so they now have to be strategy finders, knowledge generators and organisers of change instead of planners and creators of strategy. Therefore, managers need to carry out strategic planning through strategic thinking (Ansoff, 1991; Mintzberg, 1994; Sminia, 2009; Robertson, 2009; Brinckmann et al., 2010). So, strategy formulation is not only a separate phase where strategies are planned, but nowadays based on its strategy finding task and its readiness to change, its relation with strategy implementation is greater than before because of the speed of change in an organisation's environment which is necessary to exploit opportunities in the competitive environment (Feurer and Chaharbaghi, 1995; Henderson et al., 2005; Sardana, 2007; Wanjare,

2008). Also, Some researchers stated dynamic approach to strategy as a result of feedback loop and mechanism (Liu and Wang, 2009).

Feurer and Chaharbaghi (1995) and Henderson et al. (2005) believe a dynamic strategy formulation mode has some important components. Firstly, a dynamic strategy formulation mode needs a strong internal environment which presents a high degree of constancy, whilst at the same time offering a high level of flexibility to respond quickly to external changes. Secondly, the quality of effective dynamic strategy formulation depends on the quality of knowledge used by an organisation. This, in turn, shows the level of knowledge management and the importance of using knowledge within the organisation. In a dynamic environment, the quality of strategy directly depends on the quality of the organisation's learning mechanisms and the knowledge-based held view in the organisation. Dynamic Strategy formulation associated with organisational learning and the de-centralisation of the strategy process (French, 2009). Kock and Ellstrom (2011) based on questionnaire data collected through a survey of 14 SMEs found; the use of a dynamic strategy appears to be more likely in an enabling learning environment, while a formal strategy is more likely to be used in a constraining learning environment. In a dynamic view to strategy formulation, in an organisation, valuing the employees, customers and shareholders' will be equally important.

Finally, as described previously, formal and dynamic approaches to strategy formulation are on opposite sides of a spectrum, and in a dynamic environment, movement from the formal side to the dynamic side is recommended, based on the type and situation of the company. However, so

far, the impact of each of these approaches and the movement from one side to the other has not been researched.

2.11. Organisational Performance

Most strategic management researchers are interested to finding causal links to performance (Schendel, 1992, Nag et al., 2007). Some researchers, such as Nag et al. (2007) demonstrated that "the field of strategic management deals with the major intended and emergent initiatives taken by general managers on behalf of owners involving utilization of resources of firms in their external environments" (p.942). Andrews et al. (2008) strategic management frameworks are predicated upon the notion that when correctly aligned with the environment, certain strategies, structure and processes are likely to improve organizational performance.

A main concern of strategic management is attaining higher performance (Schendel, 1992; Papageorgiou and Hadjis, 2008; Ambrosini et al., 2008; Burke et al., 2011). Most researchers' note how performance can be achieved and it is one of the main subjects that strategy scholars must face in their research (Venkatraman and Ramanujam, 1986; O'Regan and Ghobadian, 2006; Leitner and Guldenberg, 2010; Simpson et al., 2012). Thus, it is necessary to define performance very clearly for two reasons: firstly, because this research is about strategy and is not exempt from other research in this area; secondly, the main purpose of this research is to address the relationship between a strategy formulation model in action and the performance of high-tech SMEs.

How can we achieve a high level of performance? Answering this question depends on who is asking the question? The ability of a firm to perform is closely tied to the propositions of the firm's stakeholders, e.g., different interested parties may have different expectations. Strategy researchers have defined organisational performance in different ways, but most of them have used financial and non-financial methods (operational) (Venkatraman and Ramanujam, 1986; Lytle and Timmerman, 2006; Hult et al., 2008; Rauch et al., 2009; Richard et al., 2009). Financial performance is usually measured by financial ratios, such as: profitability and turnover ratios and so on. In contrast to the financial aspects of performance, non-financial performance is more qualitative and takes into consideration indicators such as the number of new products, market-share percentage, product quality, and so on.

Each method of measuring performance has its benefits and limitations (Venkatraman and Ramanujam, 1986; Hult et al., 2008; Rauch et al., 2009). But, more importantly, it has been advised that objective measures of performance should be employed whenever possible (Dess and Robinson, 1984; Zott and Amit, 2008; Baker and Sinkula, 2009). Sometimes objective measures are not accessible. For example, secondary data for measuring performance may not be available especially when the organisation is private. In this case, the only available choice is to rely on personal measures such as the managers' perceptions of performance. This alternative is actually not that bad because there is proof of a correlation between objective and subjective measures of performance (Dess and Robinson, 1984; Venkatraman and Ramanujam, 1986; Jennings and Young, 1990; Zott and Amit, 2008; Baker and Sinkula, 2009).

Performance is a broad concept which has been used by many researchers in many areas. Performance, generally, is a mechanism which measures the degree of achievement of purpose in a system such as an organisation. An organisation's performance has been defined as "how well the organization is managed" and "the value the organization delivers for customers and other stakeholders" by Moullin (2003).

Measuring performance is a model with several dimensions. Most performance measuring models concentrate on two essential dimensions: effectiveness and efficiency (Neely, 1998; Frnaco-Sentos et al., 2007; Braz et al., 2011). Effectiveness refers to the level to which stakeholder requirements are met, whilst efficiency is a measure of how economically the firm's resources are used in achieving a given level of stakeholder contentment (Neely et al., 2002, Schiuma, 2009). An organisation achieves greater performance when it accomplishes its anticipated objectives with better efficiency and effectiveness than its competitors do (Neely, 1998; Frnaco-Sentos et al., 2007; Braz et al., 2011). Hence, multi-dimensional performance measuring models are able to compute efficiency as well as effectiveness. A balanced and multi-dimensional performance measurement model should be assessed by five key factors: quality, delivery speed, delivery reliability, price (cost), and flexibility (Neely, 1998; Braz et al., 2011).

2.11.1. Performance Measurement

Before 1980, firms simply used financial data as the most important performance gauge. But, after the 1980s, researchers found that financial data alone cannot access inclusive performance information and, for this reason, it does not entirely predict the future performance

of a company. Consequently, some balanced and multi-dimensional performance measurement models were developed.

Although there are many definitions of performance measurement, its definition is still being discussed. Moulin (2003) defined performance measurement as an evaluating system which concentrates on how well organisations are managed and the value they deliver for the organisation's stakeholders. Another definition believes performance measurement is a monitoring and control mechanism which deliberates the organisational strategies pursuing level, which leads to success in all goals and purposes (Nanni et al., 1990; Wu, 2009; Fiorentino, 2010). Gimbert et al. (2010), through a survey study from 349 Spanish firms, found Performance Measurement Systems (PMSs) are concise sets of (financial and/or non-financial) metrics that support the decision-making processes of an organisation by gathering, processing and analysing quantified information about its performance. A very specific definition supposes that performance measurement helps to identify areas of strength and weakness, and decides on how best to improve future organisational performance by measuring the foundations for an organisation to assess how well it is moving towards its determined goals (Amaratunga and Baldry, 2002; Anand and Kodali, 2008). The latest definition shows the role and the process of performance measurement.

Accordingly, performance measurement is a balanced and multi-dimensional-structured system which provides a procedure for gathering, monitoring, and assessing the information of an organisation in order to achieve its planned goals.

2.11.2.The Evolution of Performance Measurement

Before the 1980s, in most companies, particularly in large firms, performance was measured by focusing on the achievement of key financial measures and ratios (Ghalayini and Noble, 1996; Garengo et al., 2005; Dror, 2008). But after the 1980s, due to the increasing complexity of organisations, markets and business environments, just measuring financial indicators as the sole criteria for assessing success was no longer suitable for the new conditions (Kennerley and Neely, 2002; Cardinaels, 2010). Some weaknesses of the performance measurement models, based on financial indicators, are presented below (Yeniyurt, 2003; Gomes et al., 2004):

- Financial measures of performance are insufficient for strategic decisions (Kaplan and Norton, 1992),
- Financial measures are too historical and backward-looking (Ittner and Larcher, 2003),
- They do not enable estimates about future performance (Ittner and Larcher, 2003),
- Financial measures are not comprehensive indicators because they do not link the non-financial metrics to financial numbers (Kaplan and Norton, 1992),
- They just report functional not cross-functional processes (Ittner and Larcker, 2003),
- They do not consider and include intangible assets (Lehn and Makhija, 1996).

In response to this new attitude towards performance measurement, several performance measurement methods were initiated such as: the Performance Pyramid (Lynch and Cross 1995), Performance Measurement in Service Businesses (Brignall et al. 1991), the Balanced Scorecard

(BSC) (Kaplan and Norton, 1992), Integrated Performance Measurement (Nanni et al. 1992), Activity-Based Profitability Analysis (ABPA) (Meyer 2002) and the Performance Prism (Adams and Neely 2002). But, so far, the most widely used performance measurement model is the balanced scorecard. The principles of the BSC are based on assisting managers at all levels to observe results in their key areas. The BSC measures a business performance from four important perspectives: financial, internal business processes, learning and growth and customer (Wu et al., 2009).

2.11.3. Balanced Scorecard (BSC)

The Balanced Scorecard (BSC) (Kaplan and Norton, 1996) is the most eminent performance measurement framework. Balance Scorecard implies two major concepts; the strategic importance of the measurements, the integrated view of a company's performance, which is the "balance" (balanced) (Biazzo and Garengo, 2012). Biazzo and Garengo (2012), in their book *Performance Measurement with the Balanced Scorecard*, " … Balanced Scorecard, currently used by more than 70% of companies worldwide, and regularly ranked among the top-ten management tools used worldwide according to the annual survey conducted by Bain & Company, a leading strategy consulting company".

The BSC recommends managers analyse an organisation's performance from four perspectives (figure 2-7):

(a) Customer perspective: How do customers see us?

(b) Internal Business Processes Perspective: What must we excel at?

(c) Learning and Growth Perspective: Can we continue to improve and create value?

(d) Financial perspective: How do we look to our shareholders?

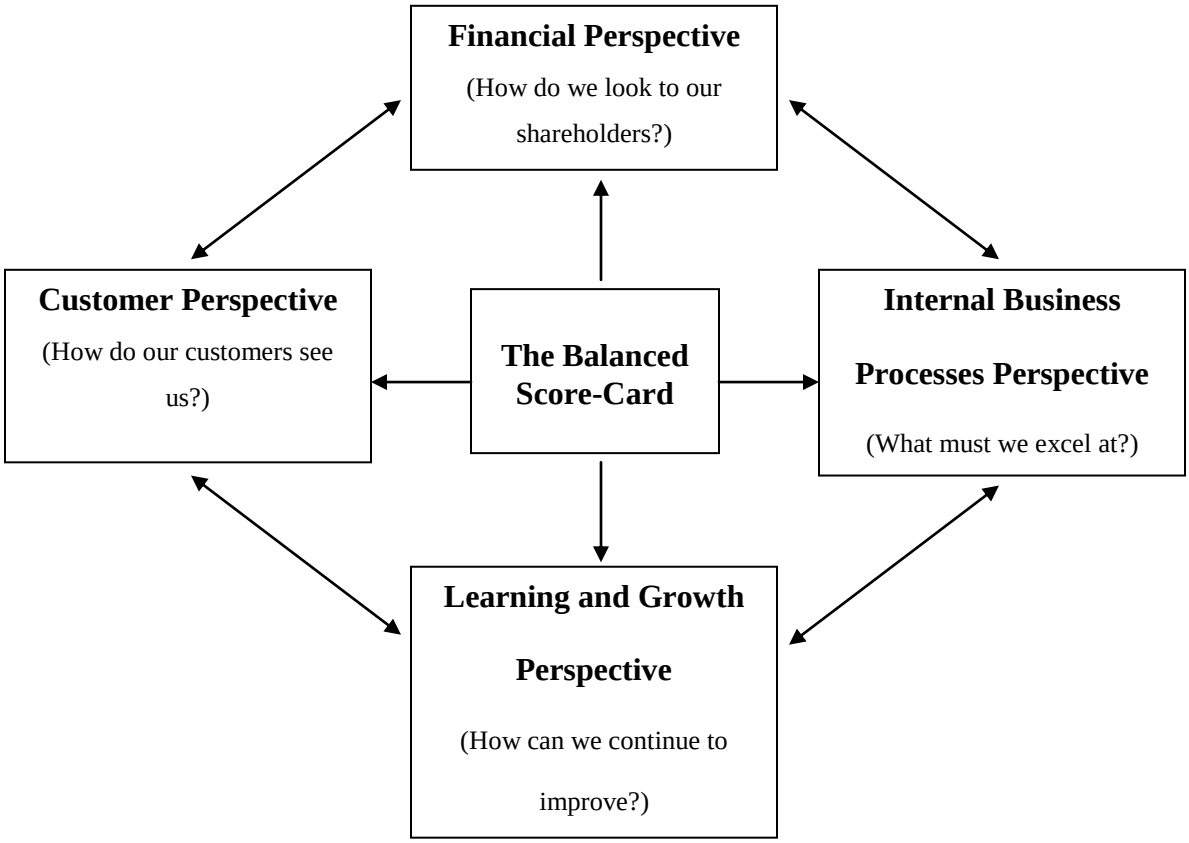
One prominent feature of the BSC is its integration of financial and non-financial measures. Hoque (2004), obtained data from 52 manufacturing companies and found there is a significant and positive association between management's strategic choice and performance acting through management's high use of non-financial measures for performance evaluation. Similar results were also found by Shrader et al. (2004), who surveyed manufacturing firm, found significant association between strategic management and firm performance. The strategy of a firm and its mission statement are the main drivers of the BSC's perspectives. The BSC presents a comprehensive framework which interprets a company's strategy and mission statement and is consistent with a rational performance measurement model.

According to Kaplan and Norton, (1996), "the balanced scorecard not only allows the monitoring of present performance, but also tries to capture information about how well the organization is positioned to perform in the future". Additionally, the BSC becomes a very useful management instrument because not only does it enable managers to clarify and communicate a firm's strategy, it also helps them to manage strategy.

The four perspectives in the BSC's performance measurement model are linked like a chain, based on their cause and effect relationship. A proper BSC should be a balanced combination of outcomes and performance drivers of a firm's strategy (Kaplan and Norton 1996, 2001). In fact, the BSC can be considered a "strategy map". "The strategy map describes the process for

transforming intangible assets into tangible customer and financial outcomes" (Kaplan and Norton, 2001).

Figure 2-7: Balanced Scorecard Performance measurement model



Source: Kaplan and Norton (1992, p. 174)

One of the striking features of the BSC is its combination of financial and non-financial objectives and their percentage of access. De Geuser et al. (2012), based on survey data collected from 76 firms, found the sources of performance derived from the BSC are primarily of three types; a better translation of the strategy into operational terms, the fact that strategising becomes a continuous process, and the greater alignment of various processes, services, competencies and

units of an organisation. In addition, besides this main feature of BSC, other features make it different from other performance measurement systems (Garengo et al., 2005) (table 2-3). These features are:

- Strategy alignment: strategy is the key dimension in BSC
- Strategy improvement: BSC helps improve pre-defined objectives and strategy
- Balance: BSC uses different perspectives that are based on the type of measure (financial and non-financial) and the objective of the measure (internal or external).
- Process oriented: BSC looks at the organisation as a whole set of co-ordinated processes which create a system
- Depth: measures are disaggregated into detailed indicators or in the other word the single operational activities involved in each process are measured by BSC
- Breadth: the whole organisation is the object of the BSC and a number of functions are included for measuring each perspective
- Causal relationship: results and BSC determinants have to be measured to quantify the 'causal relationship' between them, and to support the control of actions and the improvement process

The concept of the Balanced Scorecard has been used successfully in a number of small organisations (Kaplan and Norton, 2001). There are also several studies reporting the use of this technique in SMEs (Hvolby and Thorstensen, 2000; Fernandes et al., 2006; Bhagwat and Sharma, 2007; Manville, 2007). Consequently, due to all of these advantages and the unique

characteristics of the BSC, this is the performance-measuring model that is selected for measuring SMEs performance.

Table 2-3: Comparison of eight performance-measuring models

	Performance Measurement Matrix	Performance Pyramid System	Result and Determinants Framework	Balanced Scorecard	Integrated Performance Measurement System	Performance Prism	Organizational Performance Measurement	Integrated Performance Measurement for Small Firms
Strategy alignment	•	•	•	•	◻	◻	◻	
Strategy improvement		•	•	•	•	•		
Focus on stakeholders					•	•	•	
Balance	•	•	•	•	•	•	•	•
Dynamic adaptability			•		•	•		•
Process oriented		◻		◻	•	•	•	•
Depth	•	•	•	•	•	•	•	◻
Breadth		•	•	•	•	•	•	
Casual relationships		•	•	•	◻	•		•
Clarity and simplicity	•				◻	•	◻	•

- Fully present ◻ Partially present

Source: Garengo et al., (2005, p. 37).

2.12. Summary

This chapter has reviewed the relevant literature on subjects regarding to the research questions, including: strategy formulation, environmental scanning, mission statement, general competitive strategies, strategic capabilities, strategy formulation approaches and performance measuring models.

Regarding the environmental scanning literature, I have endeavoured to describe the various types of environmental scanning and the environmental scanning used in high-tech SMEs based on previous research. In this regard, the most appropriate type of environmental scanning to bring about the best performance in high-tech SMEs has been explored. Regarding mission statement, various researches have been carried out from different perspectives and they have been described. In addition, the gap in the literature relating to the correlation between measurable and non-measurable elements of a mission statement relating to a high-tech SMEs performance, has been clarified. Based on this review of the literature, it seems that many researches regarding general competitive strategies have been done so far, but there is still a gap in the literature concerning the relationship between competitive strategies and SMEs performance particularly in the high-tech sector.

Next will follow a review of empirical studies, history and the principles of strategic capabilities. However, since KBV and its relationship to performance of SMEs is under investigation in this research, this issue is addressed in more detail. Based on this review, it is clear that the relationship between KBV and SMEs performance, especially in high-tech industries, is still

needs further study. Moreover, the research question in this regard is appropriate. Based on approaches to strategy formulation, formal and dynamic and new research that has been done in this regard, their relationship and SMEs performance is reviewed. This review on one hand shows that an approach to strategy formulation is one of the most important and fundamental details of a strategy formulation framework especially in competitive environments such as in the high-tech sector. On the other hand, the connection between these approaches and SMEs' performance has not been researched.

Finally, since the aim of all of the questions in this research is to improve the performance of high-tech SMEs, studies on organisational performance are reviewed. In addition, due to the many different models pertaining to performance-measuring, they and their evolution are described. As the BSC has been selected for measuring performance in this study, its studies are also reviewed.

Chapter 3

Research Context and Conceptual Framework

3.1. Introduction

This chapter presents a framework for addressing the research questions. The first section gives an introduction to high-tech SMEs in the UK and an overview of high-tech industries in the UK. Specification is given to the biotechnology and pharmaceutical industry, particularly the medical technology, medical biotechnology and industrial biotechnology sectors from which the sample firms of this study come. The second section builds up a research framework by proposing research questions, hypotheses and research variables. A summary of this chapter is presented in the last section.

3.2. Introduction to High-Tech SMEs

3.2.1. Definition of SMEs

A definition of SMEs covers a variety of firms. In February 1996, the European Commission adopted a communication setting out a single definition of SMEs. On 6th May, 2003, the European Commission adopted a new recommendation regarding the SMEs definition (Recommendation 2003/361/EC) which replaced its 1996 recommendation (Recommendation 1996/280/EC). The new definition has been used since 1st January 2005. This definition states that "Enterprises qualify as micro, small and medium-sized enterprises (SMEs) if they fulfil the criteria laid down in the recommendations which are summarized in the table below." Table 3-1 shows the definition of SMEs according to the European Commission's official website.

Table 3-1: European Commission's definition of SMEs

Criterion	Micro	Small	Medium
Maximum number of employees	<10	<50	<250
Turnover (€ million)	≤ 2	≤ 10	≤ 50
Balance sheet total (€ million)	≤ 2	≤ 10	≤ 43

Source: http://ec.europa.eu/enterprise/policies/sme/facts-figures-analysis/sme-definition/index_en.htm, date of access: 23/4/2009.

Therefore, a definition of SMEs, according to the European Commission, exhibits the following characteristics:

- Employing up to 250 employees,
- Having an annual turnover up to 50 million Euros,
- Having a balance sheet total up to 43 million Euros.

Most research carried out so far has indicated that a small or medium sized enterprise in the industrial sector must satisfy at least one of the criterions, number of employees, annual turnover or balance sheet total. The number of employees is commonly used as one of the classification criteria of SMEs (Anderson et al. 2001; Fraser, 2004; Garengo, et al., 2005; Karami, 2006, 2007; Kraaijenbrink, 2009; Top, 2010; Bastiaenssens, 2011). For example, in the UK, the Department for Business, Innovation and Skills (BIS), in its methodology section of "small and medium-sized enterprise (SMEs) statistics for the UK and regions, 2009" regarding the size of enterprise has stated that "this refers to the number of employees within an enterprise. In the Statistical Press Release, we refer to small as those with 0 to 49 employees, medium as 50 to 249

employees and large as 250 or more employees. Employees may work full or part-time each counts as an employee". Therefore, by examining the general agreement within previous research and the definition of statistical bodies, the current study uses the number of employees to classify the size of the sample firms.

3.2.2. Role of SMEs in the UK

Undoubtedly, SMEs play an important role in the economy of all countries including the UK. The competencies of SMEs in an economy reveal themselves by reforming and opening economic policies. According to National Statistics from 2000 to 2009, it is easy to see that SMEs maintain or improve their position in terms of the number of enterprises, employment and turnover. The following tables and figures illustrate and compare the situation of SMEs with LEs from 2000 to 2009 in the whole economy of the UK (Tables 3-2 to 3-4 and figures 3-1 to 3-3). However, before showing these tables and figures, examining some terminologies, according to National Statistics, is useful for common understanding.

- Enterprise: An enterprise is the smallest combination of legal units (generally based on VAT and/or PAYE records) which has a certain degree of autonomy within an enterprise group. A branch or office of a larger organisation is not in itself an enterprise.
- Employment: This refers to the number of employees plus the number of self-employed people that run the enterprise. Both full-time and part-time employees are counted, and both are counted as an employee.
- Turnover: This refers to the value of sales, works done and services rendered, it excludes VAT (National Statistics, methodology note, 2009).

Table 3-2: Number of SMEs and LEs in whole economy of the UK

Number of enterprises (/1000)	Total	SMEs		LEs	
		Number	Percent	Number	Percent
2000	3,722.62	3,715.87	99.82	6.75	0.18
2001	3,746.38	3,739.59	99.82	6.79	0.18
2002	3,797.73	3,791.14	99.83	6.59	0.17
2003	4,021.39	4,015.31	99.85	6.08	0.15
2004	4,282.85	4,276.87	99.86	5.98	0.14
2005	4,342.04	4,336.07	99.86	5.97	0.14
2006	4,466.70	4,460.76	99.87	5.94	0.13
2007	4,679.09	4,673.17	99.87	5.92	0.13
2008	4,783.29	4,777.26	99.87	6.03	0.13
2009	4,834.05	4,828.16	99.88	5.89	0,12

Sources: National Statistics 2000 -2009

Figure 3-1: Number of SMEs and LEs in whole economy of the UK

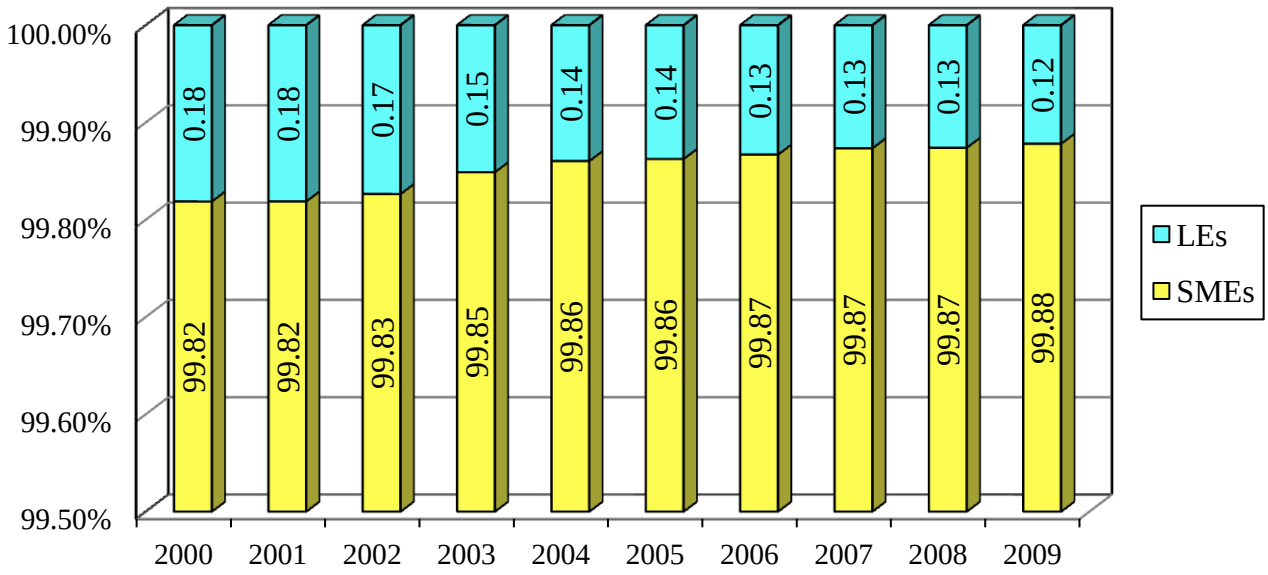


Table 3-3: Employment of SMEs and LEs in whole economy of the UK

Employment (/1,000,000)	Total	SMEs		LEs	
		Number	Percent	Number	Percent
2000	22.14	12.19	55.06	9.95	44.94
2001	22.62	12.53	55.39	10.09	44.61
2002	22.68	12.60	55.56	10.08	44.44
2003	21.66	12.61	58.22	9.05	41.78
2004	22.00	12.87	58.49	9.13	41.51
2005	22.13	12.99	58.70	9.14	41.30
2006	22.41	13.19	58.87	9.22	41.14
2007	22.74	13.46	59.18	9.28	40.82
2008	23.13	13.74	59.42	9.39	40.58
2009	22.82	13.64	59.77	9.18	40.23

Sources: National Statistics 2000 -2009

Figure 3-2: Employment of SMEs and LEs in whole economy of the UK

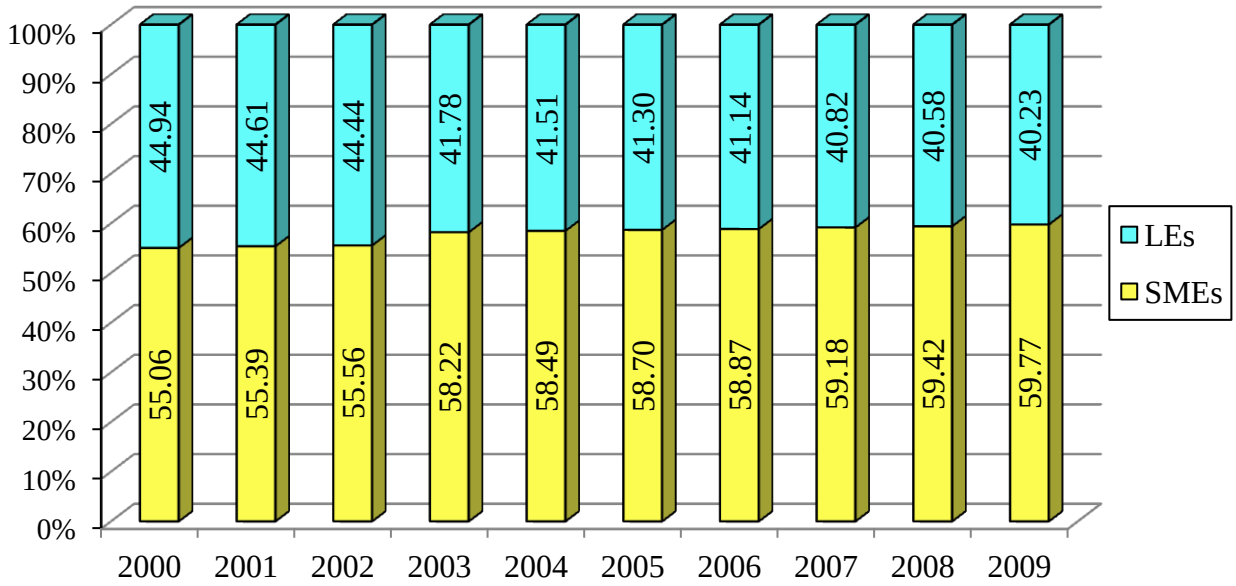
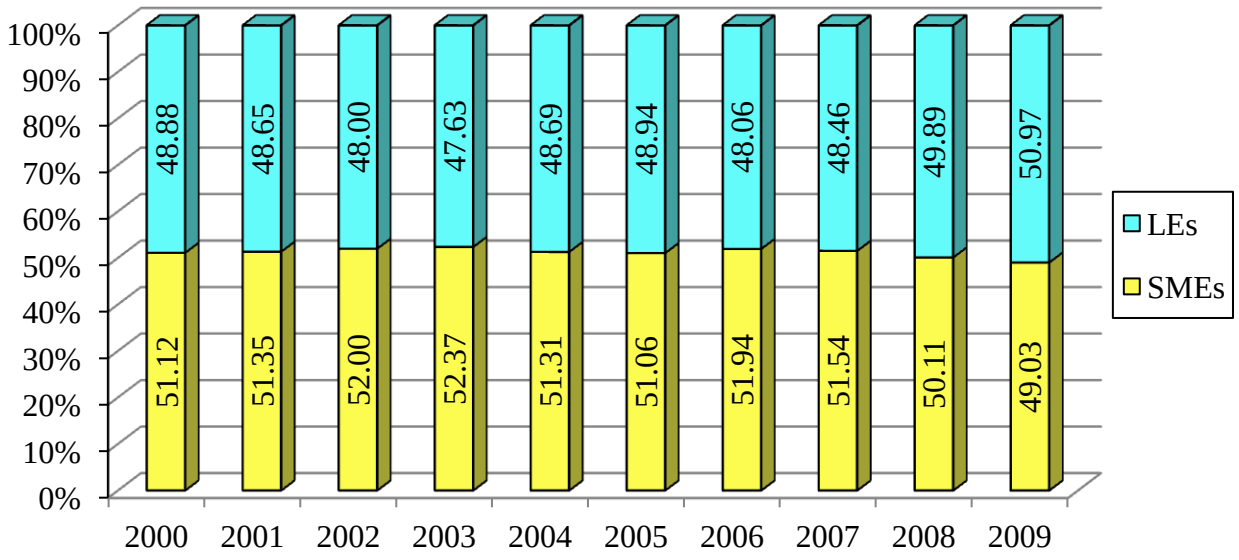


Table 3-4: Turnover of SMEs and LEs in whole economy of the UK

Turnover (/£ million)	Total	SMEs		LEs	
		Number	Percent	Number	Percent
2000	2,033,729	1,039,560	51.12	994,169	48.88
2001	2,112,013	1,084,565	51.35	1,027,448	48.65
2002	2,199,923	1,143,907	52.00	1,056,016	48.00
2003	2,240,345	1,173,287	52.37	1,067,058	47.63
2004	2,350,742	1,206,152	51.31	1,144,590	48.69
2005	2,447,645	1,249,789	51.06	1,197,856	48.94
2006	2,613,907	1,357,761	51.94	1,256,146	48.06
2007	2,794,686	1,440,291	51.54	1,354,395	48.46
2008	2,994,977	1,500,825	50.11	1,494,152	49.89
2009	3,240,330	1,588,582	49.03	1,651,748	50.97

Sources: National Statistics 2000 -2009

Figure 3-3: Turnover of SMEs and LEs in whole economy of the UK



Tables and figures demonstrate that SMEs have a significant role to play in the whole economy of the UK and their importance is constantly increasing. Figures show that more than 99.82% of companies in the UK over the past decade have been classified as SMEs and this figure increased to 99.88% in 2009. In 2000, 55% of employment or 12.19 million people were working in SMEs; in 2009 this figure increased to 60% or 13.64 million workers in the whole economy of the UK. In addition, about half the turnover (49%) of the total economy of the UK belongs to SMEs. All these figures indicate that not only do SMEs play an essential role in the economy of the UK, but also that the degree of their importance is growing from year to year.

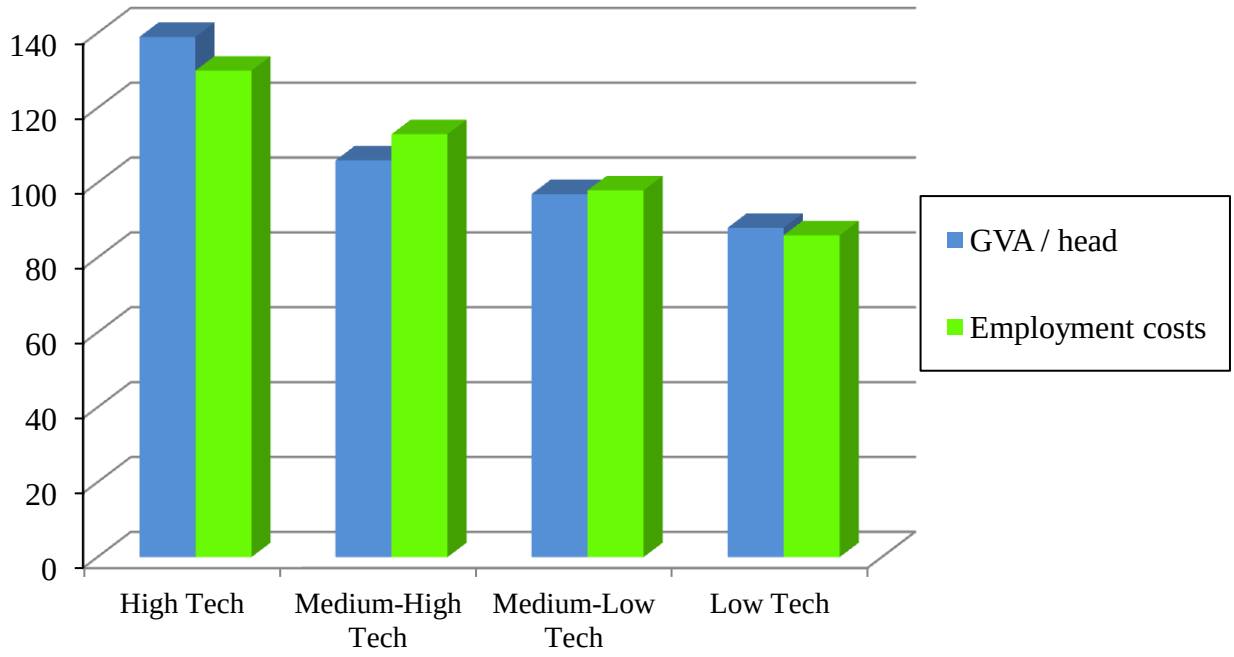
3.2.3. High-Tech Industries in the UK

Despite the recent slowdown in global growth and world trade, many still expect the world economy to double in size over the next decade. The market for high value goods and services associated with advanced manufacturing, especially those produced to high environmental standards, is likely to increase significantly. New and improved technologies will continue to reshape manufacturing by creating the capability to adapt more processes that are efficient and to develop new and better products to supply for new and changing market demands.

The UK is well placed to take advantage of this growing market. The UK is the world's sixth largest manufacturer measured by output, and has a well-developed infrastructure of manufacturing companies and supply chains. The UK is a leading exporter of high-tech goods, with 25% of UK goods exports defined as high-tech (Building Britain's Future, BIS, 2009).

Nowadays, UK manufacturing focuses on specialised and diverse activities, particularly in high technology areas. Many UK firms have used information and communication technology, new materials and processes such as nanotechnology and biotechnology, to transform the way they work. High-tech manufacturing in the UK generates 27% higher wages than average manufacturing (Figure 3-4). Since 2009, some industries such as; industrial biotechnology, composites and silicon electronics have been identified by the Department for Business, Innovation and Skills (BIS) as having significant opportunities (Building Britain's Future, BIS/July/09/NP).

Figure 3-4: UK manufacturing Gross Value Added (GVA) per head and employment costs in 2007



Source: http://interactive.bis.gov.uk/advancedmanufacturing, date of access, 23/4/2009.

3.2.4. Biotechnology and Pharmaceutical Industry in the UK

Industrial biotechnology is the application of biotechnology for the manufacturing, processing and production of chemicals, materials and energy. It is used in the chemicals and pharmaceuticals sectors as well as in downstream sectors that use chemicals in their products or processes, e.g. construction and automotive industries, cosmetics, household and industrial detergents, paints, adhesive, inks and papermaking, biodiesel and pharmaceutical products, including vaccines. The UK market has significant potential and is estimated to grow by £4 to £12 billion and the global market between £150 to £360 billion by 2025 in the chemical sector alone (Building Britain's Future, BIS, 2009).

The UK life sciences industry is an example of a high-tech and innovative industry where excellence in science is translated into commercial success, requiring highly skilled workers and strong collaboration between industry, academia and the public sector. The industry brings the UK economic growth and job creation, as well as broader social and environmental benefits. The industry offers a major contribution to the delivery of high-quality healthcare, modern manufacturing and industrial processes. The UK medical technology industry is the second largest in Europe (EUCOMED Medical Technology Brief, 2007) and has a strong record of accomplishment in innovation.

As the life sciences industry has grown over the past years, the sector classification between pharmaceutical, biotechnology and medical technology has become increasingly difficult. Similarly, as can be seen, the Standard Industrial Classification (SIC) codes used by the Office

for National Statistics (ONS) do not provide a comprehensive picture of the life sciences industry and its specialist support organisations. Pharmaceutical companies were traditionally defined as companies that developed drugs based on the discovery and development of small molecules. The changes in the healthcare market over the last decade has challenged many of the business models of pharmaceutical companies who have responded by embracing the new technologies of biotechnology and by diversifying into areas such as diagnostics and customer healthcare (HM Government, 2010). With this continuing trend, it has become increasingly complicated to separate pharmaceutical business from biotechnology. Pharmaceutical manufacturing companies had a turnover of £15.2 billion in 2008 and accounted for £8.6 billion gross value added (GVA), some 5.56% of all manufacturing GVA (HM Government, 2010).

Biotechnology and pharmaceutical industry in medicine is divided into three sub-areas: medical technology and diagnostics, medical biotechnology and industrial biotechnology. These areas contain just over 4,000 companies, with a combined turnover of £19 billion and they employed 93,500 people across the UK by 2010 (HM Government, 2010). Table 3-5 shows the number of companies, based on their size for all sectors in the biotechnology and pharmaceutical industry in the UK. The medical and industrial biotechnology sectors are based on the application of life science for the production of new medicines and industrial processes or products. The medical technology and biotechnology sectors produce products and services for the global healthcare industry and the NHS. The medical technology, medical biotechnology and industrial biotechnology sectors in the UK are competing for a share of global markets, which are exhibiting strong growth rates.

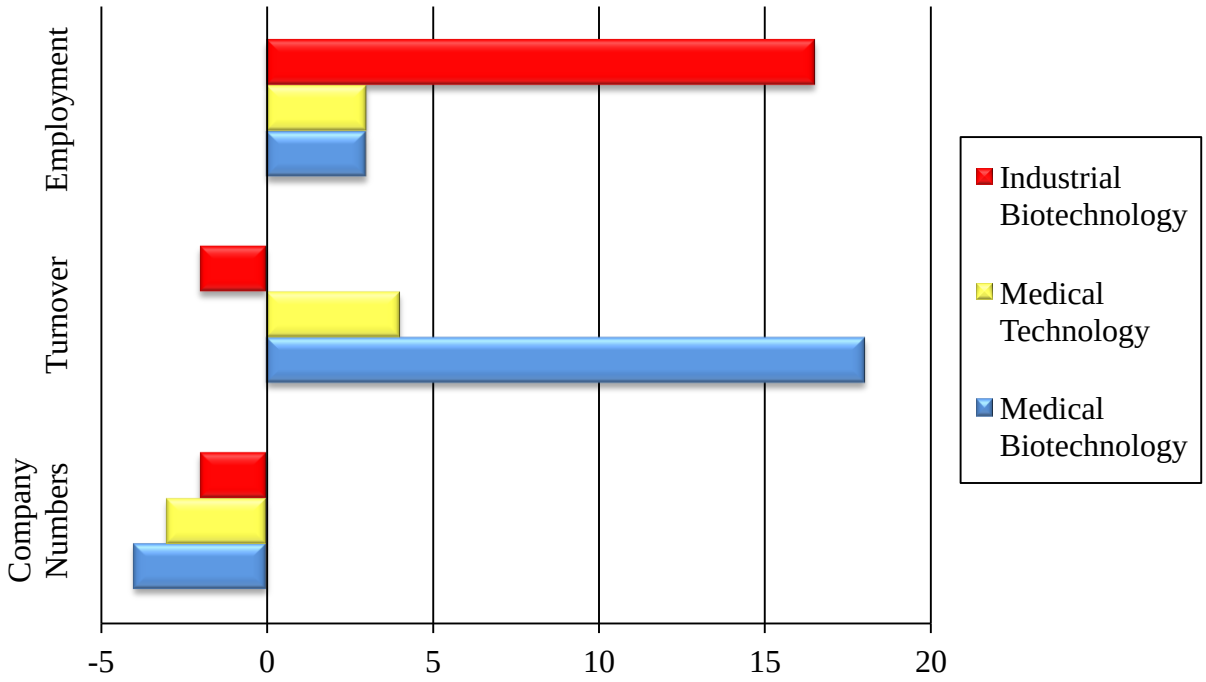
Table 3-5: Number and percentage of SMEs and LEs in Biotechnology and pharmaceutical industry in the whole economy of the UK

	All companies	SMEs		LEs	
		Percent	Number	Percent	Number
Medical technology	3034	99%	3003	1%	31
Medical biotechnology	942	97%	914	3%	28
Industrial biotechnology	55	100%	55	0	0
Total	4031	98.5%	3972	1.5%	59

Source: compiled by author

With growing multi-billion global markets, a strong UK science base and an existing company base supported by a strong supply chain, the medical technology, medical and industrial biotechnology sectors have shown resilience against the background of global recession (HM Government, 2010). Figure 3-5 shows and compares turnover, employment and company numbers for all three sectors since 2009 to 2010. Whilst the number of companies has shown a modest decline in all three sectors due to merger and acquisition and companies ceasing trading, employment has increased in all three by an average of 3%. Turnover comparisons show an excellent performance with medical biotechnology posting 18% growth in one year and medical technology achieving a 4% growth. A small decrease in turnover in the industrial biotechnology market and a large increase in employment of 16% suggests that this industry is emerging and continuing to invest in the capability to drive future growth.

Figure 3-5: Percentage of change 2009 to 2010



Source: HM Government, "Strength and Opportunity: The landscape of the medical technology, medical biotechnology and industrial biotechnology sectors in the UK", December 2010.

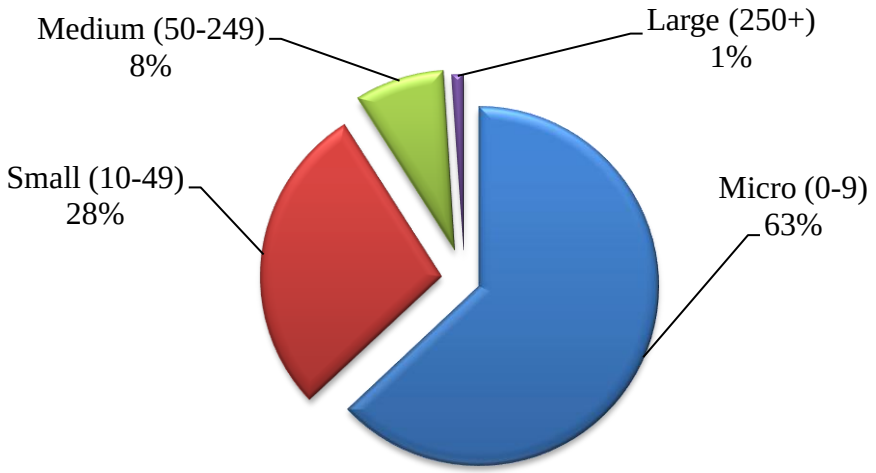
3.2.4.1. Medical Technology and Diagnostics Sector

The definition used for companies included in the medical technology and diagnostics sector are those whose major business activity involves the development, manufacture or distribution of medical devices as defined by the European Union Medical Devices Directive (93/42/ECC) and companies who have significant activity, defined as more than 10% of their turnover, in supplying specialist services into the sector.

In 2010, the UK medical technology sector within the Bioscience and Health Technology Database contained 3,034 companies, which employed over 55,625 individuals and had a combined annual turnover of £13.1 billion (HM Government, 2010).

The sector is widely distributed across the UK, with concentrations of turnover and employment in the West Midlands, the East of England and the South East. The sector is dominated by SMEs who make up 99% (2730 companies) of all the companies in the sector. Within this number, there are 425 companies with a turnover of greater than £5 million. The overall company size distribution in this sector is shown in figure 3-6. This employee per company distribution is similar to that of all industries in the UK where 99.8% of all companies are SMEs with less than 250 employees.

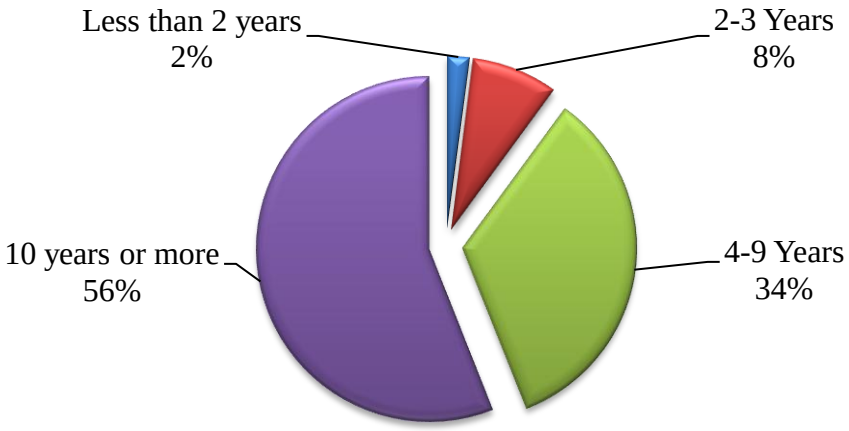
Figure 3-6: Distribution of medical technology companies by employee bands



Source: HM Government, "Strength and Opportunity: The landscape of the medical technology, medical biotechnology and industrial biotechnology sectors in the UK", December 2010.

The age profile of companies within the medical technology sector states that 56% of all medical technology companies are over 10 years old (figure 3-7).

Figure 3-7: Profile of UK medical technology sector by company age



Source: HM Government, "Strength and Opportunity: The landscape of the medical technology, medical biotechnology and industrial biotechnology sectors in the UK", December 2010.

3.2.4.2. Medical Biotechnology Sector

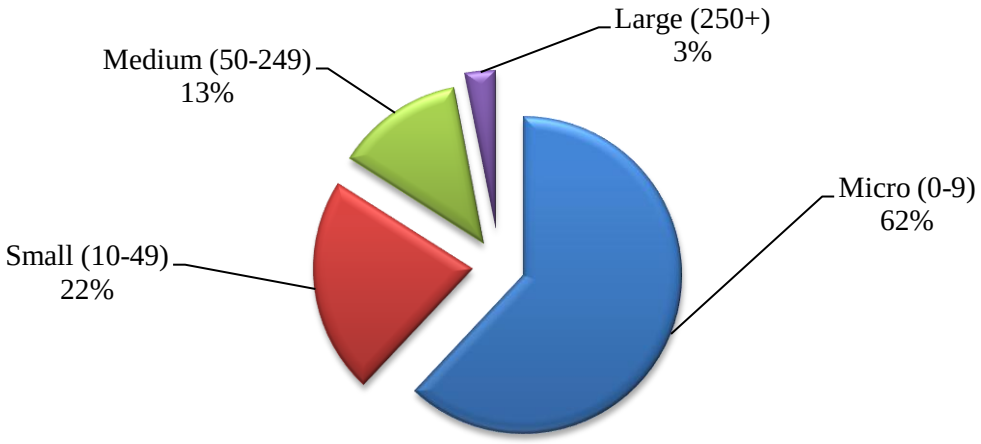
This sector includes companies (HM Government, Dec 2010):

- With an involvement in the discovery, development or manufacturing of bio-pharmaceuticals,
- That offer specialised, sector specific services to bio-pharmaceutical companies such as regulatory or legal advice, contract manufacturing or research services,
- SMEs involved in the discovery and development of chemical "Small Molecules".

In 2010, the UK medical biotechnology sector contained 942 companies with a combined turnover of £5.5 billion, employing 36,700 people. This included 345 or 37% of the sector companies that have at least one major activity in the development, manufacturing or selling of therapeutic products. The UK biotechnology sector is involved in a wide range of therapeutic areas. However over 50% of all companies are focused on the design of therapies and technologies for central nervous system (CNS) disorders or oncology. Medical biotechnology companies are spread right across the UK although there is a degree of concentration with over half of the total turnover being located in the Southeast and the East of England.

The UK medical biotechnology sector is dominated by SMEs with 97% (914 companies) of the companies having less than 250 employees. Figure 3-8 shows that the sector has almost 62% of micro companies with less than 10 employees and 84% with fewer than 49. However, this sector has 29 companies (3%) with 250 employees or more and 13% are in medium-sized companies.

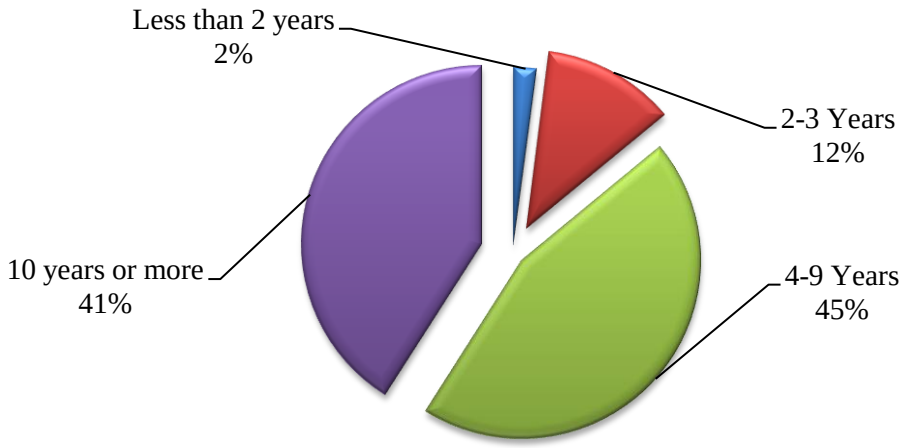
Figure 3-8: Distribution of medical biotechnology companies by employee bands



Source: HM Government, "Strength and Opportunity: The landscape of the medical technology, medical biotechnology and industrial biotechnology sectors in the UK", December 2010.

Figure 3-9 shows the age range of medical biotechnology companies, this shows a healthy mix of young and older companies. 41% of the companies are over 10 years old indicating that the UK has a sustainable medical biotechnology industry sector.

Figure 3-9: Profile of UK medical biotechnology sector by company age



Source: HM Government, "Strength and Opportunity: The landscape of the medical technology, medical biotechnology and industrial biotechnology sectors in the UK", December 2010.

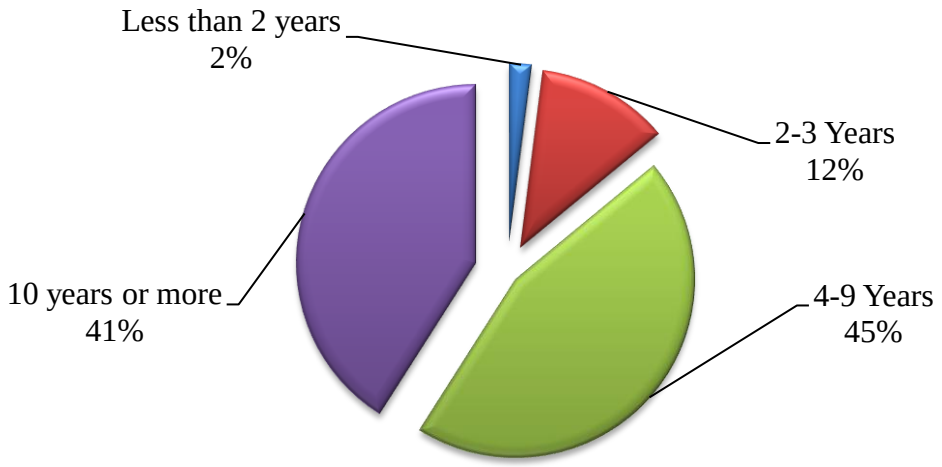
3.2.4.3. Industrial Biotechnology Sector

This sector contains companies whose prime business activity and turnover is derived directly from the development, manufacture and selling of products and services that use or contain biological material as catalysts or feedstock to make industrial products. This definition is based around the technology or process involved in the production of the final product that makes up the majority of a company's turnover (HM Government, Dec 2010).

The UK industrial biotechnology sector, as defined, consists of 55 companies with a turnover of £308 million and employing 1083 people. Industrial biotechnology is an emerging sector. The report of the Industrial Biotechnology Innovation and Growth Team (May-2009) estimates that the UK industrial biotechnology market by 2025 will range from £4 billion to £12 billion indicating the potential of this sector. The integration of industrial biotechnology into mainstream industrial production has the potential to contribute to the UK economy's productivity, environmental and low carbon targets over the next 20 years.

The majority of the companies in this sector are SMEs with less than 250 employees. 86% of the companies, being four years old or older, predominantly populate this sector (figure 3-10).

Figure 3-10: Profile of UK Industrial biotechnology sector by company age



Source: HM Government, "Strength and Opportunity: The landscape of the medical technology, medical biotechnology and industrial biotechnology sectors in the UK", December 2010.

3.3. Research Framework of Strategy Formulation Process in High-Tech SMEs in the UK

3.3.1. Defining a 'Strategy Formulation Process'

To clarify the object of this study, the 'strategy formulation model in high-tech SMEs in the UK' as a significant part of strategic management has been chosen for use throughout this study. Strategic management is fundamentally about setting the underpinning aims of an organisation, choosing the most appropriate goals towards those aims, and fulfilling the art and science of formulating, implementing and evaluating cross-functional decisions that enable an organisation to achieve its objectives (Karami, 2007). Strategic management process has been illustrated previously in Chapter 2 by figure 2-2. To aid the understanding of the studied phenomenon, several points about what is and what is not contained in a 'strategy formulation model' are presented as follows:

1) Although strategic management has two main stages, formulation and implementation, this study's purpose is to develop a model for strategy formulation in high-tech SMEs in the UK.

2) In most strategic management models, researchers are considered to have a linear relationship between, formulation, implementation and a firm's performance (Ahlfors, 2005; Veettil, 2008; Trim, 2008). In this study, the relationship between strategy formulation and performance is investigated based on a linear model.

3) Although strategy formulation components are often shown in a line by most models, in this research the impact of each element has been investigated independently.

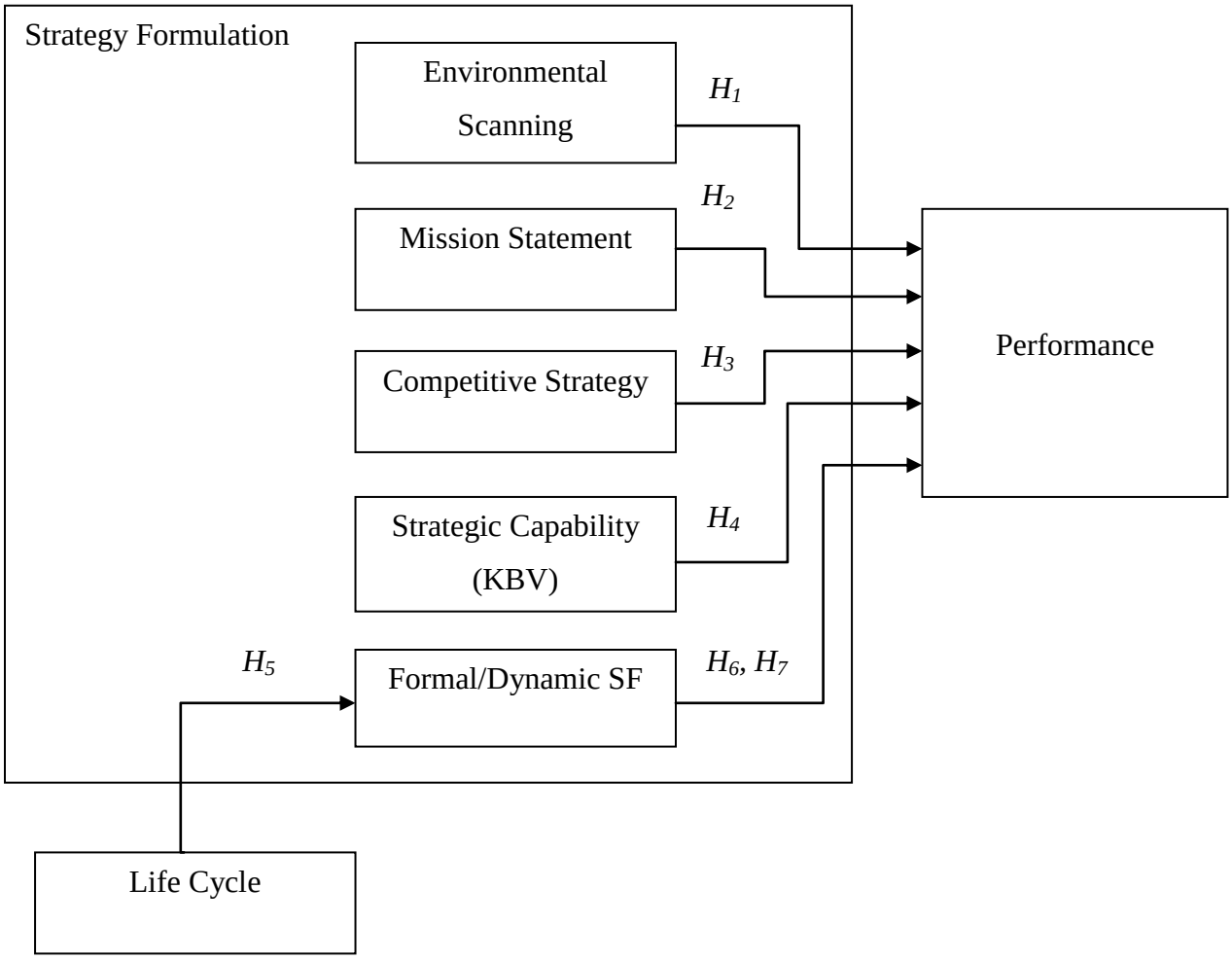
4) Firms should be included, in at least one of the sub-branches of the biotechnology and pharmaceutical industry in the UK, which is medical technology and diagnostics, medical biotechnology or industrial biotechnology.

3.3.2. An Outline of the Research Framework

In order to achieve the objectives of the study, six areas are considered for designing a model to formulate strategy in high-tech SMEs in the UK. One of these areas examines the relationship between the characteristics of SMEs and strategy formulation approaches in SMEs, and the others studies the impact or relationship between different elements of strategy formulation on SMEs performance. These areas are: the influence of environmental scanning and mission statement on SMEs performance and the association between types of strategy, approaches to strategy formulation and views to strategy formulation with regard to SMEs performance.

To address these areas, six research questions and seven hypotheses are proposed. And also, based on the strategic management model, research questions, hypothesis and the assumptions which were mentioned in defining the strategy formulation model section (3.3.1), an outline for a research model was designed as follows (figure 3-11). All these areas, research questions and hypotheses are discussed in six sub-sections in the rest of this chapter.

Figure 3-11: the outline of research model



Source: compiled by author

3.3.3. Impact of Environmental Scanning

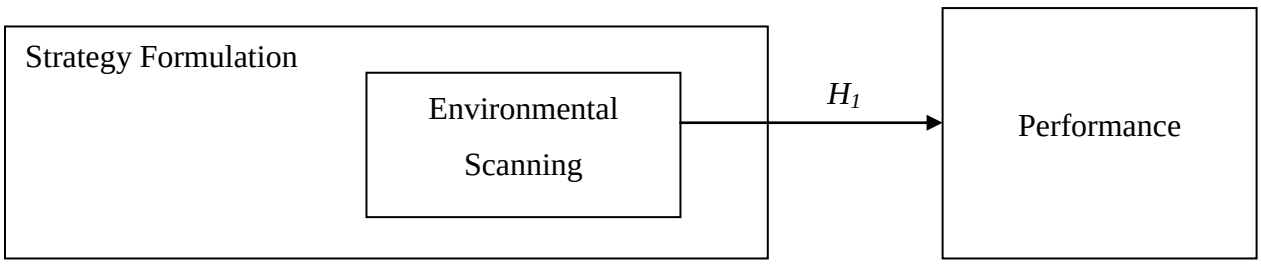
Nowadays organisations are constantly trying to adjust themselves to environmental changes in all kinds of ways (Choo, 1993; Olamade, 2011; Parnell et al., 2012). Companies are becoming more and more complicated, unstable and vague. Therefore, they should find new

solutions in order to respond and adjust. However, in the case of SMEs there is an ambiguity about their activity for scanning the environment, insomuch as some studies have noted that SMEs have only a slight tendency to carry out environmental scanning activities (Hambrick 1982; Johnson and Kuehn 1987; Liao, et al., 2008; Olamade, 2011; Franco, et al., 2011). Hence, to achieve the relationship between environmental scanning on the performance of SMEs especially those, which are working in high-tech industries, the first research question and related hypotheses, were designed (figure 3-12).

Q1. What is the influence of different types of environmental scanning on the SMEs performance?

- ***H_1:*** There is a significant relationship between the type of environmental scanning and the levels of the SMEs performance.

Figure 3-12: Influence of environmental scanning on performance of SMEs



Source: compiled by author

Consequently, H_1 is going give meaning to the relationship between environmental scanning on SMEs performance and the selection of an appropriate type of environmental scanning combining both general and informational perspectives on environmental scanning. One of the major types of environmental scanning was identified by Fahey, et al. (1981). This typology

included three types of environmental scanning: irregular, periodic and continuous scanning, which has been used in this study. Table 3-6 specifies the components of each type of environmental scanning.

Table 3-6: Types of environmental scanning and their components

	Irregular	Periodic	Continuous
Motivation for environmental scanning	Crisis-initiated	Problem solving	Opportunity finding
Scope of scanning	Specific events	Selected events	Broad range of environmental systems
Temporal nature: • Timeframe for data • Timeframe for decision impact	Reactive: • Retrospective • Short term (<1 year)	Proactive: • Current and retrospective • Middle term (+1 to 3 years)	Proactive: • Current and prospective • Long term (+3 years)
Types of forecasts	Budget-oriented	Economic and sales oriented	PESTEL oriented
Forecasting method	Simplistic data analyses	Statistical forecasting method	Many 'futuristic' forecasting methodologies

Source: Fahey, et al. (1981, p. 33).

3.3.4. Effect of the Mission Statement

Regarding the relationship between the mission statement and firm's performance, there are two major views; firstly, negative association exists between a firm's performance and its mission statement (Bartku, et al., 2006, Karami, et al., 2009; Desmidt et al., 2011), and secondly, there is evidence of a strong relationship between mission statement and firm's performance (Bart and Baetz, 1998; Bartkus, 2006; Yazhou and Jian, 2011; Crott, et al., 2011).

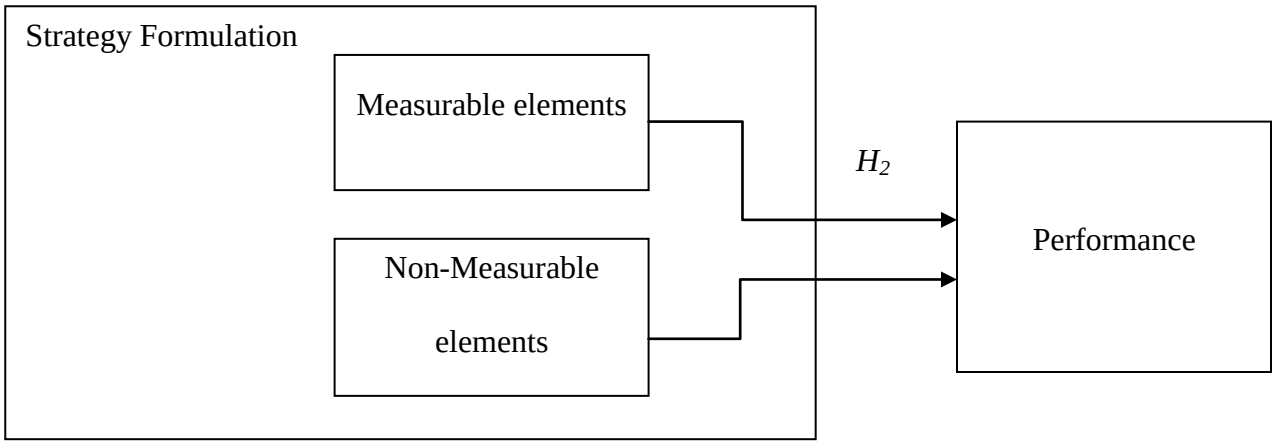
Also concerning the content of a mission statement and a firm's performance there are two highly important views; firstly, there is an influence, by the financial goals stated in the mission statement on a firm's performance and, secondly, a firm's mission statement does have an effect on a firm's financial performance.

According to the relevant literature, the nature of the relationship between mission statement, in all sorts of companies, particularly in high-tech SMEs, and a firm's performance is still not apparent (Crott et al., 2005; Alavi et al., 2009; Desmidt et al., 2011). Therefore, in order to achieve the desired effect of a mission statement and in recognition of the effective part of the mission statement, financial or non-financial, on an SMEs performance this second research question and related hypothesis has been designed (figure 3-13).

R2. What is the effect of the mission statement on the SMEs performance?

- ***H_2:*** High performance SMEs place more emphasis on the measurable elements of their mission statements when developing their business strategies.

Figure 3-13: Effect of mission statement on performance of SMEs



Source: compiled by author

Therefore, H_2 is going to clarify the association between mission statement and SMEs performance and, in particular, it will test the influence of measurable and non-measurable elements of mission statement to improve SMEs performance. Although there is no universal and standard agreement about the content of mission statement (Moneva, 2007), it is found that the contents of mission statement should include nine dimensions: Customers, Products/Services, Location/Markets, Technology, Growth and Profitability, Firm's Philosophy, Self-concept, Public image and Employees (Pearce and David, 1987; Alavi et al., 2009; Arefin, et al., 2011). So, based on several studies, the most important components of an effective mission statement are selected and broken down into two, measurable and non-measurable, groups (Pearce and

David, 1987; Bart, 1998; Alavi, et al., 2009; Arefin, et al., 2011). Table 3-7 indicates the components of each type of environmental scanning.

Table 3-7: Measurable and Non-Measurable contents of a mission statement

Measurable	Non-Measurable
1. Specific financial objectives	1. Specific non-financial objectives
2. Specific product offered	2. General definition of production
3. Specific market served	3. General market definition
4. One big goal for company	4. General company goals
5. Distinctive competitive position	5. General competitive position

Source: compiled by author

3.3.5. Generic Types of Strategy

According to the relevant literature, there are two key viewpoints regarding how firms obtain competitive advantage: Industrial Organisation View and Resource-Based View (Caloghirou et al., 2004). In the1980s, the Industrial Organisation View stated that a firm's competitive advantage mainly relied on its strategic position in the competitive market and its aim was to explain how the external environmental factors affected a firm's benefits (Aaker, 1984; Coyne, 1986; Porter, 1985, Weber and Polo, 2010; Nandakumar, 2011; Del Rio, 2012). According to the Industrial Organisation View, Porter (1985) developed the concept of generic competitive strategies, to understand how to achieve advantage and how to generalise about the relative position of individual firms within an industry. There are two basic types of competitive advantage which the firm can process: cost leadership or differentiation. The two basic types of

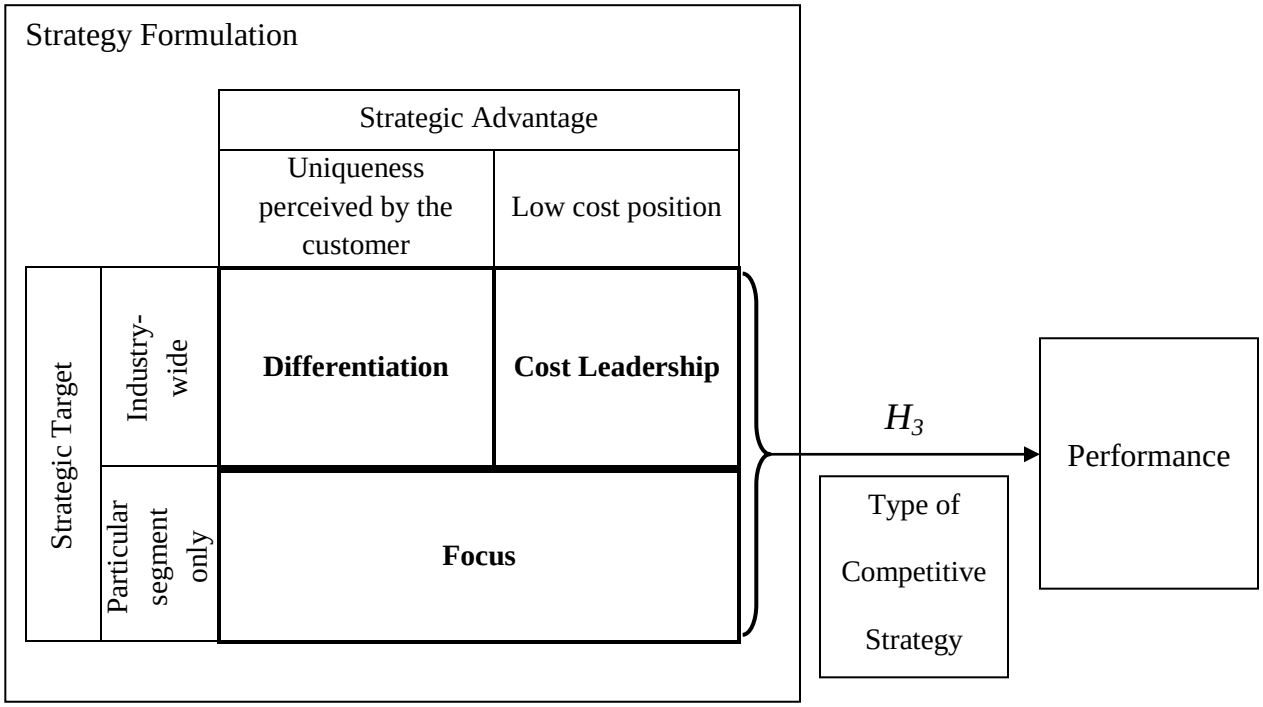
competitive advantage combined with the scope of activities a firm seeks to achieve (Porter, 1985, Karami, 2007; Gomes et al., 2009; Acquaah, 2011; Plechero et al., 2012) lead to three generic strategies for achieving an average performance in an industry.

Although many studies have been carried out into generic competitive strategies (Porter, 1981; Homburg, et al, 1999; Galoghirou and, et.al, 2004; Kastelli, et al, 2004, Gomes et al., 2009; Plechero et al., 2012), there is still a gap in the literature about the relationship between types of generic competitive strategies and the performance of high-tech SMEs. Therefore, to achieve correlation between the type of competitive strategy and the performance of SMEs, the third research question and related hypothesis has been designed (figure 3-14).

Q3. What is the relationship between the types of competitive strategy and the SMEs performance?

- ***H_3:*** There is a significant relationship between the type of strategy and the SMEs performance.

Figure 3-14: relationship between type of competitive strategy and performance of SMEs



Source: Compiled from Porter (1985, p.12)

Hence, H_3 is going to investigate the relationship between an effective type of competitive strategy and performance within high-tech SMEs. To find an association between a generic type of strategy and the performance of SMEs, emphasis on each of these types of strategy and their influence on the performance of SMEs have been measured. Table 3-8 shows the elements of each type of competitive strategy.

Table 3-8: elements of each type of generic competitive strategy

Cost leadership	Differentiation	Focus
1. Unit cost reduction 2. Change production process (with the goal of constantly reducing production cost) 3. Overhead cost control 4. Pursuing operating efficiencies 5. Pursuing cost advantages in raw material procurement	1. Refine products 2. Manufacturing innovation 3. Always the first to market a new product 4. R &D of new products is very important within the firm. 5. Competition by quality of the products	1. Narrow or broad areas of the market 2. Specific or broad range of products

Source: compiled by author

3.3.6. Knowledge-Based View (KBV)

As already stated, the resource-based view (RBV) is a key viewpoint in relation to how firms can obtain competitive advantage (Caloghirou et al., 2004; Furr, 2010; Padayachy, 2010). In the last decade, researchers have paid more attention to the RBV especially in the fields of strategic management, economics and organisational theories (Galbreath, 2005; Wernerfelt, 2009; Arend and Levesque, 2010; Peteraf, 2011). The RBV stresses that firms should attempt to develop their own special resources and capabilities and, in that regard, should formulate their own strategies (Aaker, 1989; Prahalad and Hamel, 1990; Grant, 1991; Javidan, 1998; Paiva, et al., 2008; Padayachy, 2010). Two branches of the resource-based view are put forward in order to give it a wider application. The first branch is a knowledge-based view (KBV) and the second branch of the RBV is dynamic capabilities.

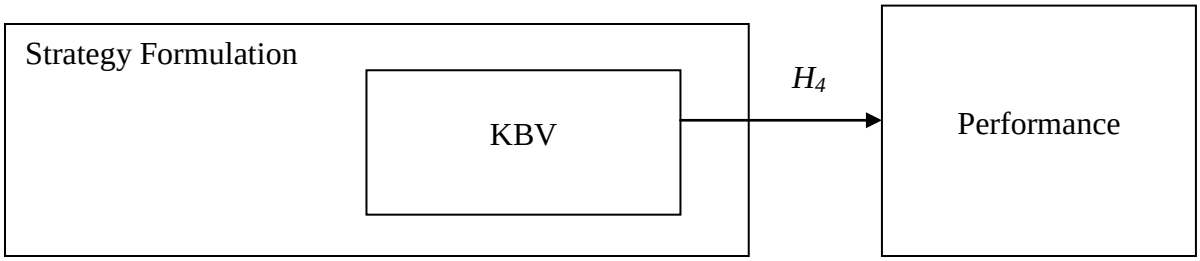
It is important to distinguish between two types of knowledge: explicit and tacit knowledge. Usually, competence requires both kinds of knowledge (Nonaka and Takeuchi, 1995; Nonaka and Krogh, 2009; Clarke, 2010; Huang, 2011). Scientists argue that truly innovative companies are the ones that can modify and enlarge the knowledge of individuals to create a "spiral of interaction" between tacit and explicit knowledge through the four processes of the Socialisation–Externalisation–Combination–Internalisation (SECI) model (Nonaka and Takeuchi, 1995; Lynch, 2003; Johnson and Scholes, 2008; Nezafati, 2009; Heng, et al., 2011). The KBV regards knowledge as the most important resource of a firm, and most of the knowledge in a firm is created by individuals and then is stored in them. Hence people are the more important holders of knowledge (Nonaka and Toyama, 2002; Shaw and Edwards, 2006; Wang, et al., 2009; Leiponen and Helfat, 2010).

In addition, it is clear that knowledge management cannot work without other sorts of resources, whether tangible or intangible, for creating and transferring knowledge (Sherif, et al., 2006). However, the relationship between the KBV to strategy formulation and the performance of high-tech SMEs is still not clear. For that reason, to achieve a relationship between the KBV view of strategy formulation and the performance of SMEs, the fourth research question and related hypothesis has been designed (figure 3-15).

Q4. Is there any relationship between a knowledge-based view (KBV) to formulation of strategy and the SMEs performance?

- ***H_4:*** There is a significant relationship between a knowledge-based view to the formulation of strategy and the SMEs performance.

Figure 3-15: relationship between KBV to strategy formulation and performance of SMEs



Source: compiled by author

Thus, H_4 is going to explore the relationship between the KBV to strategy formulation and the performance of high-tech SMEs. To find a relationship between the KBV to strategy formulation and the performance of SMEs, the SECI model as a knowledge creation model used for KBV (Nonaka, 1994) and other resources has been classified into two categories: tangible and intangible. Table 3-9 shows the content of each category.

Table 3-9: Content of RBV and KBV

RBV	KBV
Tangible: 1) Capital 2) Technologies 3) Machinery 4) Geographic dispersion 5) Company location Intangible: 6) Brand 7) Patents/ licences/rights	1) Personal interaction with customers 2) Face-to-face meeting 3) Informal meetings in the organisation 4) Formal inter-team discussion about customer needs 5) Formal inter-team discussion about relevant technologies 6) Collective decision making processes 7) Systematic technical knowledge 8) Systematic customer needs knowledge 9) Formal business education 10) New production practices 11) Assessment of technical requirements 12) Customer needs analysis

Source: compiled by author

3.3.7. Characteristics of SMEs

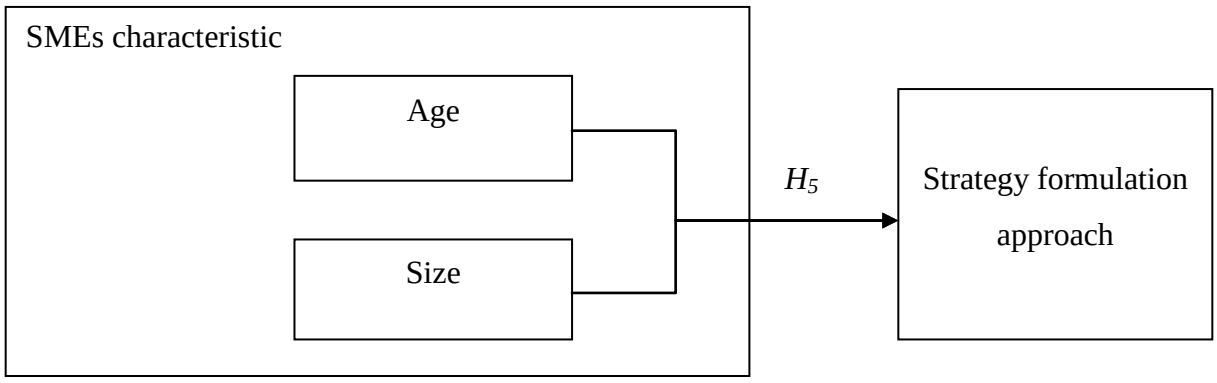
Several elements are involved in the formulation of strategy; their compositions strongly and directly depend on their strategy-making mode (Mintzberg, 1973; Bellamy, 2009; Franco, et al., 2011). These elements are: type of motives for decisions, goals and objectives of the organisation, the methods used to evaluate strategy, the person who is authorised to evaluate and makes choices, the decision horizon, the environment, flexibility, degree of dynamism and stability, and mission and vision of direction. It is clear that each approach to strategy formulation depends on the organisation's specific situation, such as: size, age and level of technology as quantity characters, and the type of leadership and the kind of environment as

quality characters. Therefore, it is important to distinguish the relationship between the characteristics of SMEs, particularly in high-tech industries and strategy formulation approaches (Wohrl, et al., 2009; Yang, et al., 2009). Hence, to discover the relationship between the characteristics of SMEs and approaches to strategy formulation, the fifth research question and related hypothesis has been designed (figure 3-16).

Q5. What is the relationship between the characteristics of SMEs and their strategy formulation approach?

❖ ***H_5:*** There is a significant relationship between the characteristics of SMEs and their strategy formulation approach.

Figure 3-16: SMEs characteristic and strategy formulation approach



Source: compiled by author

3.3.8. Dynamic and Formal approaches to Strategy Formulation

Formulation of strategy is a combination of dimensions and elements of strategy-making that work together to define a logical pattern of action for the firm (Dess and Lumpkin, 2001; Bellamy, 2009; Brinckmann, et al., 2010; Franco, et al., 2011). Therefore, the study of these dimensions is not only important but is also vital in helping to identify a rational strategy formulation approach in firms, particularly SMEs. Different approaches to strategy formulation depend on quantitative characters such as: size and age, which were discussed previously, and some qualitative characters such as: type of leadership and kind of environment. Based on these approaches and a very strong correlation between formulation, as the formation stage of strategy, and implementation, as the application stage of strategy, two main types of strategy-making are created so far: formal and dynamic strategy formulation approaches.

Some researchers identified a comprehensive definition and an approach to formal strategy formulation (Bechtold, 1997; Sandberg, 2010). Based on their point of view, due to rapid change, ambiguities and fluctuations in the environment, formal strategy formulation needs to be a continuing process. This permanent process is moving towards increasing organisational knowledge, flexibility and adaptation and these are, indeed, the targets of strategy. In other words, formal strategy formulation needs to continue updating processes and events such as sudden environmental opportunities or remarkable environmental shifts are among the important factors that can activate this process.

Some researchers believe a dynamic strategy formulation approach requires some important details (Feurer and Chaharbaghi, 1995; Koyana, 2009; Greiner and Cummings, 2009; Liu and Wang, 2009; Harrison and Leitch, 2012). Firstly, a dynamic strategy formulation approach needs a strong internal environment that presents a high degree of constancy and stability whilst at the same time offering a high level of flexibility to respond quickly to external changes. Secondly, the quality of an effective dynamic strategy formulation depends on the quality of knowledge that is used by an organisation. From this view, though, dynamic strategy formulation has a high level of flexibility in the face of external environments, but it needs a stable internal environment as well.

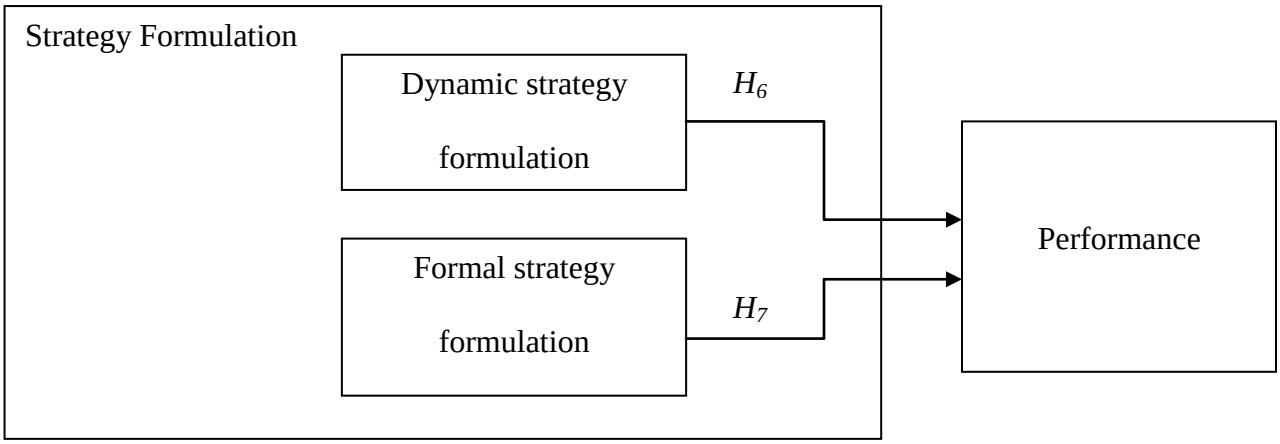
As can be seen, according to new definitions and approaches to formal and dynamic strategy formulation, not only do these two approaches of strategy formulation have significant differences but also their ability to respond to the external environment is different, especially when there are uncertainties in the external environment. However, based on the relevant literature, usually one of these two approaches to strategy formulation is explored in various studies. This means one of these two approaches to strategy formulation can work in an organisation and the improved performance of a firm can be attributed to one of them.

According to this new definition, this study is going to investigate the relationship between formal and dynamic approaches to strategy formulation and the performance of high-tech SMEs. Therefore, the sixth research question and related hypotheses were designed (figure 3-17).

Q6. What is the association between different approaches to strategy formulation and the SMEs performance?

- ***H_6:*** High performance SMEs place more emphasis on dynamic strategy formulation.
- ***H_7:*** High performance SMEs place more emphasis on formal strategy formulation.

Figure 3-17: Approaches to strategy formulation and performance of SMEs



Source: compiled by author

Thus, H_6 and H_7 are going to be used to investigate the relationship between dynamic and formal modes of strategy formulation and the high level performance of SMEs. Characteristics of formal and dynamic modes of strategy formulation are listed in the table 3-10.

Table 3-10: Characteristics of formal and dynamic mode of strategy formulation

Formal	Dynamic
1. A view from outside to inside	1. A view from inside to outside
2. Resource-based view	2. Knowledge-based view
3. Using a mechanic control mechanism	3. Using a organic control mechanism
4. Elimination of potential barriers	4. Constantly looking to change
5. A written strategy	5. An unwritten strategy

Source: compiled by author

3.3.9. Performance Measurement

Before the 1980s, researchers generally thought of financial data as being the most important index for measuring companies' performance. After the 1980s, they tended to focus only on financial indicators which cannot be a comprehensive and balanced measurement of a company's performance (Neely, 1998; Adams, 2002; Amaratunga and Baldry, 2002; Jusoh and Parnell, 2008; Wan and Zhao, 2009).

Since the 1990s, several performance measurement models have been designed e.g. the Performance Pyramid, Performance Measurement in Service Businesses, the Balance Scorecard, Integrated Performance Measurement and Activity-Based Profitability Analysis. In this study, the balanced scorecard (BSC) is used as an effective measuring model for SMEs performance. The BSC recommends that managers analyse an organisation's performance from four perspectives (figure 3-18):

(e) Customer perspective: How do customers see us?

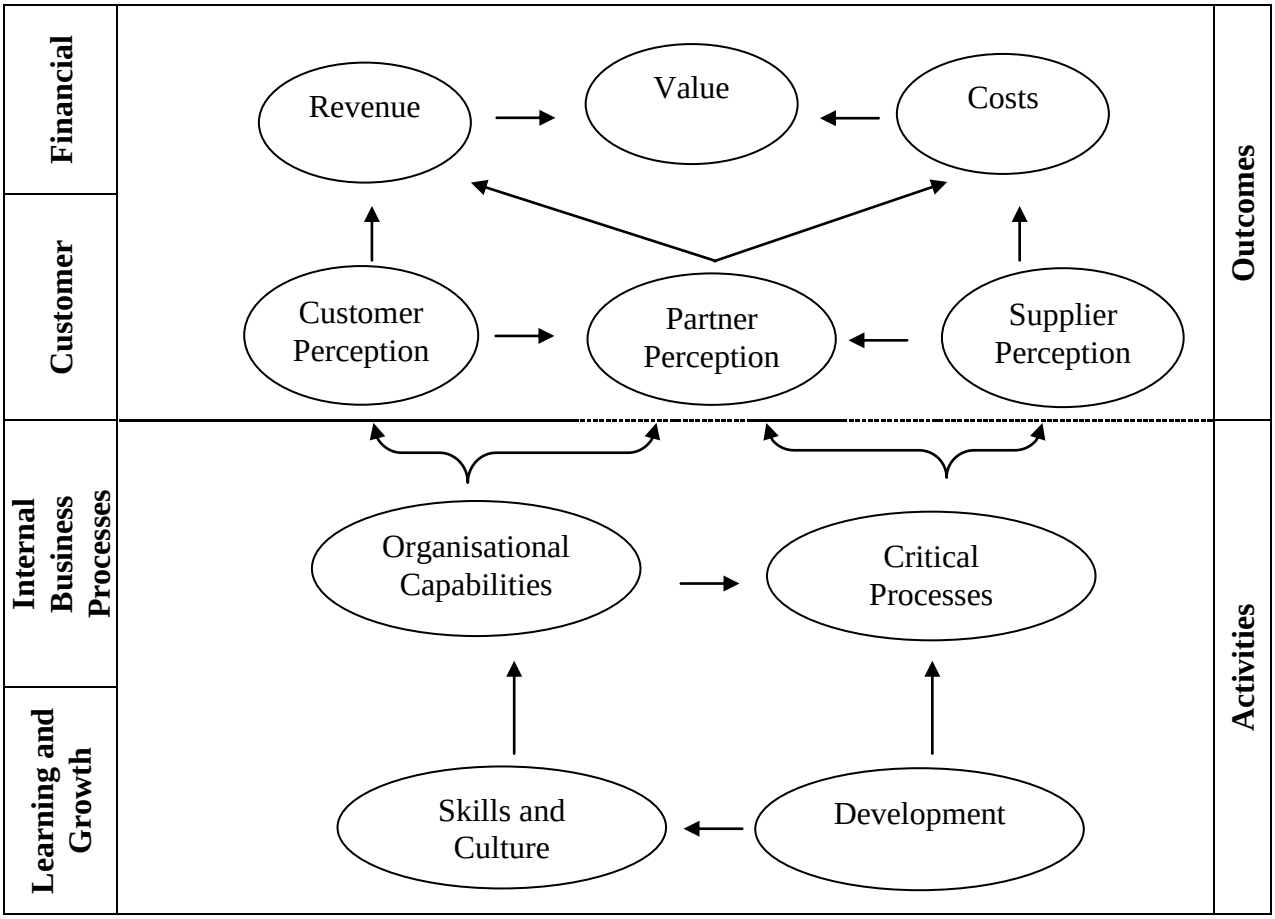
(f) Internal Business Processes Perspective: What must we excel at?

(g) Learning and Growth Perspective: Can we continue to improve and create value?

(h) Financial perspective: How do we look to our shareholders?

The lower two perspectives contain objectives relating to the most important activities in terms of 'Learning and Growth' and 'Internal Processes'. The higher two perspectives address objectives relating to the desired outcomes of the activities undertaken in terms of 'External Relation' and 'Financial Perspective'.

Figure 3-18: Four perspectives of BSC



Source: Anderson and Lawri (2001, p. 642).

Each of these four perspectives should be measured based on various indicators and, finally, by combining the results of these perspectives, a firm's performance is able to be measured. Table 3-11 shows the used indicators for each BSC's perspective.

Table 3-11: Indicators of BSC perspectives

Financial	1. Operating income 2. Return On Investment (ROI) 3. Earnings Per Share (EPS) 4. Net Present Value (NPV) 5. Productivity growth
Customer	1. Customer satisfaction 2. Customer retention 3. Percentage of sales to new customers 4. Market share growth 5. On-time delivery
Internal Business Processes	1. Job rotation 2. Operation process 3. Post sale service process 4. Quality control 5. R & D
Learning and Growth	1. Employee satisfaction 2. Employee productivity 3. Training hours per employee 4. Sale growth 5. Percentage of revenue per employee

Source: compiled by author

3.4. Summary

An overview of SMEs and high-tech industries in the UK develops an understanding of the research context of the current study. Consequently, a research framework is formulated in which research questions and hypotheses are proposed to be tested and analysed in the following chapters.

According to the European Commission (Recommendation 2003/361/EC), SMEs are those which have less than 250 employees, or an annual turnover of less than 50 million Euros, or a balance sheet total of less than 43 million Euros. This study uses the number of employees as the criterion for sampling and for classifying sample firms. While high-tech industries greatly contribute to the UK's economy, the biotechnology industry, according to forecasts, will hold a large global market in 2025 and currently it is the second largest industry in Europe. SMEs play a significant role in the biotechnology industry. However, insufficient attention to strategy formulation and its model has been the limiting factor for all sorts of firms' performance, particularly high-tech firms. High-tech firms have mainly resorted to strategy based cooperation in pursuing their goals.

Based on a critical review of theoretical studies, empirical studies and high-tech SMEs' strategy formulation in the UK, a research framework is outlined which is constructed of 6 research questions and 7 hypotheses and, so, this should enable this study to answer the proposed research questions.

Chapter 4

Research Design and Methodology

4.1. Introduction

This chapter presents research design and methodology in great detail. The first section describes the research strategy, consisting of the deductive approach, the cross-sectional survey method and the postal questionnaire instrument. Types of survey error are systematically discussed to emphasise the importance of questionnaire design and the administration of the questionnaire process. The second section articulates the construction of the postal questionnaire developed for this study, including data to be collected, types of questions and measurement considerations. Steps for improving the response rate are displayed. The third section describes the sample design from the sampling frame to the procedure of data collection. The fourth section, based on data from the questionnaire, defines research variables and their measurements for data analysis in the following chapter. The last section provides a conclusion to the chapter.

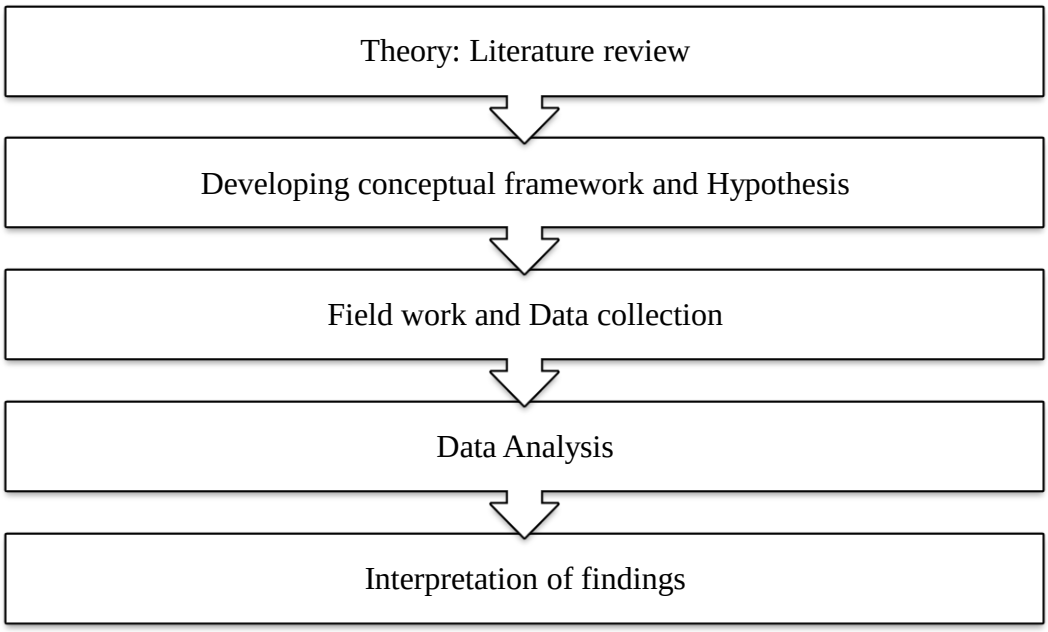
4.2. Research Strategy

4.2.1. The Research Process

A deductive approach is the rational process of deriving a conclusion from a known basis or something known to be true, while an inductive approach is the valid process of creating a general plan based on observation of particular facts (Zikmund, et al., 2000, Bryman and Bell, 2007). According to the definition, deductive study is a research approach based on an existing theory in a particular area or related to that area. The main purpose of a deductive research approach is to examine and develop the theory (Saunders et al., 2009). This research needs to

verify theoretical assumptions and hypotheses by using a scientific method. Therefore, a deductive approach has been employed in this research. The process of a deductive study is illustrated in figure 4-1.

Figure 4-1: Process of a deductive study



Source: Lewis, at al. (2003); Bryman (2004)

According to the deductive approach, firstly hypotheses deduce from theories and then drive the process of gathering data. The steps of deductive study can be outlined largly as below:

- Deducing hypothesis from the theory,
- Expressing the hypothesis in operational terms which propose a relationship between variables,

- Testing this operational hypothesis,
- Examining this operational hypothesis,
- Confirming the theory if the hypothesis supported.

Some significant characteristics of the deductive approach shortened by Lewis, et al. (2003), are below:

1. Research follows scientific principles, moving from theory to data and explaining the causal relationship between variables,
2. Researchers operationalise the concepts developed in the hypothesis, enabling the facts to be measured quantitatively,
3. Researchers collect quantitative data and use controls to allow the testing of hypotheses,
4. The research process is highly structured and also the researcher needs to be independent of what is being researched to ensure the impartiality of the research.

4.2.2. Rationale for Performing a Questionnaire Survey

Karami, et al. (2006) state that research questions function as an appropriate research instrument. In addition, literature discloses that studies on strategy formulation employ surveys to collect data (Andrews, et al., 2009; Gimbert, et al., 2010; Borden, et al., 2010; Parnell, et al., 2012). To address the research questions proposed in this study, relating to collecting primary data, a comprehensive survey becomes necessary.

Based on the relevant literature, research questions and hypotheses developed in this study, a questionnaire is chosen to be the main instrument of data collection. The research strategy of this study is to use the questionnaire survey in high-tech SMEs across the UK.

The research method is a cross-sectional study. Cross-sectional research requires the collection of data on more than one case and a single point in time in order to collect a body of quantitative data in connection to two or more variables (Bryman and Bell, 2007; Saunders , 2009). Research questions and hypotheses describe the variables to be studied and the number of cases is determined by the sample size in this case. Data on the variables is gathered at the same time in a cross-sectional design which is dissimilar to an experimental design, where data is from pre-test and post-test, and different from longitudinal research where data is from a time series.

Data in each cell in the matrix represents the information of a certain variable of a certain case at a certain time. Table 4-1 shows the data matrix in cross-sectional research.

Table 4-1: Data matrix in cross-sectional research

	Variable 1	Variable 2	……	Variable n
Case 1				
Case 2				
…..				
Case n				

Source: compiled by author

4.2.3. Discussion of the Postal and Digital Questionnaire Instrument

A questionnaire survey can be of different types. The postal kind is a type of self-administered questionnaire which has advantages and disadvantages. Its benefits and drawbacks are as below (Lewis, et al, 2003, Bryman and Bell, 2007, Saunders, 2009).

Advantages:

1. Lower cost and higher efficiency

   Postal questionnaires could be sent out in a large number at one time. Postal questionnaires, compared to face-to-face interviews, can save time and cost to any research. The result of this advantage is clear in this study because of the widely distributed nature of science parks and high-tech SMEs across the UK.

2. Avoiding executive error from interviewers

   During a face-to-face interview, the characteristics of the interviewer may affect the answers that the interviewees give. For example, the changeability and non-uniformity of interviewers' abilities may make the interview questions biased error. However, postal questionnaires are completed by respondents themselves with highly standardised and structured questions, without the influence and interference of interviewers.

3. Increasing the accuracy of respondents' answers

The absence of interviewers promotes greater confidentiality and encourages respondents to disclose important information, which assists in raising the precision of answers regarding sensitive questions. In addition, a postal questionnaire allows respondents more time to think about, or to check with, the documents or people involved.

Disadvantages:

1. The effect of the researcher's absence on the procedure of answering questions

Respondents may be not familiar with some questions because of the vagueness of the questions or the inadequate knowledge of the respondent. This problem may be increased if some of the data is missing. Missing data appears when respondents decide to skip over some questions to which they have no interest in responding. Therefore, a pre-test has been carried out at the questionnaire developing stage and questions, which have been tried out, have been expressed at the maximum contraction with minimum deliberate secret company information.

2. Lack of in-depth information

Researchers are limited to the answers provided on the questionnaires and have no chance to probe further to discover deeper and more meaningful answers.

3. Limitation on the number of questions

A long questionnaire is the most important cause of low response rates and further missing data.

4. No control over the respondents

Questionnaires are mostly sent out to the specified individuals or the person in the named position. When respondents included are in a senior position, such as senior managers e.g. CEOs, it is highly probable the questionnaire will be assigned to others to complete. Although on one hand this may decrease the reliability of the answers, on the other hand, in some cases, delegating the questionnaire to someone else in the firm for completion perhaps increases the dependability of the answers because of their expertise in that area. Thus, the choice was left open for either CEOs to respond to the questionnaire themselves or for them to refer it to a relevant manager, but their position was enquired after in order to discover who had responded to the questionnaire.

5. Low response rate

Compared to interviews, the lower response rate of postal surveys is the most serious disadvantage. Although the tolerance of a low response rate to questionnaire survey is not known for certain, in general a low response rate risks being unrepresentative and too generalised for quantitative research.

4.2.4. Errors in Questionnaire Survey Research

The quality of a research project largely depends on the accuracy of the survey. Being aware of and realising various sources of errors is the basic method for handling and reducing survey errors. Random sampling error and systematic error are two major sources of error that are already known (Saunders, 2009).

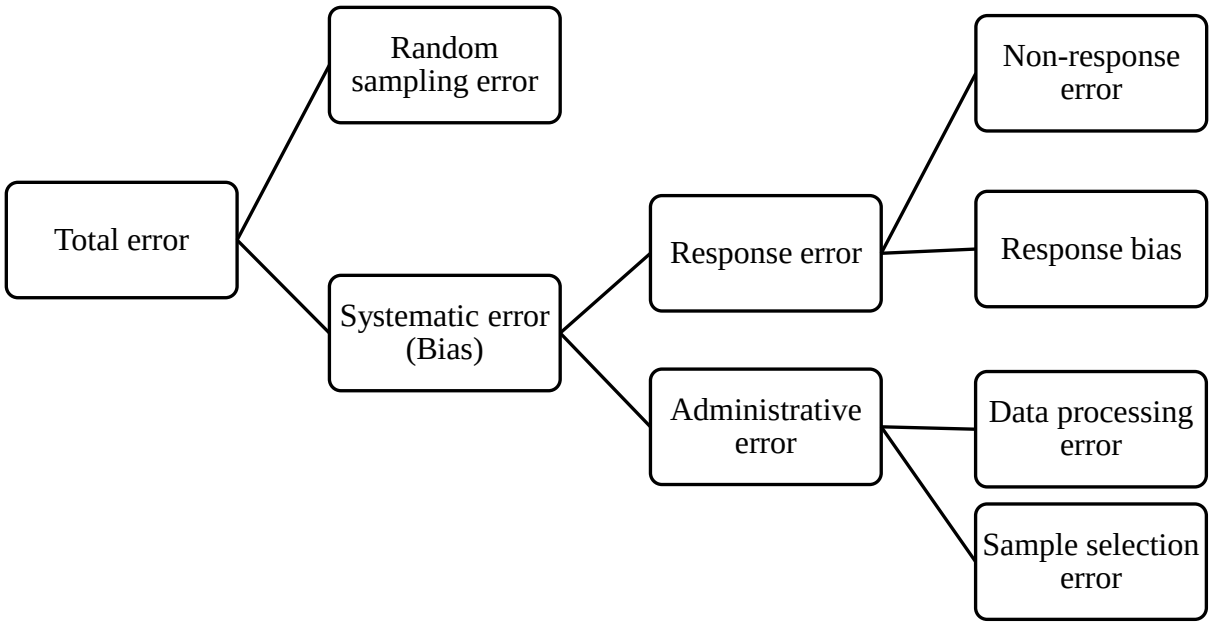
Random sampling error occurs when samples cannot represent the target population. Random sampling error is an unavoidable statistical problem. Appropriate questionnaire design, sample design and sampling procedure can reduce random sampling error.

Systematic error results from imperfect aspects of the research design and execution of the research. It is also called a non-sampling error, implying that all sources of error not included in random sampling error fall into the category of systematic error. Figure 4-2 shows a tree diagram of the total survey error.

Zikmund (2000) presents two groups of systematic error: response error and administrative error. There are two types of response error: non-response error and response bias. Few questionnaires have a 100 percent response rate. A questionnaire survey with a low response rate risks non-response error, wherein respondents have significant differences compared to non-respondents. Therefore, Zikmund (2000) suggests that a researcher must be sure that those who did respond to the questionnaire were representative of those who did not. Response bias occurs when

respondents' answers are falsified or misrepresented, either intentionally or inadvertently. A thoughtful questionnaire design helps reduce response bias.

Figure 4-2: Tree diagram of total survey error



Source: adapted from Zikmund (2000, p.145)

Administrative error results from the improper administration of the research process. Misunderstanding, neglect, or other kinds of mistakes are causes. Administrative error can occur in the process when data is wrongly edited, coded or entered into a computer, which is called data processing error. Administrative error can also occur when a sampling frame is not appropriately selected, and this is called sample selection error.

4.3. Data Collection

4.3.1. Questionnaire Construction

The construction of a questionnaire should mean that it is especially easy to follow and its questions should be particularly easy to answer because there is no interviewer involved in the administration of a postal questionnaire. The questionnaire design under this study follows a three-fold principle: firstly, to translate the research questions into a set of specific questions that the respondents can answer; secondly, to motivate respondents' willingness to participate in the survey; and thirdly, to minimise the potential non-response error.

4.3.1.1. Needed Data

The questionnaire is structured systematically. The first step is to decide what information needs to be collected. Based on research questions and hypotheses, the following information needs to be collected via the questionnaire:

1. The respondent's organisational position; they were asked to specify their position in the firm, e.g. CEO, middle manager, supervisor or others,

2. Basic information on the firm; including the firm's location, age, industry and number of employees,

3. Strategy formulation framework variables; including type of market and monitoring of other competitors, mission statement, type of competitive strategy inclusive cost leadership, differentiation and focus strategy, formal and dynamic strategy formulation and knowledge-based view,

4. Data to measure the level of a firm's performance according to the balance score-card (BSC) measurement method.

All of the required data is covered by the questionnaire's questions. There are a total of 33 questions in the questionnaire, which cover all research variables. Table 4-2 presents the layout of the questionnaire questions and the covered variables.

Table 4-2: Layout of questionnaire questions and related variables

Number of question	Number of variables	Section
1 – 6	1 - 5	General information
7 – 12	6 - 23	Type of market and other competitors monitoring
13 – 17	24 - 28	Mission statement
18 – 22	29 - 41	Type of competitive strategy
23	42 - 60	Knowledge based view (KBV)
24 – 32	61 - 69	Formal and dynamic strategy formulation
33	70 - 89	Performance

Source: compiled by author

4.3.1.2. Type of Questions

The second step, in questionnaire construction, is to decide on the types of question. According to Saunders (2009), regarding whether alternative answers are provided for respondents, questions are categorised into open-ended questions and close-ended questions. An open-ended question allows respondents to give answers in their own way. A close-ended question provides a number of alternative answers from which the respondent is instructed to choose. The first question in the questionnaire asks the firm's name but as it has been promised that the questionnaire will remain anonymous, this question has been considered optional. Besides the "other" choice in question number 2 and 3 that specifically require an answer to a company's location and the respondent's position, all the other questions in the questionnaire are close-ended. For example, question 2 in the questionnaire is:

Where is your company based?

- o Science or technology park
- o Based on its own
- o Other (please specify)

Close-ended questions are considered advantageous in terms of response rate for two reasons. Firstly, they provide an easy and simple process for answering; in these types of questions respondents need only tick or circle an answer or answers among the alternative answers

provided. In the eventuality that respondents may not be clear about what a question is getting at, the availability of answers may help to clarify the meaning of the question for respondents. The method of providing alternative answers can reduce the likelihood of missing data and improve respondents' confidence to complete the questionnaire. Secondly, less energy and time is required; close-ended questions provide easier and quicker ways for respondents to work their way through questionnaires.

However, close-ended questions exhibit disadvantages as well. Bryman (2004) points out that close-ended questions deter respondents' spontaneity. There is a possibility that respondents might come up with interesting replies that are not covered by the fixed answers. Another argument is that forced-choice answers are not exhaustive, and to achieve exhaustiveness will result in a long list of possible answers. To overcome the potential drawbacks and to capture as much detailed information as possible, it is suggested that a catchall category of 'other' be included in the provided choices. The questionnaire under this study uses this catchall category in questions 2 and 3.

4.3.1.3. Measurement Considerations

The third stage of questionnaire design is to decide on the type of scale. According to Zikmund (2000) and Saunders et al. (2009), four types of scale can be used to collect data; these are nominal**,** ordinal, interval and ratio scale. The questionnaire used in this study uses nominal and interval scales.

Nominal scale: questions use nominal scale when the alternative answers are categories with regard to the subject's characteristics or attributes. The requirement for a nominal scale is that its categories are mutually exclusive and exhaustive of all possibilities. This means each category must be different and all possible categories must be included. To ensure that all possible categories are considered, the category of 'other' is used and 'please specify' follows the 'other' category to collect the information not listed in the provided answers. In the questionnaire, general information sections and formal and dynamic strategy (part 2) are measured by nominal scale. For example, question 7 in the questionnaire is:

How many years has this company been in operation?

- ☐ 1 to 5
- ☐ 6 to 10
- ☐ 11 to 15
- ☐ 16 to 20
- ☐ 21 and more

Nominal scale is the lowest level of measurement and therefore the precision of data is relatively low. Data analysis is restricted to counting the number of responses in each category, calculation of the mode or percentage, and use of the Chi-square (χ^2) statistic.

Interval scale: questions use interval scale when asking respondents to assess and rate objects or events. With the interval scale, the distances between the rating numbers are equal, thus, differences between points on the scale can be interpreted and compared meaningfully. For instance, the difference between a rating of 3 and 4 is the same as the difference between a rating

of 1 and 2. An interval scale has all the qualities of nominal and ordinal scales, plus the differences between the scale points is considered equal. Therefore, data obtained using an interval scale can handle more sophisticated calculations than nominal scale and ordinal scale. Mean, standard deviation and Spearman correlation coefficient can be calculated. For example, question 10 in the questionnaire is:

Which time-frame do you use when monitoring your market?

	Extremely unimportant	Unimportant	Not sure	Important	Extremely important
Retrospective					
Current and Retrospective					
Current and Prospective					

4.3.2. Reliability and Validity of Questionnaire

Reliability and validity are the basic principles of designing a questionnaire. The former refers to the ability of an instrument to produce consistent results. Validity means the ability to procedure accurate result and to measure what is supposed to be measured (Bryman and Bell, 2007). A valid measure produces true results that reflect the true situation and condition of the environment supposed to study (Sarantakos, 1998). There are different methods that address in

reliability and validity in quantitative research. A number of strategies were employed to minimize bias, to ensure the reliability and to improve the validity.

4.3.2.1. Reliability

In quantitative research, reliability deals with an indicator's dependability, which means that the information provided by indicators does not vary as a result of the characteristics of the indicator, instrument or measurement device itself (Sarantakos, 1998). In other words, reliability is fundamentally concerned with issues of consistency of measures (Bryman and Bell, 2007). The following are three prominent factors involved when considering whether a measure is reliable.

- Stability. This consideration entails asking whether or not a measure is stable over time. Therefore, it can be confident that the results relating to that measure for a sample of respondents do not fluctuate.

- Internal reliability. The key issue is whether or not the indicators that scale or index are consistent. In other words, whether or not respondents' scores on any one indicator tend to be related to their scores on the other indicators.

- Inter-observer consistency. When a great deal of subjective judgement is involved in such activities as the recording of observations or the translation of data into categories, there is the possibility that there is a lack of consistency. In quantitative research, especially with a survey research strategy, when answers to open-ended questions have to be categorised, this lack may arise.

Internal reliability applies to multiple-indicator measures. When there is a multiple-item measure, in which each respondent's answers to each question are aggregated to form an overall score, the possibility is raised that the indicators do not relate to the same thing; in other words, they lack of coherence. In this case, it needs to be sure that all designed indicators are related to each other. If they are not, some of the items may actually be unrelated to indicator and therefore indicative of something else (Bryman and Bell, 2007). Cronbach's alpha is a commonly used test of internal reliability. It essentially calculates the average of all possible split-half reliability coefficients. A computed alpha coefficient will vary between 1 (denoting perfect internal reliability) and 0 (denoting no internal reliability). An acceptable level of reliability coefficient is 0.70 or greater (Nunnally, 1978; George and Mallery, 2003; Hair, et al, 2006).

4.3.2.2. Validity

The core essence of validity is captured by the word accuracy (Huck, 2004). Validity refers to the issue of whether or not an indicator that is devised to gauge a concept really measures that concept (Bryman and Bell, 2007). According to Sarantakos (1998), Bryman and Bell (2007) and Huck (2007), validity of a questionnaire includes face validity, content validity and external validity.

- *Face validity* is a form of validity in which researcher determines if the test seems to measure what is intended to measure Huck (2007). If a test has face calidity then it looks like a valid test to those who use it. Face validity might be established by asking other people whether or not the measure seems to be getting at the concept that is the focus of

attention. In other words, people, possibly those with experience or expertise in a field, might be asked to act as judges to determine whether or not on the face of it the measure seems to reflect the concept concerned (Bryman and Bell, 2007; Huck, 2007).

- *Content validity* is a non-statistical type of validity that involves "the systematic examination of the test content to determine whether it covers a representative sample of the behaviour domain to be measured" (Anastasi and Urbina, 1997 p.114). Content validity evidence involves the degree to which the content of the test matches a content domain associated with the construct. Huck (2007) note that by using a panel of experts to review the test specifications the content validity of the test can be improved. The experts will be able to review the items and comment on whether the items cover a representative sample of the behaviour domain.

- "*External validity* has to do with the generalisability of the research findings; to what extent can the findings of a research be generalised to and across population?" (Taylor and Asmundson, 2008, p.30). This concerns the question of whether the findings from the selected group of research participants can be generalised to other categories of population, such as population with other geographic or demographic features.

4.3.3. Steps to Improve the Response Rate

Considering the aforementioned disadvantages of the postal questionnaire, the following steps are employed to improve the response rate.

1. Two covering letters from my supervisor and myself are attached to the postal questionnaire. The covering letters articulate the importance of the research project to respondents, the scientific process that has selected the respondents' organisations, and the importance of the respondents providing truthful information is explained. My supervisor's letter is sent out to boost the respondent's confidence and willingness to participate. The covering letter guarantees the confidentiality of the respondent's individuality and the confidentiality of the organisation the respondent represents. The estimated time for completing the questionnaire is declared to facilitate respondents' confidence to contribute their time. To encourage respondents to contact the researcher for any queries, the detailed contact information of the researcher is provided. Covering letters use the official letterhead of Bangor Business School. Both covering letters contain signatures to portray formality and sincerity (Appendices A-1 and A-2).

2. Before starting to answer the questions, research objectives and aims are provided to help respondents relate to the questionnaire and therefore to supply reliable information (Appendix B).

3. A stamped addressed envelope is attached to the postal questionnaire for the respondents' convenience, to return the completed questionnaires.

4. The questionnaire is designed with a considerate format to motivate respondents to complete the questionnaire. These efforts include keeping the questionnaire to a

reasonable length, using close-ended questions as far as possible to save respondents' energy and time, designing a clear layout which is easy on the eye, using simple and direct language, and asking questions in a particular order, beginning with basic and general questions and proceeding to more specific questions (Appendix B).

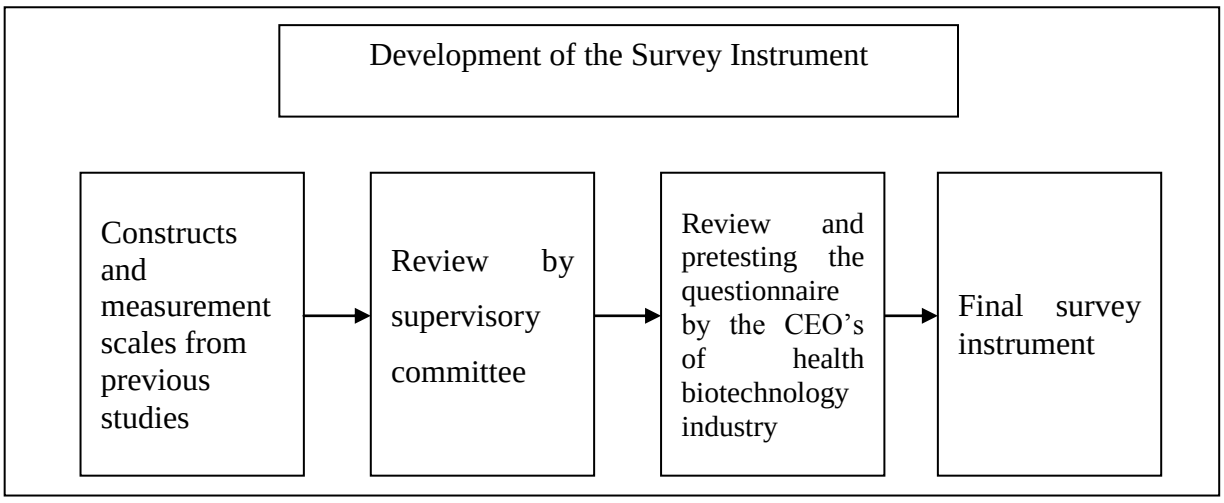
5. Pre-test the questionnaire.

6. Follow up those who have not responded to the questionnaire.

4.3.4. Pilot Study

The process in the development of the survey instrument is depicted in figure 4-3.

Figure 4-3: Steps in the development of the survey instrument



Source: compiled by author

Without a trial run, there is no way of knowing that the questionnaire will succeed (Bell, 1993, Bryman and Bell, 2007) so a pilot study was carried out. A draft version of the questionnaire was mailed to and discussed with supervisory committee. Based on the comments received from supervisory committee, the questionnaire was modified. The modified questionnaire was pretested by sending it to fifteen Chief Executives Officers (CEOs) belonging to the biotechnology and pharmaceutical industry. CEOs were asked to express their comments after completion of the questionnaire and fill a feedback form which was attached to the questionnaire (appendix C). The Chief Executives were requested to indicate the time taken to fill in the questionnaire and to comment on the following aspects in the feedback form:

- The relevance of the contents to their strategic management and the biotechnology and pharmaceutical industry;
- Whether they had any difficulty in understanding the meanings of the questions;
- Ease in reading the questions

After the pilot test, and based on the responses received from the CEOs the questionnaire script was revised and reworded to ensure that respondents would have no difficulty in understanding and answering the questions. Through this process, the content validity and face validity of the measures used in this study were assessed.

4.4. Survey Process

4.4.1. Research Area

The sample firms come from high-tech industries, according to the definition given by the Organisation for Economic Co-operation and Development (OECD), across the UK. OECD has two different approaches, which include high-tech sectors and high-tech products.

The sector approach classifies industries according to their technology intensity, whereas the product approach classifies them in relation to their finished products. High-tech sectors are as below:

- Aerospace
- Artificial intelligence
- Biotechnology and Pharmaceutical
- Energy
- Instrumentation
- Electrical engineering
- Optoelectronics
- Nanotechnology
- Nuclear physics
- Robotics
- Telecommunication

The OECD's classification for high-tech industries is as below (stable since 1973):

High-tech:

- Biotechnology and Pharmaceutical
- Aircraft and Spacecraft
- Medical, Precision and Optical instruments
- Radio, Television and Communication equipment
- Office, Accounting and Computing machinery

Medium-High-tech:

- Electrical and Energy machinery and apparatus
- Motor vehicles, Trailer and semi-trailers
- Railroad and Transport equipment
- Chemical and Chemical products
- Machinery and equipment

High-tech SMEs have recently been the subject of much attention among researchers and policy makers, not only in the UK but also in most of the world. Table 4-3 illustrates the number of newspaper articles, journal papers and books about high-tech SMEs which have been published during the last decade.

The selected industry for this research, according to OECD's classification for high-tech industries, is Biotechnology and the Pharmaceutical industry. Based on a discussion with one of

the officials at the UK Science Park Association (UKSPA), I was assured that the majority of firms in science parks are small or medium-sized. Unfortunately, many websites do not classify firms according to their tenants' activity. Therefore, profiles of tenants were studied and SMEs who are operating in biotechnology and pharmaceuticals were selected. It was decided to search email or postal addresses of firms through Science, Innovation or Biotechnology Parks or biotechnology and pharmaceutical associations' websites across the UK. According to the report of the Department for Business Innovation and Skills (BIS), 3972 high-tech SMEs were identified as working in the biotechnology and pharmaceutical industries in the UK by Dec 2010.

Table 4-3: Number of newspaper articles, journal paper and books about high-tech SMEs

		During last years	During last 2 years	During last 5 years	During last 10 year
Newspaper Article	High-tech	>3000	>3000	>3000	>3000
	SMEs	>3000	>3000	>3000	>3000
	High-tech SMEs (in the headline)	12	29	45	64
	High-tech SMEs (anywhere)	114	204	383	572
Journal Paper	High-tech	8193	12277	21322	31244
	SMEs	1523	2243	4042	6211
	High-tech SMEs (all fields)	549	783	1327	1863
Book	High-tech	249	510	3142	7768
	SMEs	87	166	1155	2406
	High-tech SMEs (all fields)	6	29	153	266

Source: compiled by author by using Nexis UK and Science Direct, date of access: 23/4/2011.

The information about biotechnology and pharmaceutical SMEs was collected from the list of tenants in each Science, Innovation or Biotechnology Park and the list of members of biotechnology and pharmaceutical associations across the UK. These number over 133 and some of them are listed below:

- Companies in the UK; www.companiesintheuk.co.uk
- Association of British healthcare industries; www.abhi.org.uk/productsearch
- Harwell Oxford+; www.harwelloxford.com/business-directory?page=1
- UK bio-incubator forum; www.ukbioincubation.com/
- UK data; ukdata.com/company/search
- Scottish enterprise; http://www.scottish-enterprise.com/your-sector.aspx
- Norwich bio-incubator; www.norbio.com/tenants.php
- UKBI; www.ukbi.co.uk/
- DiagnOx; www.diagnox.co.uk/site/directory/
- Bio industry (BIO); www.bioindustry.org/cgi-bin/member_list.pl?SITE_ID=84
- UK science park association; www.ukspa.org.uk/
- BioPark; www.biopark.co.uk/
- Association of university research parks; www.aurp.net/
- All UK science park's websites; such as, University of Southampton science park, advanced manufacturing park, Babraham bioscience technologies, Begbroke science park, Bio-city Nottingham, BRE innovation park, Cardiff business technology centre, Chesterford research park (Cambridge), etc.

4.4.2. Sample Frame

Although 3972 SMEs are working in the biotechnology and pharmaceutical industries, it was not possible to send questionnaires to all their email or postal addresses because of various reasons. The main reasons were: not having a website, the website was under repair or construction, there was an invalid email address on the website and finally some companies do not announce their company's postal address on their website.

A total of 2139 (54%) questionnaires were sent to the SMEs in two stages, the first stage was in digital form and the second stage was in postal form. In early November 2010, 1151 questionnaires in digital form, and in late January 2011, 988 questionnaires in postal form were sent to the SMEs. By the end of March 2011, 378 completed questionnaires were returned in both forms. Out of these completed questionnaires, 21 (5.6%) questionnaires, 9 digital and 12 postal, were removed because of substantial missing data in the questionnaire. Some follow-up methods, including phone calls and reminder emails, were employed to increase the response rate. Table 4-4 illustrates the number of distributed and completed questionnaires and the response rate as well.

Table 4-4: Number of distributed and completed questionnaires and response rate

		2010-2011					Total	Response rate
		Nov	Dec	Jan	Feb	Mar		
Digital questionnaire	Distributed	1151	-	-	-	-	1151	15.90 %
	Completed	-	147	36	-	-	183	
Postal questionnaire	Distributed	-	-	988	-	-	988	19.74 %
	Completed	-	-	-	124	71	195	
Total	Distributed	1151	-	988	-	-	2139	17.67 %
	Completed	-	147	36	124	71	378	

Source: compiled by author

Based on a quota sampling method, the recommended sample size for a population of 3972, with a confidence level of 95%, and a 5% margin of error (degree of accuracy), would be 348. This sample size is sufficient to generalise the results to the population (Krejcie and Morgan, 1970). The calculation of sample size is as below. In addition, figure 4-4 shows a flowchart of the questionnaire survey process.

$$n = \frac{\chi^2 * N * P * (1 - P)}{\{ME^2 * (N - 1)\} + \{\chi^2 * P * (1 - P)\}}$$

Where:

n = Sample size

χ^2 = Chi-square for the specific confidence level at 1 degree of freedom

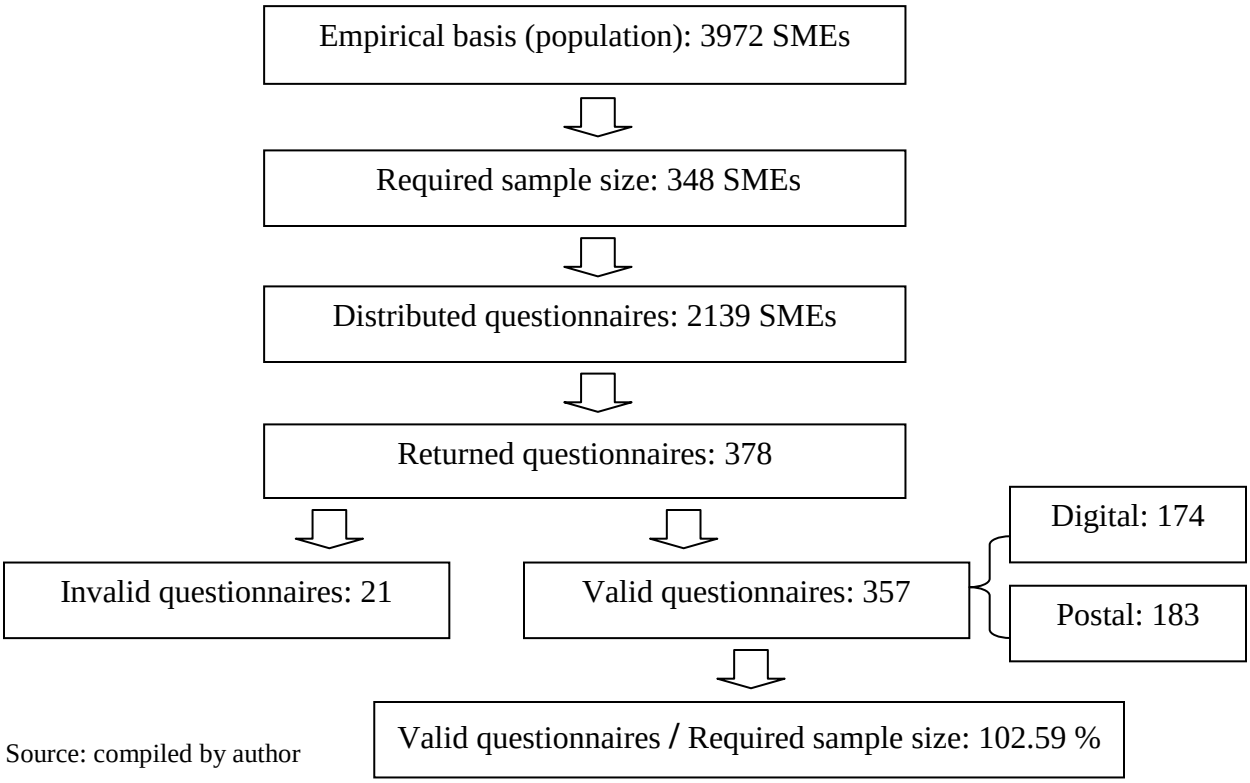
N = Population size

P = Population proportion

ME = Desired Margin of Error (the degree of accuracy expressed by proportion)

Population Size	$\chi^2_{0.95,1}$ = 3.841495	P = 0.54	ME = 0.05
3972	348		

Figure 4-4: Flowchart of the questionnaire survey process



Source: compiled by author

The validity and reliability of data was secured by several means. The questionnaire is carefully pre-tested in a small number of SMEs as described in subsection 4.3.4. Furthermore, CEOs are targeted as respondents, who are considered the most knowledgeable informants in SMEs about strategy formulation.

4.5. Data Analysis Plan

4.5.1. Data Coding

Coding is the process of identifying and classifying each of the provided answers in the questionnaire with a numerical score. The purpose of data coding is to transform the data in the questionnaire to computer readable data for data analysis. A data matrix is used to code data. Each row in the matrix represents a sample firm, thus a total of 357 sample SMEs are listed in rows. Each column represents a variable in a given time, therefore a total of 90 variables under a given time are recorded in columns. As a result, a 357 × 89 data matrix (31,773 cells) is formed by data coding. The following tables are data dictionaries (Appendix D) for each areas of this research. The data is analysed by SPSS version 17.

4.5.2. Defining Research Variables and Their Measurements

To test hypotheses and address research questions, measurements of research variables need to be defined and computed based on row data.

4.5.2.1. General Information

In questions 1 to 6, respondents are asked to tick some general information for identifying the demography of the sample. These questions include: the company's name (optional), the company's place, the respondent's position, the size and age of the company (table 4-5).

Table 4-5: Data dictionary for general information

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
General information					
General information	2	1	COMPLA	Company place	1= Science or technology park 2= Based on its own 3= Other
	3	2	JOBPOS	Job position	1= CEO/Senior manager 2= Middle manager 3= Supervisor 4= Other (Please specify)
	4	3	HITECH	High-tech	1= Yes 2= No
	5	4	SIZE	Size of company	1= 1 to 9 2= 10 to 49 3= 50 to 249 4= +249
	6	5	AGE	Age of company	1= 1 to 5 2= 6 to 10 3= 11 to 15 4= 16 to 20 5= 21 and more

4.5.2.2. Tendency to Type of Environmental Scanning

The type of environmental scanning was determined according to five indicators; these indicators have been previously described in detail in Chapter Four. Calculating a simple average

determined the amount of tendency to the type of environmental scanning for each respondent. These indicators are asked about in questions 7 to 12 (table 4-6).

Table 4-6: Data dictionary for type of environmental scanning (H_1)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
H_1: Type of environmental scanning					
Drives for scanning	7	6	CRIINI1	Crisis-initiated	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		7	PROSOL2	Problem solving	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		8	OPPFIN3	Opportunity finding	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Scope of Scanning	8	9	SPEEVE1	Specific events	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		10	SLEEVE2	Selected events	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		11	BRORAN3	Broad range of environmental systems	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

Table 4-6: Data dictionary for type of environmental scanning (H_1) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Time-frame for data	9	12	RETROS1	Retrospective	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		13	CURRET2	Current and retrospective	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		14	CURPRO3	Current and prospective	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Time-frame for decision impact	10	15	SHOTER1	Short term (< 1 year)	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		16	MIDTER2	Middle term (+1 to 3 years)	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		17	LONTER3	Long term (+3 years)	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

Table 4-6: Data dictionary for type of environmental scanning (H_1) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Types of forecast	11	18	BUDORI1	Budget oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		19	ECOORI2	Economic and sales oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		20	PESTEL3	Political, economical, social, technological, environmental, legal oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Methodological sophistication	12	21	SIMANA1	Simplistic data analysis	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		22	STAORI2	Statistical forecasting oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		23	FUTMET3	Many “futuristic” methodologies	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

To identify the types of environmental scanning and the tendency towards each one, three new continuous variables are defined, as follows:

— Irregular scanning (IRRSCA): simple average of six indicators; Crisis-initiated, Specific events, Retrospective, Short term (< 1 year), Budget oriented and Simplistic data analysis

— Periodic scanning (PRISCA): simple average of six indicators; Problem solving, Selected events, Current and retrospective, Middle term (+1 to 3 years), Economic and sales oriented and Statistical forecasting oriented

— Continuous scanning (CONSCA): simple average of six indicators; Opportunity finding, Broad range of environmental systems, Current and prospective, Long term (+3 years), PESTEL oriented and Many "futuristic" methodologies

4.5.2.3. Mission Statement Components

Questions 13 to 17 are designed to identify the emphasis given by respondents to measurable or non-measurable components of their mission statement (table 4-7). Symantec has been typical of these questions; 7 shows a complete emphasis on the measurable elements of a mission statement and, on the other hand, 1 shows a complete emphasis on non-measurable elements, and because point 4 shows neither emphasis on measurable nor non-measurable elements, it has been excluded. A simple average of the answers to these questions indicates the amount of emphasis placed on measurable or non-measurable components of mission statement.

To identify the degree of emphasis on measurable and non-measurable elements of mission statement, a new continuous variable is defined as "Measurable and Non-measurable Elements"

(MANDNON), values greater than 4 indicate more emphasis on measurable elements of mission statement than non-measurable elements, and values of less than 4 represent more emphasis on non-measurable elements of mission statement than measurable elements.

Table 4-7: Data dictionary for mission statement (H_2)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
H_2: Mission statement					
Measurable and non-measurable	13	24	COMOBJ	Definition of company objectives	7=Complete attention to specific financial objectives 6=Intensive attention to specific financial objectives and little attention to non-financial objectives 5=More attention to specific financial than non-financial objectives 4= Neither emphasis on both specific financial and non-financial objectives 3=More attention to specific non-financial than financial objectives 2=Intensive attention to specific non-financial objectives and little attention to financial objectives 1=Complete attention to specific non-financial objectives
	14	25	PRODEF	Production definition	7=Complete attention to specific product offered 6=Intensive attention to specific product offered and little attention to general definition of production 5=More attention to specific product offered than general definition of production 4= Neither emphasis on both specific product offered and general definition of production 3=More attention to general definition of production than specific product offered 2=Intensive attention to general definition of production and little attention to specific product offered 1=Complete attention to general definition of production

Table 4-7: Data dictionary for mission statement elements (H_2) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Measurable and non-measurable	15	26	MARDEF	Market definition	7=Complete attention to specific market served 6=Intensive attention to specific market served and little attention to general market definition 5=More attention to specific market served than general market definition 4= Neither emphasis on both specific market served and general market definition 3=More attention to general market definition than specific market served 2=Intensive attention to general market definition and little attention to specific market served 1=Complete attention to general market definition
	16	27	GOLDEF	Goals definition	7=Complete attention to one big goal for company 6=Intensive attention to one big goal for company and little attention to general company goals 5=More attention to one big goal for company than general company goals 4= Neither emphasis on all company goals 3=More attention to general company goals than one big goal for company 2=Intensive attention to general company goals and little attention to one big goal for company 1=Complete attention to general company goals
	17	28	COMDEF	Definition level of competition	7=Complete attention to unique competitive position 6=Intensive attention to unique competitive position and little attention to general competitive position 5=More attention to unique competitive position than general competitive position 4= Neither emphasis on unique and general competitive position 3=More attention to general competitive position than unique competitive position 2=Intensive attention to general competitive position and little attention to unique competitive position 1=Complete attention to general competitive position

4.5.2.4. Identification of the Type of Strategy

Questions 18 to 22 are designed to identify the type of competitive strategy (table 4-8). In question 18, respondents are asked to indicate their type of competitive strategy, Cost Leadership or Differentiation. Also in questions 21 and 22, respondents indicate if they are using a cost leadership-focus or a differentiation-focus.

To identify the types of competitive strategy in the firms, 4 new continuous variables are defined as; Cost leadership (COSTLEAD), Differentiation (DIFFERENT), Cost leadership – Focus (COSFOC) and Differentiation – Focus (DIFFOC).

Table 4-8: Data dictionary for type of competitive strategy (H_3)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
H_3: Type of strategy					
	18	29	TYPSTE	Type of strategy	1= Cost leadership 2= Differentiation
Cost leadership	19	30	UNTCOS	Unit cost reduction	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		31	CHAPRO	Change production process	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		32	LOWPRI	Overhead cost control	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

Table 4-8: Data dictionary for type of competitive strategy (H_3) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Cost leadership (Cont.)	19 (Cont.)	33	OPREFF	Operating efficiency	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		34	RAWCOS	Raw material cost	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Differentiation	20	35	REFPRO	Refine products	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		36	MANINN	Manufacturing innovations	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		37	NEUPRO	First to new product	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		38	RANDD	R&D	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		39	COMQUA	Compete by quality	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Focus	21	40	MARARE	Market area	1= Narrow area of the market 2= All areas of the market
	22	41	RANPRO	Range of products	1= Concentrate on specific range of products 2= Broad range of products

4.5.2.5. Recognition View to Strategy

Question 23 is designed to recognise the view to strategy. This question has 19 components: the first 7 elements are checking the recourse-based view (RBV) to strategy and the remaining factors are examining the knowledge-based view (KBV) to strategy (table 4-9).

To ascertain if a recognition view to strategy is being used, new continuous variables are defined by calculating a simple average of the RBV and KBV elements.

Table 4-9: Data dictionary for recognition view to the strategy (H_4)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
H_4: Knowledge-Based View (KBV)					
RBV	23	42	CAPIMP	Importance of capital	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		43	TECIMP	Importance of technology	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		44	MACIMP	Importance of machinery	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		45	GEOIMP	Importance of geography dispersion	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

Table 4-9: Data dictionary for recognition view to the strategy (H_4) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
RBV (Cont.)	23 (Cont.)	46	LOCIMP	Importance of company location	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		47	BRAIMP	Importance of brand	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		48	PATIMP	Importance of Patents/ licences/rights	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
KBV	23	49	CUSINT	Personal interaction with customers	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		50	F2FMIT	Face-to-face meeting	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		51	INFMIT	Informal meeting in organisation	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		52	FORCUS	Formal inter-team discussion about customer needs	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		53	FORTEC	Formal inter-team discussion about relevant technologies	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

Table 4-9: Data dictionary for recognition view to the strategy (H_4) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
KBV (Cont.)	23 (Cont.)	54	COLDEC	Collective decision making processes	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		55	SYSTEC	Systematic technical knowledge	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		56	SYSCUS	Systematic customer needs knowledge	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		57	FOREDU	Formal business education	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		58	NEWPRO2	New production practices	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		59	TECREQ	Assessment of technical requirements	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		60	CUSNID	Customer needs analysis	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

4.5.2.6. Identification of Strategy Formulation Approach

Questions 24 to 32 are designed to identify the strategy formulation approach and some supplementary information is highlighted in this regard (table 4-10). Symantec has been typical of questions 24 to 28; 1 shows a complete tendency towards a formal strategy formulation approach and 7 shows a complete tendency towards a dynamic strategy formulation approach, since point 4 shows neither attention to formal nor dynamic approaches to strategy formulation, it has been excluded. A simple average of the answers to these questions rates the tendency to formal or dynamic approaches to strategy formulation.

To identify the degree of attention to formal or dynamic approaches to strategy formulation, a new continuous variable is defined as: Formal or Dynamic Strategy Formulation (FORORDYN); values greater than 4 indicate more attention is paid to a dynamic strategy formulation approach than formal and values less than 4 represent more attention being paid to a formal strategy formulation approach than dynamic.

In addition, respondents are asked some supplementary questions, such as: their designing strategy period, their forecasting business evolution period, the interval between formulation and implementation of strategy and the strategy formulation revising period. These questions aid a better understanding of strategy making processes in high-tech SMEs.

Table 4-10: Data dictionary for identification of strategy formulation approach ($H_{5, 6 \text{ and } 7}$)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
$H_{6\&}$ H_7 *:* Formal and Dynamic strategy					
Formal and Dynamic strategy	24	61	STRORI	Strategy orientation	7=Complete attention to external orientation 6=Intensive attention external orientation and little attention to internal orientation 5=More attention to external orientation than internal orientation 4= Neither attention to external and internal orientation 3=More attention to internal orientation than external orientation 2=Intensive attention to internal orientation and little attention to external orientation 1=Complete attention to internal orientation
	25	62	VIWSTR	View to strategy	7=Complete attention to KBV 6=Intensive attention to KBV and little attention to RBV 5=More attention to KBV than RBV 4=Neither attention to KBV and RBV 3=More attention to RBV than KBV 2=Intensive attention to RBV and little attention to KBV 1=Complete attention to RBV
	26	63	CONMEC	Control mechanism	7=Complete attention to informal control system 6=Intensive attention to informal control system and little attention to formal control system 5=More attention to informal control system than formal control system 4=Neither attention to informal and formal control system 3=More attention to formal control system than informal control system 2=Intensive attention to formal control system and little attention to informal control system 1=Complete attention to formal control system

Table 4-10: Data dictionary for identification of strategy formulation approach ($H_{5, 6 \text{ and } 7}$) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Formal and Dynamic strategy	27	64	STRLOK	Strategic looking	7=Complete attention to "constantly looking to change" 6=Intensive attention to "constantly looking to change" and little attention to "elimination of potential barriers" 5=More attention to "constantly looking to change" than "elimination of potential barriers" 4=Neither attention to "constantly looking to change" and "elimination of potential barriers" 3=More attention to "elimination of potential barriers" than "constantly looking to change" 2=Intensive attention to "elimination of potential barriers" and little attention to "constantly looking to change" 1=Complete attention to "elimination of potential barriers"
	28	65	WRISTR	Unwritten or written strategy	7=Complete attention to unwritten strategy 6=Intensive attention to unwritten and little attention to written strategy 5=More attention to unwritten than written strategy 4=Neither attention to unwritten and written strategy 3=More attention to written than unwritten strategy 2=Intensive attention to written and little attention to unwritten strategy 1=Complete attention to written strategy
Supplementary questions	29	66	DESPER	Design strategy period	1= < = 6 months 2= +6 to 12 months 3= +1 to 3 years 4= +3 to 5 years 5= + 5 years
	30	67	FORPER	Forecast business evolution period	1= < = 6 months 2= +6 to 12 months 3= +1 to 3 years 4= +3 to 5 years 5= + 5 years

Table 4-10: Data dictionary for identification of strategy formulation approach ($H_{5,\ 6\ and\ 7}$) (Cont.)

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Supplementary questions	31	68	SF2SIMP	Interval between formulate and implement of strategy	1= < = 1 month 2= +1 to 3 months 3= +3 to 6 months 4= +6 to 12 months 5= +12 months
	32	69	REVPER	SF revising period	1= Every < = 6 months 2= Every +6 to 12 months 3= Every +1 to 3 years 4= Every +3 to 5 years 5= Every +5 years

4.5.2.7. Measuring Performance

Question 33 is a question about the SMEs performance (table 4-11). In this question, the respondents are asked to determine their firm's performance in 4 areas: financial objectives, external relations, internal processes and learning and growth, according to the four perspectives of the balanced scorecard.

For grading the performance of SMEs, a new continuous variable is defined as Performance (PERFORMANCE). Performance values stem from calculating a simple average of all BSC perspectives. According to the values provided for performance, 3 groups of SMEs with different levels of performance are identified:

- Low performance SMEs: with performance equal or smaller than 2.5 (X = < 2.5)

- Moderate performance SMEs: with performance greater than 2.5 and less than 3.5 (2.5 < X < 3.5) and,

- High performance SMEs: with performance equal or greater than 3.5 (3.5 = < X)

Table 4-11: Data dictionary for measuring performance

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Performance (Balanced Scorecard)					
Financial objectives	33	70	OPRINC	Operating income	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		71	ROI	Return on investment	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		72	EPS	Earnings per share	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		73	NPV	Net present value	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		74	PROGRO	Productivity growth	1= Very low 2= Low 3= Moderate 4= High 5= Very high

Table 4-11: Data dictionary for measuring performance

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Customer	33	75	CUSSAT	Customer satisfaction	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		76	CUSRET	Customer retention	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		77	SALNEW	Percentage of sales to new customers	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		78	MARSHR	Market share growth	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		79	ONTIME	On-time delivery	1= Very low 2= Low 3= Moderate 4= High 5= Very high
Internal Business processes	33	80	JOBROT	Job rotation	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		81	OPRPRO	Operation process	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		82	POSSAL	Post sale service process	1= Very low 2= Low 3= Moderate 4= High 5= Very high

Table 4-11: Data dictionary for measuring performance

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Internal Business processes	33	83	QUACON	Quality control	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		84	RNDEXP	R&D	1= Very low 2= Low 3= Moderate 4= High 5= Very high
Learning and growth	33	85	EMPSAT	Employee satisfaction	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		86	EMPPRO	Employee productivity	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		87	TRAEMP	Training hours per employee	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		88	SALGRO	Sale growth	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		89	REVEMP	Percentage revenue per employee	1= Very low 2= Low 3= Moderate 4= High 5= Very high

4.6. Summary

Based on research questions and hypotheses proposed in the prior chapter, this chapter presents the research methodology step by step. This study adopts a deductive approach and employs a cross-sectional research method. The firm is the unit of analysis. The postal questionnaire is the instrument for collecting data. The questionnaire design and data collection process exploits the advantages of the postal questionnaire instrument to the greatest extent and takes appropriate steps to secure the response rate and quality of data.

The questionnaire is constructed in two parts. Part one consists of questions relating to the demographic information of respondents, basic information about the firm's business and basic information about the firm's strategy making process. Part two is composed of questions concerning strategic formulation components, including the type of environmental scanning, mission statement, type of competitive strategy, KBV, strategy formulation approach and SMEs performance. To clarify the investigated phenomena, a definition of strategy formulation is given initially in the questionnaire.

Sample firms come from biotechnology and the pharmaceutical industry, particularly medical technology, medical biotechnology and industrial biotechnology. A total of 2139 questionnaires were sent to sample firms. Among the returned questionnaires, 357 questionnaires were valid; this amount was 2.59 % more than was required. The validity and reliability of data was secured by several means.

To prepare for data analysis in the following chapter, raw data in the questionnaire is coded and transferred into the computer, and consequently research variables are defined and computed.

Finally, the employed statistical analysis methods are outlined. These are descriptive analysis, Spearman correlation analysis and standard multiple regression.

Chapter 5

Data Analysis

9.1. Introduction

This chapter presents the entire process of data analysis and hypotheses testing. This chapter is segmented into three sections: descriptive, correlation and regression analysis. Section one, or descriptive analysis, is divided into two sub-sections, general demographic profile and hypotheses descriptive analysis. The first part provides general information provided by respondents and surveyed firms, and the second part gives information about hypotheses. Section two separately investigates the correlation between constituent elements of strategy formulation with regards to the performance of SMEs. Section three analyses the regression of the strategy formulation considered model with regard to the performance of SMEs.

9.2. Descriptive Analysis

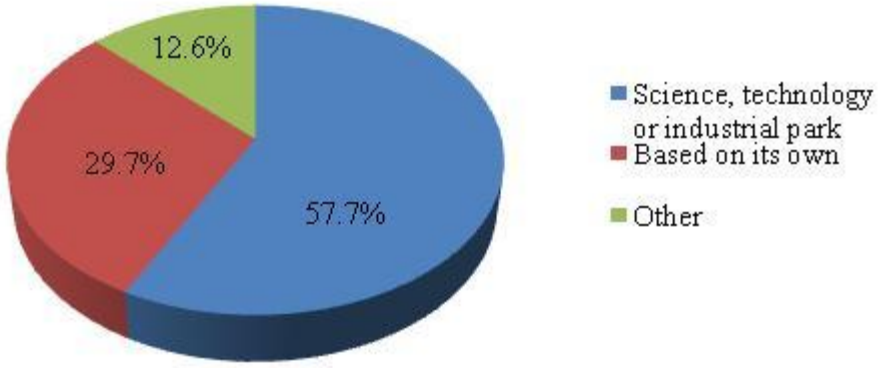
9.2.1. General Demographic Profile

The questionnaire respondents belong entirely to SMEs from the biotechnology and pharmaceutical industry, which is a high-tech industry. About 58% of respondents, according to the first question, are located in science, technology or industrial parks across the UK, 29.7% are located on their own and just 45 out of 357 respondent SMEs (12.6%) are situated in other places (table 5-1, figure 5-1). Answers given to the "other" choice question are: residential estates, business parks, innovation parks, industrial estates and private property.

Table 5-1: Place of SMEs

	Frequency	Percent	Cumulative Percent
Science, technology or industrial park	206	57.7	57.7
Based on its own	106	29.7	87.4
Other	45	12.6	100.0
Total	357	100.0	

Figure 5-1: Place of SMEs

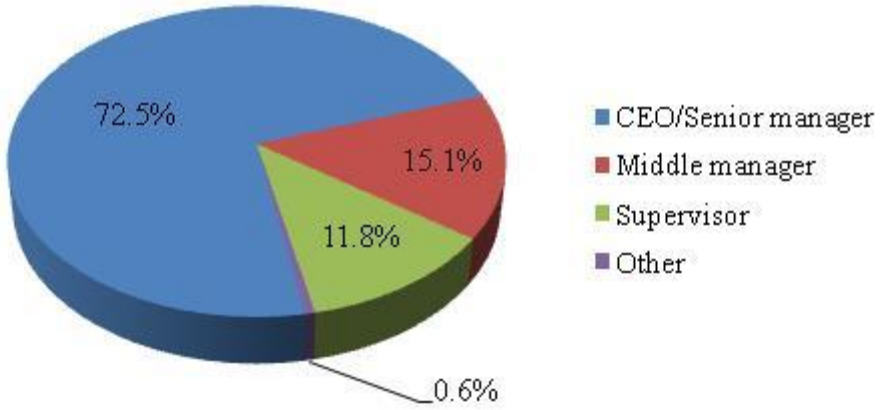


The second question investigated the position of respondents within the firm based on the level of managers within the organisation. It shows that 72.5% of respondents are CEOs or senior managers of their company (top managers), 15.1% are middle managers, 11.8% are supervisors (first-level managers) and 0.6% chose the "other" option (table 5-2, figure 5-2). Answers given to the "other" choice are: chief clinician officer, technical director and chairman. These results show, that managers, who are certainly involved in the formulation of strategies, completed 99.4% of the questionnaires and so these answers can be deemed to be reliable.

Table 5-2: Respondents job position

	Frequency	Percent	Cumulative Percent
CEO/Senior manager	259	72.5	72.5
Middle manager	54	15.1	87.6
Supervisor	42	11.8	99.4
Other	2	.6	100.0
Total	357	100.0	

Figure 5-2: Respondents job position



92.2% of the surveyed firms are small and 7.8% are medium-sized. The structure of companies in the biotechnology and pharmaceutical industry shows, based on the size of the company as previously described in Chapter Four, that about 93% are small, 6% are medium-sized and 1% is large. It is clear that the composition of the received questionnaires is consistent with the UK government statistics for 2010 (HM Government, 2010) (table 5-3).

Table 5-3: Size of enterprises

		Frequency	Percent	Cumulative Percent	HM Government Percent *
Small	1 to 9	205	57.4	57.4	93
	10 to 49	124	34.8	92.2	
Medium	50 to 249	28	7.8	100.0	6
	Total	357	100.0		99.0

* HM Government Statistics, 2010

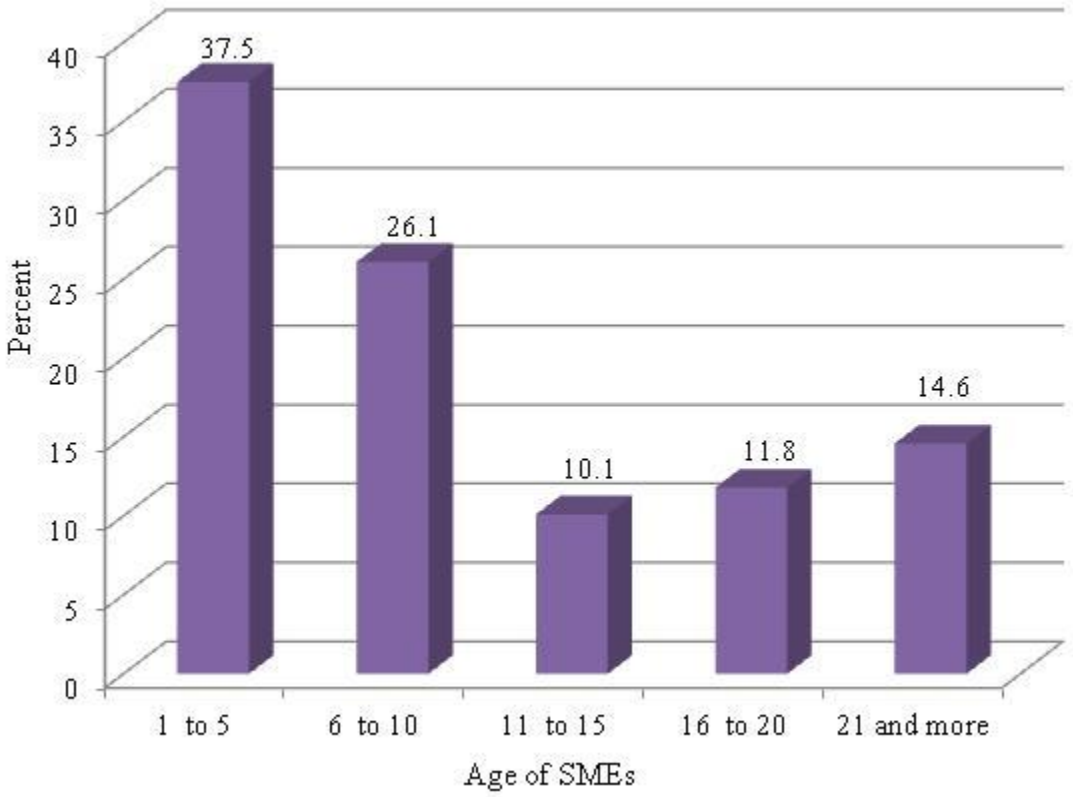
The age structure of the surveyed SMEs is portrayed in table 5-4 and figure 5-3. This data shows a large number of SMEs in the biotechnology and pharmaceutical industry are up to 10 years of age (63.6%), 21.9% of SMEs in this industry are in the middle period of their life (11 to 20 years old), and the remaining, 14.6% are over 21 years old. The distribution of the respondents' companies age is also consistent with the statistics of HM Government, according to government statistics for 2010; about 54% of SMEs in the biotechnology and pharmaceutical industry are up to 10 years old and 46% are 10 years old or more.

Table 5-4: Age of SMEs

	Frequency	Percent	Cumulative Percent	HM Government Percent *
1 to 5	134	37.5	37.5	54
6 to 10	93	26.1	63.6	
11 to 15	36	10.1	73.7	46
16 to 20	42	11.8	85.4	
21 and more	52	14.6	100.0	
Total	357	100.0		

* HM Government Statistics, 2010

Figure 5-3: Age of SMEs

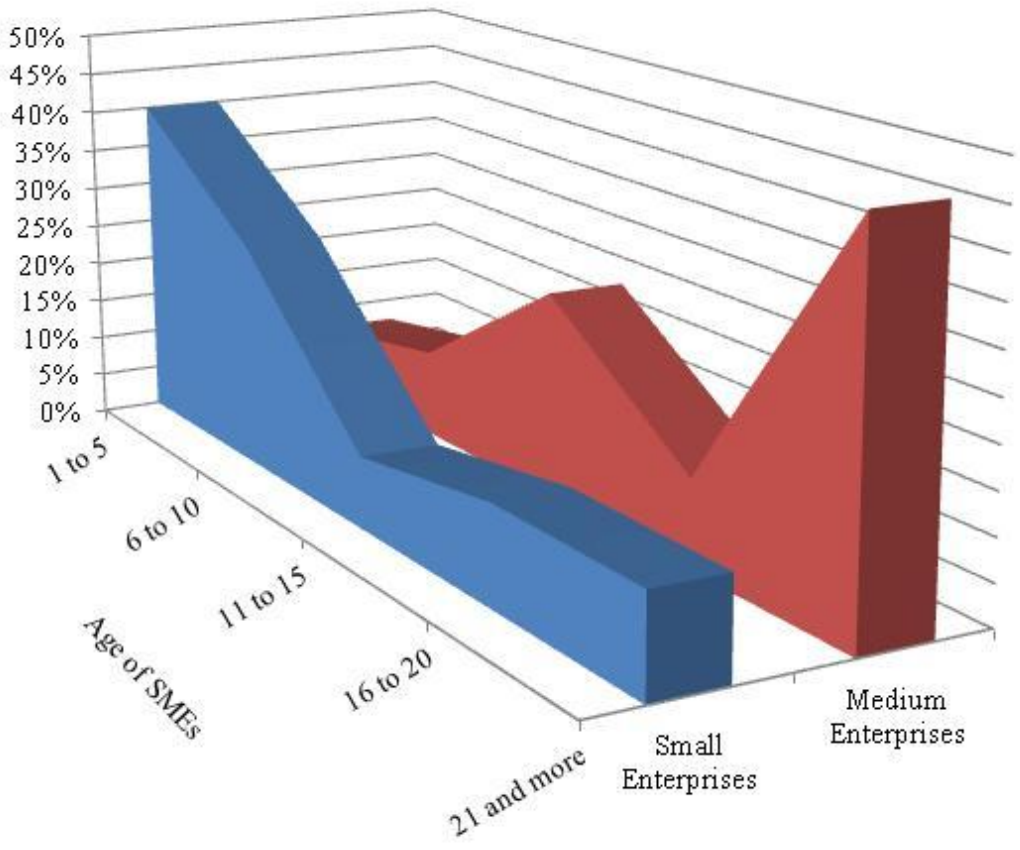


Cross-tabulation between the size and age of respondents' SMEs on one hand shows the majority of small-sized enterprises are less than 10 years old (67.5%), and the age of the rest of them, 32.5%, is over 10 years old. On the other hand, this cross-tabulation shows that the majority of medium-sized enterprises are over 10 years of age (82.1%) and only 17.9% of this sized company are less than 10 years old (table 5-5, figure 5-4).

Table 5-5: Cross-tabulation between size and age of SMEs

			Age of company					
			1 to 5	6 to 10	11 to 15	16 to 20	21 and more	Total
Size of company	Small	Count	132	90	29	39	39	329
		% of Total	40.1%	27.4%	8.7%	11.9%	11.9%	92.2%
	Medium	Count	2	3	7	3	13	28
		% of Total	7.2%	10.7%	25.0%	10.7%	46.4%	7.8%
Total		Count	134	93	36	42	52	357
		% of Total	37.6%	26.0%	10.2%	11.7%	14.5%	100.0%

Figure 5-4: Cross-graph between size and age of SMEs



5.2.2. General SMEs' Strategic Management Profile

Before analysing the research hypothesis, some general information about strategic management processes in SMEs can help promote better understanding of their approach to strategic management and its stages. In this research, the strategic management process is considered in two stages, formulation and implementation, so general information has been collected regarding these two stages.

In relation to the strategy-designing period, it has been found that about 57% of high-tech SMEs design their strategy to serve for 1 to 3 years, 20.7% for 6 to 12 months, 12% for less than 6 months, 9.5% for 3 to 5 years and just 0.6% for more than 5 years (table 5-6).

Table 5-6: Strategy-designing period in high-tech SMEs

	Frequency	Percent	Cumulative Percent
<= 6 month	43	12.0	12.0
+6 to 12 month	74	20.7	32.7
+1 to 3 years	204	57.1	89.9
+3 to 5 years	34	9.5	99.4
+5 years	2	.6	100.0
Total	357	100.0	

Surely, the strategy-designing period has a direct relationship with the duration of its anticipated future. For further clarification of this relationship in high-tech SMEs, respondents were asked to express the period of prediction for the future of their enterprise. The results show there is a strong relationship between the period of prediction for the future of the business and the strategy-designing period in high-tech SMEs. About 53% of respondents were able to foresee the

future of the enterprise for the next 1 to 3 years, 30.8% for 6 to 12 months, 11.2% for 3 to 5 years, 4.5 % for less than 6 months and 0.3% for more than 5 years (table 5-7).

Table 5-7: Foresee future of high-tech industry

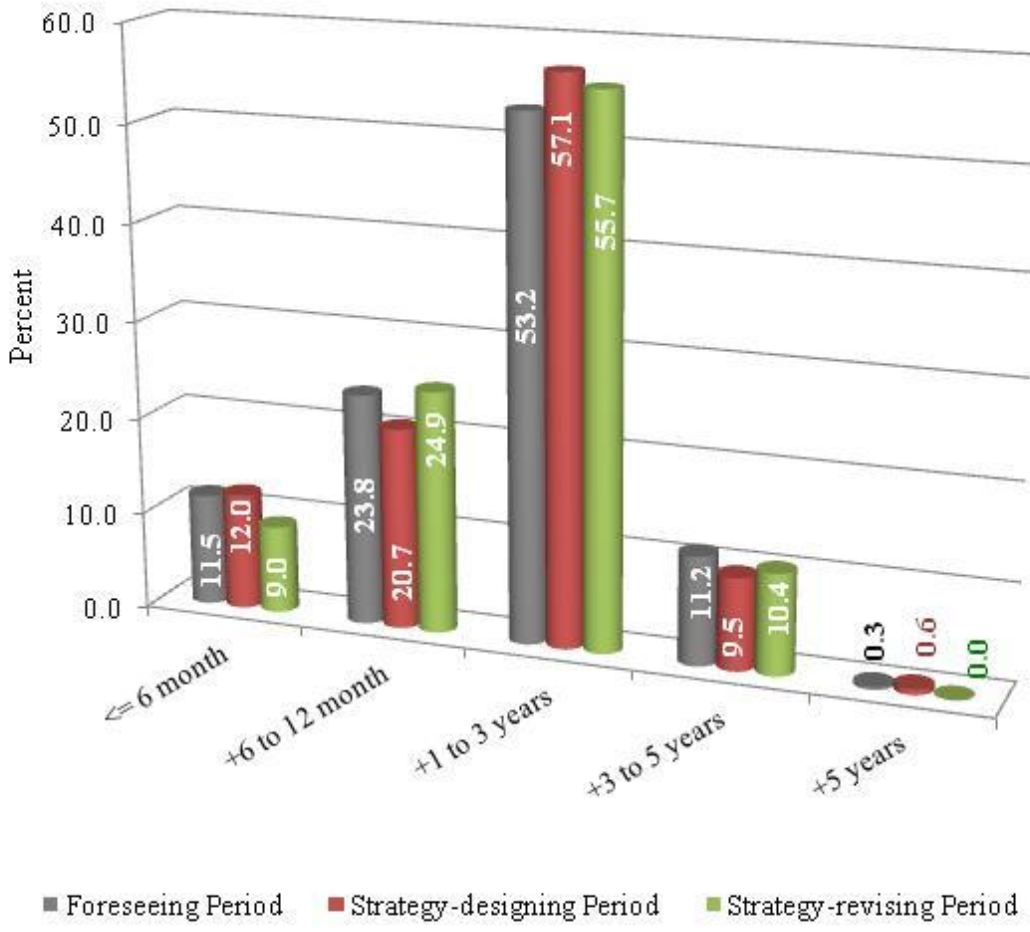
	Frequency	Percent	Cumulative Percent
<= 6 month	41	11.5	11.5
+6 to 12 month	85	23.8	35.3
+1 to 3 years	190	53.2	88.5
+3 to 5 years	40	11.2	99.7
+5 years	1	.3	100.0
Total	357	100.0	

Respondents are asked to specify their firm's strategy revising period. In descending order, 55.7% of SMEs are revising their strategy every 1 to 3 years, 24.9% every 6 to 12 months, 10.4% every 3 to 5 years and 9% every 6 months (table 5-8). Although there was the choice of "Every +5 years" among the question choices, none of the SMEs selected this answer. The results of these questions confirm that there is a strong correlation between the future forecasting period, the strategy-designing period and the strategy revising period in high-tech SMEs. A comparison of the figures relating to the foreseeing period, strategy-designing period and strategy revising period in high-tech SMEs is presented by figure 5-5.

Table 5-8: Strategy-revising period in high-tech SMEs

	Frequency	Percent	Cumulative Percent
Every <= 6 month	32	9.0	9.0
Every +6 to 12 month	89	24.9	33.9
Every +1 to 3 years	199	55.7	89.6
Every +3 to 5 years	37	10.4	100.0
Total	357	100.0	

Figure 5-5: Comparison between strategy-designing period and future foreseeing period in high-tech SMEs



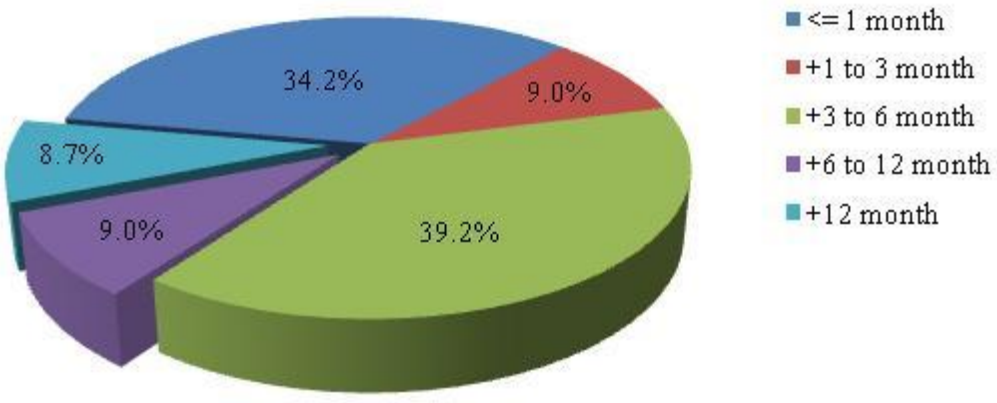
Understanding the interval between formulation and implementation of strategy is important for two reasons. Firstly, strategy formulation is not a separate phase of strategy implementation particularly nowadays because of the speed of change in an organisation's environment which is necessary to exploit opportunities in the competitive environment (Ansoff, 1991; Mintzberg, 1994; Feurer and Chaharbaghi, 1995). Secondly, in the two-stage model of the strategic management process, the implementation stage includes evaluation and control; hence, a stronger relationship between formulation and implementation of strategy means that the strategy

formulation stage uses more feedback taken from the implementation stage. The collected data shows that the interval between the formulation and implementation stages of strategy in 82.4% of the surveyed SMEs is less than 6 months, 9.0% is between 6 to 12 months and 8.7% is more than one year (table 5-9, figure 5-6).

Table 5-9: Interval between formulation and implementation of strategy

	Frequency	Percent	Cumulative Percent
<= 1 month	122	34.2	34.2
+1 to 3 month	32	9.0	43.1
+3 to 6 month	140	39.2	82.3
+6 to 12 month	32	9.0	91.3
+12 month	31	8.7	100.0
Total	357	100.0	

Figure 5-6: Interval between formulation and implementation of strategy



5.2.3. Validity Analysis

The core essence of validity is captured by the word accuracy (Huck, 2004). Validity refers to the issue of whether or not an indicator that is devised to gauge a concept really measures that concept (Bryman and Bell, 2007). According to Sarantakos (1998), Bryman and Bell (2007) and Huck (2007), validity of a questionnaire includes face validity, content validity and external validity.

Face validity is concerned with how a measure or procedure appears. In other words, does it seem like a reasonable way to gain the information the researchers are attempting to obtain? Does it seem well designed? Does it seem as though it will work reliably? (Huck, 2007; Bryman and Bell, 2007). A measure is supposed to have content validity if it covers all possible aspects of the research topics (Sarantakos, 1998, Huck, 2007). Face validity and content validity are non-statistical types of validity.

The following techniques were use to minimise the risk of face and content validity of the study and questionnaire:

1) the strategy formulation and its evolution and frameworks were studied in addition to analysing the research on strategy formulation in SMEs when the propositions and conceptual framework were developed,

2) the features of SMEs and the biotechnology and pharmaceutical in the UK were analysed when the conceptual framework was developed,

3) a draft version of the questionnaire was mailed to and discussed with supervisory committee, and asked them to give their comments whether or not the questions and measures are measuring the theories in SMEs. Based on the comments received from supervisory committee, the questionnaire was modified,

4) a pilot study was undertaken to check the validity of the questionnaire and to establish that it is user friendly. The questionnaire was sent to fifteen CEOs and they were asked to comment on the questionnaire and give feedback on its relevance for the biotechnology and pharmaceutical industry. When the completed questionnaires and comments were returned the questionnaire was revised again.

External validity reflects how accurately the results represent a phenomenon and whether results can be generalised across population (Bryman and Bell, 2007; Taylor and Asmundson, 2008). Only findings from a representative sample are generalisable to the population and if a study is not carried out on a representative sample, its findings are not generalisable. Therefore, representativeness leads to generalisability (Gobo, 2004). Based on a quota sampling method and size of population, 3972 SMEs in the biotechnology and pharmaceutical industry across the UK, the sample size which can be representative for the biotechnology and pharmaceutical SMEs across the UK would be 348. This sample size is sufficient to generalise the findings to the population. The number of valid responded questionnaires was 357, which is 2.59 % more than required sample size (figure 4-3). Hence, this amount of completed questionnaire could be a representative for the biotechnology and pharmaceutical SMEs across the UK or in other words, the results can be generalised to the biotechnology and pharmaceutical SMEs across the UK.

Also a two-tailed Z-test indicates there is no significant difference between the proportion of small and medium-sized enterprises in this study and the report of HM Government Statistics (2010) which was reported in table 5-3. Because -0.592 for small-sized and 1.432 for medium-sized enterprises are between ±1.96, the null hypotheses that sample and population mean proportion is equal cannot be rejected (table 5-10). This means, there is no evidence that the sample proportion can be considered different from population proportion that was reported by HM Government Statistics (2010) for small and medium-sized companies in the biotechnology and pharmaceutical industry. Therefore, this shows this sample could be a representative for the biotechnology and pharmaceutical SMEs across the UK and the findings can be generalised to the biotechnology and pharmaceutical SMEs across the UK.

Table 5-10: Z-test for testing the sample and population mean proportion

$H_0: \bar{X} = \mu$ $H_1: \bar{X} \neq \mu$		
	Small-sized enterprises	Medium-sized enterprises
$\sigma = \sqrt{\frac{\mu*(1-\mu)}{n}}$	0.013504	0.012569
$Z = \frac{\bar{x}-\mu}{\sigma}$	- 0.592	1.432
μ = Mean of HM Government Statistics for small companies, 2010	0.93	0.06
$\bar{X}$ = Mean of completed questionnaires by small companies	0.922	0.078
$\alpha/2$ = 0.025 and 0.975 (1-.025) and The z-value that correspondent to ±0.025 is ±1.96		

5.2.4. Reliability Analysis

Reliability analysis allows the study of the properties of measurement scales and their components. A measurement is reliable if it reflects a largely true score, relative to the possible error. A Cronbach's alpha (α) measure is used to test the reliability of the questionnaire which contained 11 items. Although Cronbach's alpha reliability coefficient normally ranges between 0 and 1, there is actually no lower limit to the coefficient. An acceptable level of reliability coefficient is 0.70 or greater (Nunnally, 1978; George and Mallery, 2003; Hair, et al, 2006). Table 5-11 shows that cost leadership has the highest reliability (α=.991) and strategy formulation approach has the lowest (α=.812) but, overall, the alpha coefficient for all independent variables is more than 0.70. This indicates the dimensions/variables used in this research are reliable and acceptable.

Table 5-11: Cronbach's alpha comparison between variables

Variables	Cronbach's Alpha (α)	No. of Items
Type of environmental scanning:		
Irregular	.863	6
Periodic	.892	6
Continues	.846	6
Mission statement	.822	5
Type of strategy:		
Cost leadership	.991	5
Differentiation	.973	5
Cost leadership - Focus	.918	7
Differentiation - Focus	.910	7
KBV	.887	12
Strategy formulation approach	.812	5
Performance	.935	20

5.2.5. Hypotheses Descriptive Analysis

In this section, descriptive characteristics of hypotheses and the performance of the surveyed high-tech SMEs will be presented.

5.2.5.1. Type of Environmental Scanning

According to Fahey et al. (1981), three types of environmental scanning, irregular, periodic and continuous, are considered to identify the type of environmental scanning used in high-tech SMEs. The importance of each type of environmental scanning is determined by six factors (table 5-12). The 5-degree Likert scale is used for rating the importance of each type of environmental scanning, so that 1 is "Extremely Unimportant" and 5 is "Extremely Important".

Table 5-12: Types of environmental scanning and their factors

	Irregular	Periodic	Continuous
Motivation for environmental scanning	Crisis-initiated	Problem solving	Opportunity finding
Scope of scanning	Specific events	Selected events	Broad range of environmental systems
Temporal nature: • Timeframe for data • Timeframe for decision impact	Reactive: • Retrospective • Short term (<1 year)	Proactive: • Current and retrospective • Middle term (+1 to 3 years)	Proactive: • Current and prospective • Long term (+3 years)
Types of forecasts	Budget-oriented	Economic and sales oriented	PESTEL oriented
Forecasting method	Simplistic data analyses	Statistical forecasting method	Many 'futuristic' forecasting methodologies
		Average	

Descriptive analysis of the factors of each type of environmental scanning, including frequency and mean, is presented in table 5-13.

Table 5-13: Frequency and mean of factors of types of environmental scanning

Type	Factor	Extremely Unimportant (Frequency)	Unimportant (Frequency)	Not Sure (Frequency)	Important (Frequency)	Extremely Important (Frequency)	Mean
Irregular	Crisis-initiated	29	90	121	111	6	2.93
	Specific events	15	96	44	112	90	3.46
	Retrospective	31	83	77	97	69	3.25
	Short term (<1 year)	6	54	44	114	139	3.91
	Budget-oriented	13	66	44	99	135	3.78
	Simplistic data analyses	24	63	48	87	135	3.69
Periodic	Problem solving	5	100	14	126	112	3.67
	Selected events	3	70	79	107	98	3.64
	Current and retrospective	0	7	127	82	141	4.00
	Middle term (+1 to 3 years)	0	81	47	105	124	3.76
	Economic and sales oriented	0	33	104	89	131	3.89
	Statistical forecasting method	5	115	66	84	87	3.37

Table 5-13: Frequency and mean of factors of types of environmental scanning (Cont.)

Type	Factor	Extremely Unimportant (Frequency)	Unimportant (Frequency)	Not Sure (Frequency)	Important (Frequency)	Extremely Important (Frequency)	Mean
Continues	Opportunity finding	39	16	64	60	178	3.90
	Broad range of environmental systems	63	63	119	76	36	2.89
	Current and prospective	9	20	80	185	63	3.76
	Long term (+3 years)	25	36	74	138	84	3.62
	PESTEL oriented	18	56	78	140	65	3.50
	Many 'futuristic' forecasting methodologies	71	141	122	20	3	2.28

By calculating a simple average from the factors of each type of environmental scanning, the importance of each type for scanning the environment can be determined. Descriptive analysis for each type of environmental scanning, including central tendency, dispersion and distribution, are presented in table 5-13. None of the environmental scanning types is ranked as "Extremely Unimportant", even the periodic type of scanning is not ranked as "Unimportant". In addition, irregular and continuous types of environmental scanning, in sequence, are ranked just 2.8% and

3.1% and are contained in the "Unimportant" level. So, this analysis shows that environmental scanning with any kind of scanning is important or extremely important for high-tech SMEs. Distributions of irregular, periodic and continuous types of environmental scanning are non-parametric, and all of them are negatively skewed and platykurtic (table 5-14 and figures 5-7, 5-8 and 5-9).

Table 5-14: Descriptive analysis of types of environmental scanning (N=357)

		Irregular Scanning	Periodic Scanning	Continuous Scanning
Extremely Important	Frequency	122	151	40
	Percentage	34.2	4.3	11.2
Important	Frequency	100	94	172
	Percentage	28.0	26.3	48.2
Not Sure	Frequency	125	112	134
	Percentage	35.0	31.4	36.7
Unimportant	Frequency	10	0	11
	Percentage	2.8	0.0	3.1
Mean		3.49	3.69	3.25
S.D.		.928	.896	.677
Skewness		-.029	-.187	-.068
Kurtosis		-1.118	-1.302	-.599

Figure 5-7: Distribution of irregular environmental scanning

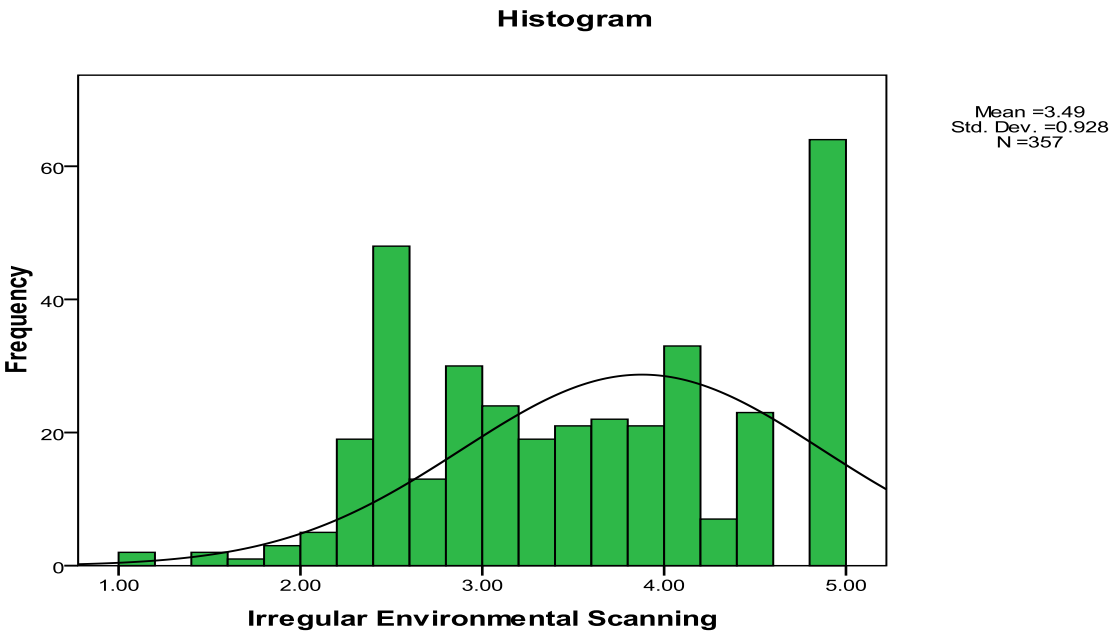


Figure 5-8: Distribution of periodic environmental scanning

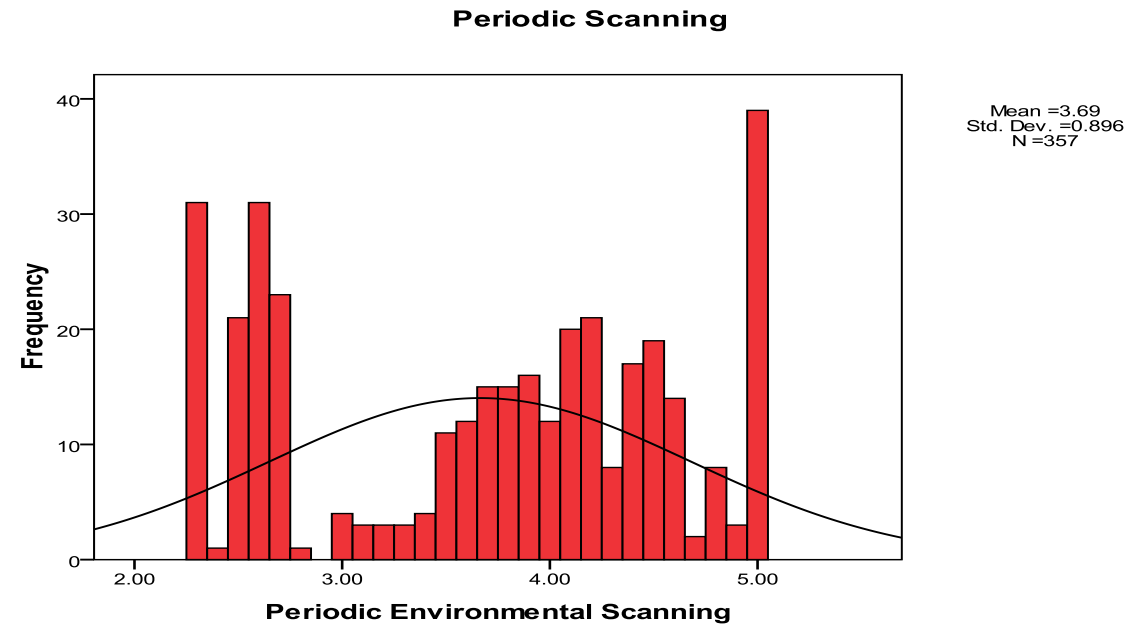
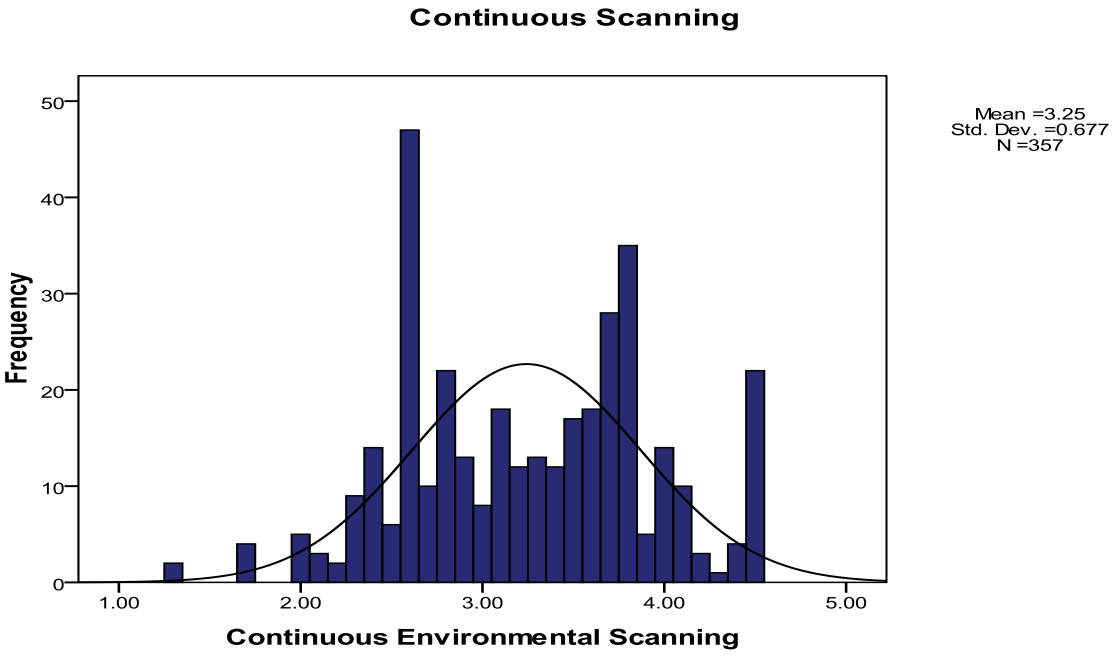


Figure 5-9: Distribution of continuous environmental scanning



5.2.5.2. Mission Statement

Emphasis on measurable and non-measurable parts of mission statement and their elements are measured by the Symantec scale. 7 shows complete emphasis on measurable elements of a mission statement and, on the other end of the scale, 1 shows complete emphasis on non-measurable elements, and as point 4 shows neither emphasis on measurable nor non-measurable elements, 8 cases have been excluded, hence, the number of SMEs has fallen from 357 to 349 for this hypothesis. A simple average of the answers to these questions indicates the amount of emphasis placed on measurable or non-measurable components of a mission statement. Descriptive analysis for measurable and non-measurable elements of mission statement, including percentage and mean, are shown in table 5-15.

Table 5-15: Percentage of factors of elements of measurable and non-measurable elements

		+ - - +								Mean
		1	2	3	4	5	6	7		
Definition of company objectives	Specific non-financial objectives	11.8	6.2	24.6	-	9.0	14.8	27.2	Specific financial objectives	4.48
Production definition	General definition of production	3.4	9.5	19.6	-	7.8	20.7	24.1	Offered Specific product	4.73
Market definition	General market definition	3.9	12.3	12.6	-	10.4	31.9	15.4	Specific market served	4.71
Goals definition	General company goals	14.0	15.1	16.5	-	17.6	17.9	13.7	One big goal for company	4.06
Definition level of competition	General competitive position	3.6	4.2	13.2	-	18.5	12.9	35.9	Unique competitive position	5.19

To identify the degree of emphasis on measurable and non-measurable elements of mission statement as a whole, a new continuous variable is defined as “Mission Statement” (MISSTAT); values greater than 4 indicate more emphasis on measurable elements of mission statement than

non-measurable elements and values less than 4 represent more emphasis on non-measurable elements of mission statement than measurable elements. Descriptive analysis of the elements of mission statement and mission statement as a whole, including central tendency, dispersion and distribution, is presented in table 5-16.

Table 5-16: Descriptive analysis of mission statement

(+)	Measurable elements	
	Frequency	Percent
7	99	28.4
6	58	16.6
5	67	19.2
(-)	-	-
3	49	14.0
2	76	21.8
1	0	0.0
(+)	Non-measurable elements	

	Mission statement	Non-measurable elements	Measurable elements
N	349	125	224
Mean	4.649	2.926	5.611
S.D.	1.482	.408	.862
Skewness	-.107	-.580	-.329
Kurtosis	-1.418	.094	-1.291

The results indicate that none of the SMEs completely emphasise non-measurable elements of their mission statement. In addition, 64.2% of SMEs tend to place greater emphasis on measurable elements of their mission statement and, for this reason, the mean is pulled to this side (mean = 4.649). Distributions of the elements of mission statement and mission statement as a whole are non-parametric. In addition, all of them are negatively skewed, but regarding kurtosis, measurable elements of mission statement and mission statement are platykurtic and non-measurable elements is leptokurtic (figures 5-10, 5-11 and 5-12).

Figure 5-10: Distribution of elements of mission statement

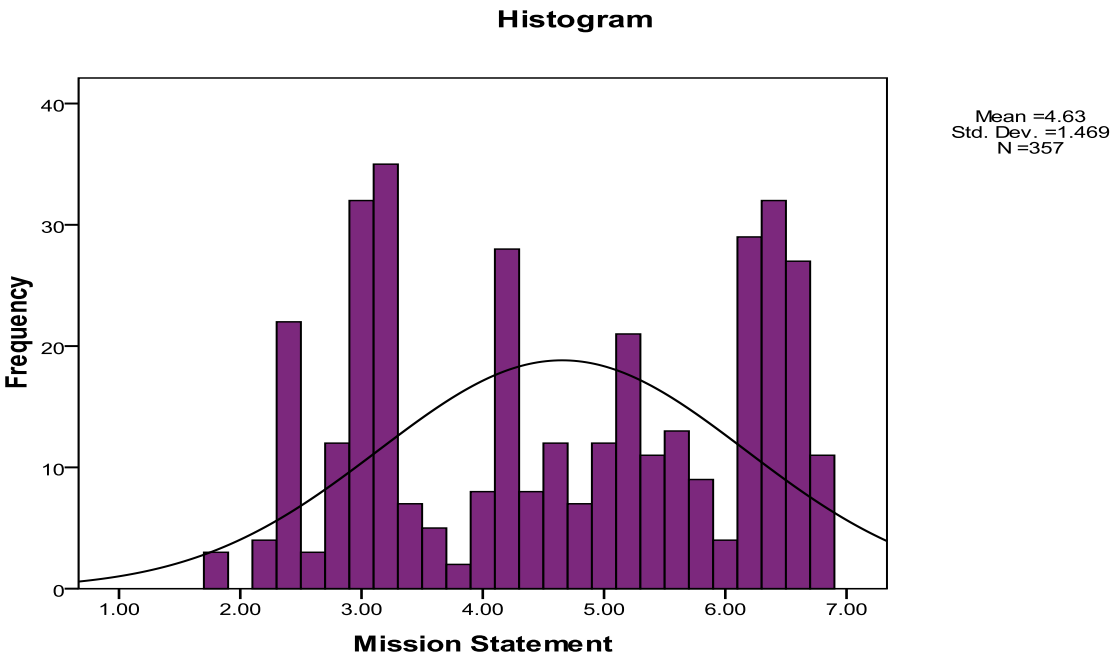


Figure 5-11: Distribution of non-measurable elements of mission statement

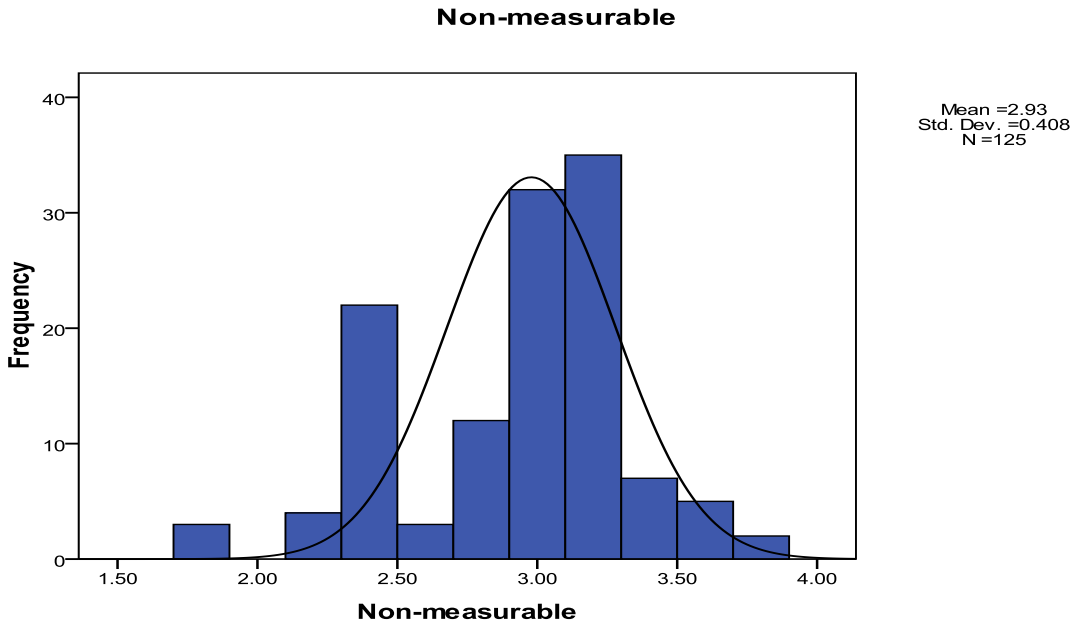
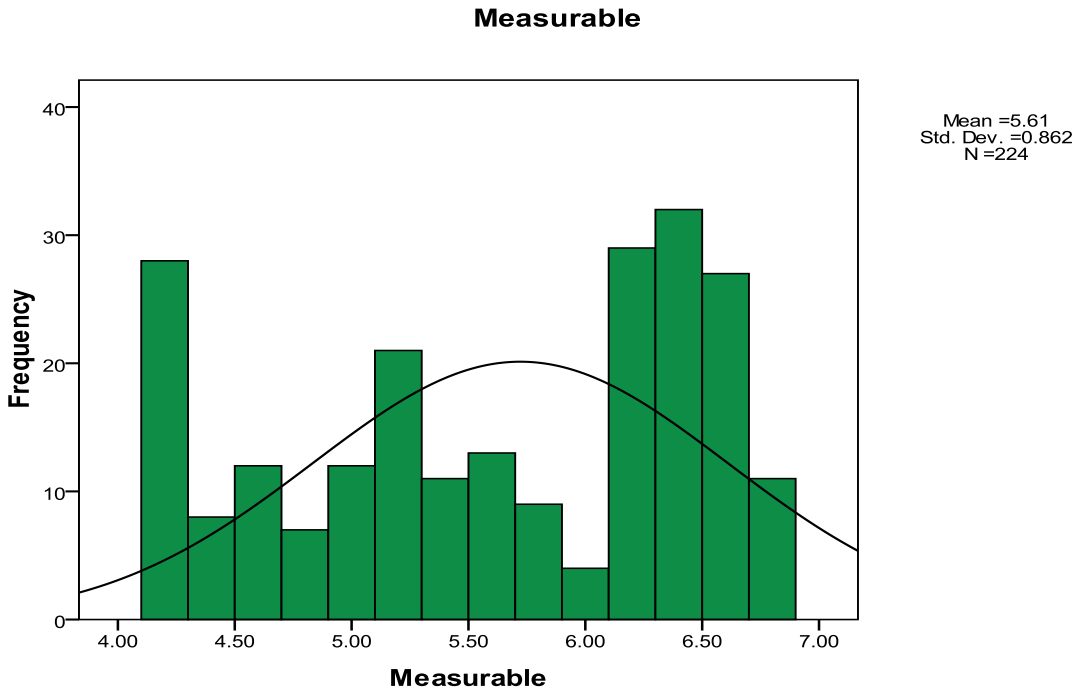


Figure 5-12: Distribution of measurable elements of mission statement



5.2.5.3. Types of Strategy

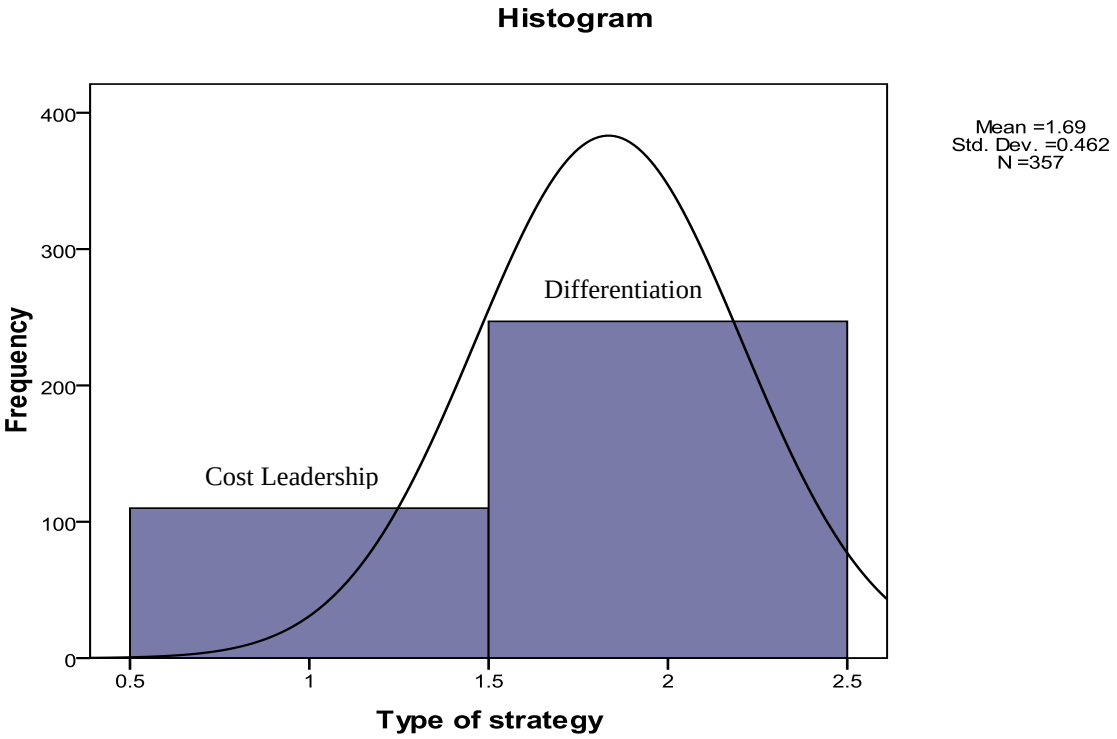
Porter (1985) developed the concept of generic strategies. Cost leadership and differentiation are two basic types of competitive advantage. These two basic types of competitive advantage within the scope of activities that a firm seeks to achieve (Porter, 1985) lead to third type of generic strategy, which is called "Niche" or "Focus" and this is used to achieve an average performance in an industry. Hence, there are three types of generic competitive strategy: cost leadership, differentiation and focus. Of course, focus is not considered as a type of competitive strategy without combining with one of the two other types. Each company chose only one of these types of competitive strategy to achieve its improved performance.

Firstly, respondents were asked to determine generic types of strategy used in their SMEs; cost-leadership or differentiation. Afterwards, the importance of each type of competitive strategy is verified by five factors. The 5-degree Likert scale is used for rating the importance of each factor, so that 1 is “Extremely Unimportant” and 5 is “Extremely Important”. Finally, two factors are used for identifying the focus or non-focus type of cost leadership or differentiation strategy. Descriptive analysis of the SMEs’ tendency to the cost leadership and differentiation types of generic competitive strategy, including central tendency, dispersion and distribution, is as follow (table 5-17 and figure 5-13).

Table 5-17: Descriptive analysis of types of competitive strategy

	Category	Frequency	Percent
Cost leadership	1	110	30.8
Differentiation	2	247	69.2
N	357		
Mean	1.69		
S.D.	.462		
Skewness	-.835		
Kurtosis	-1.311		

Figure 5-13: Distribution of type of strategy



Based on the collected data, 70% of high-tech SMEs chose differentiation competitive strategy, in contrast to cost leadership strategy (30%). Hence, the mean of distribution is pulled toward differentiation (mean = 1.69) and it is platykurtic and negatively skewed.

Descriptive analysis for factors of non-focus and focus types of generic competitive strategy, including frequency and mean, is presented in tables 5-18 and 5-19.

Table 5-18: Frequency and mean of non-focus and focus types of generic competitive strategy

			Extremely unimportant	Unimportant	Not sure	Important	Extremely important	Mean
Non-focus	Cost leadership	Unit cost reduction	0	0	0	3	0	4.00
		Change production process	1	1	0	1	0	2.33
		Overhead cost control	0	0	0	2	1	4.33
		Operating efficiency	0	0	0	1	2	4.67
		Raw material cost	0	0	1	1	1	4
	Differentiation	Refine products	1	2	3	5	4	3.60
		Manufacturing innovations	2	3	0	4	6	3.60
		First to new product	2	0	3	5	5	3.87
		R&D	3	0	1	3	8	3.87
		Compete by quality	1	0	1	6	7	4.20
Focus	Cost leadership	Unit cost reduction	0	1	1	63	42	4.36
		Change production process	4	7	33	5	58	3.99
		Overhead cost control	0	2	0	62	43	4.36
		Operating efficiency	0	0	4	93	10	4.06
		Raw material cost	0	5	0	45	57	4.44
	Differentiation	Refine products	1	10	16	105	100	4.26
		Manufacturing innovations	1	60	17	43	111	3.88
		First to new product	3	38	26	110	55	3.76
		R&D	3	26	8	89	106	4.16
		Compete by quality	0	1	2	84	145	4.61

Table 5-19: Frequency and of factors of focus type of competitive strategy

		Narrow area of the market (1)	All areas of the market (2)	Concentrate on specific range of products (1)	Broad range of products (2)	Mean
Focus	Market area	293	64	-	-	1.18
	Range of products	-	-	328	29	1.08

In addition, descriptive analysis of non-focus and focus strategy of cost leadership and differentiation competitive strategy, including importance rating, central tendency, dispersion and distribution, is following (tables 5-20).

Table 5-20: Central tendency, dispersion and distribution of non-focus and focus type of generic competitive strategy.

		Cost leadership	Differentiation
Non-focus	N	3	15
	Mean	3.867	3.827
	S.D.	.643	.767
	Skewness	1.545	-.047
	Kurtosis	.0	-.943
Focus	N	107	232
	Mean	4.243	4.133
	S.D.	.356	.618
	Skewness	-1.681	-.963
	Kurtosis	4.794	.032

The frequency of SMEs which have chosen non-focus cost leadership (N=3) and non-focus differentiation (N=15) is very low. This indicates these types of competitive strategy are not generally used in high-tech SMEs. Accordingly, the results of their analysis cannot be generalised to the population of high-tech SMEs; hence, it has been decided not to carry out non-focus cost leadership and differentiation competitive strategy analysis. However, distribution of both cost leadership-focus and differentiation-focus are non-parametric, negatively skewed and leptokurtic (figure 5-14 and 5-15).

Figure 5-14: Distribution of cost leadership-focus competitive strategy

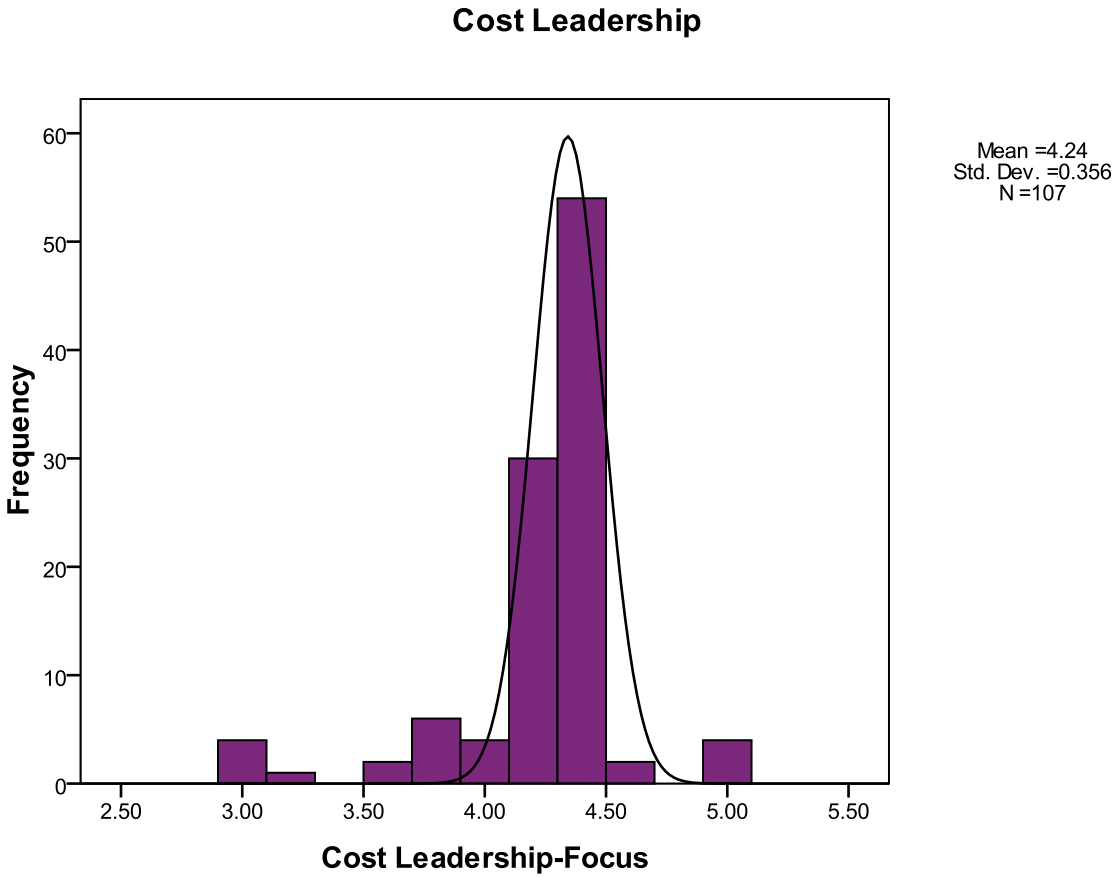
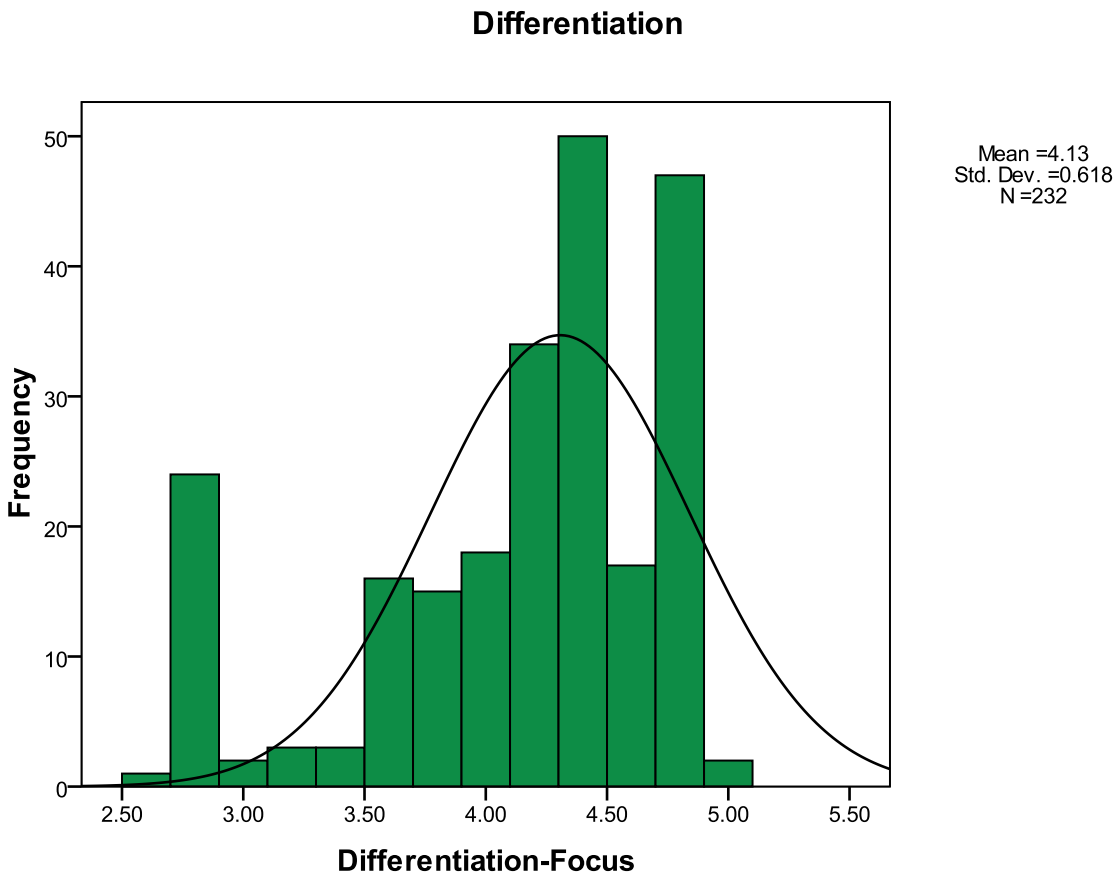


Figure 5-15: Distribution of differentiation-focus competitive strategy



5.2.5.4. Knowledge-Based View (KBV)

According to the SECI model and its four modes of knowledge conversion, Socialisation, Externalisation, Combination and Internalisation (Nonaka, 1994), 12 factors are determined for testing the importance of the KBV in high-tech SMEs and its relationship with their performance. The 5-degree Likert scale is used for rating the importance of each type of environmental scanning, so that 1 is “Extremely Unimportant” and 5 is “Extremely Important” (table 5-21).

Table 5-21: Frequency and mean of factors of KBV

		Extremely unimportant	Unimportant	Not sure	Important	Extremely important	Mean
socialisation	Personal interaction with customers	2	2	23	99	231	4.55
	Face-to-Face meeting	2	24	69	158	104	3.95
	Informal meeting in organisation	3	32	89	196	37	3.65
Externalisation	Formal inter-team discussion about customer needs	37	50	25	135	110	3.65
	Formal inter-team discussion about relevant technologies	90	49	30	125	63	3.06
	Collective decision making processes	41	108	21	147	40	3.10
Combination	Systematic technical knowledge	2	47	28	168	112	3.96
	Systematic customer needs knowledge	2	79	22	103	151	3.90
	Formal business education	11	97	52	155	42	3.34
Internalisation	New production practices	42	94	62	64	95	3.21
	Assessment of technical requirements	33	105	25	90	104	3.36
	Customer needs analysis	1	2	21	180	153	4.35

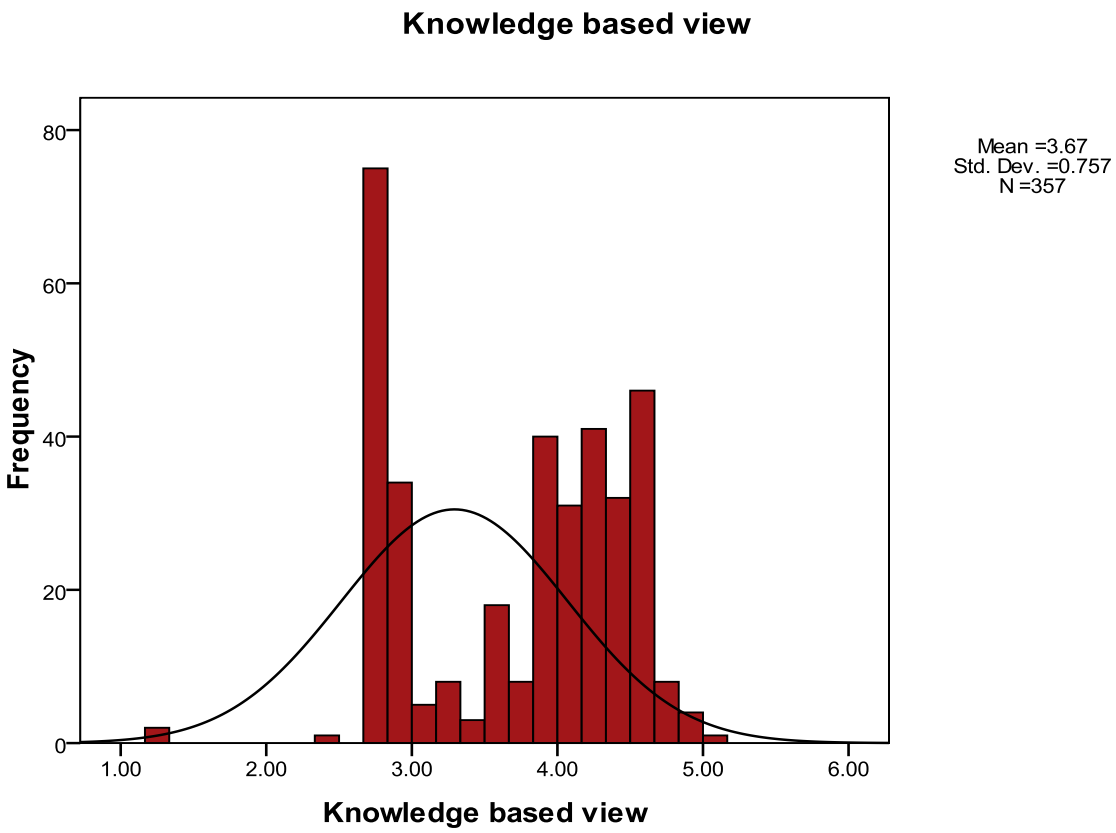
By calculating a simple average from the factors, the importance of the KBV is determined. Descriptive analysis for the KBV, including central tendency, dispersion and distribution, is following (table 5-22 and figure 5-16).

Table 5-22: Descriptive analysis of the KBV (N=357)

KBV		
Extremely Important	Frequency	150
	Percentage	42.0
Important	Frequency	94
	Percentage	26.3
Not Sure	Frequency	111
	Percentage	31.1
Unimportant	Frequency	2
	Percentage	.6
Mean		3.673
S.D.		.757
Skewness		-.375
Kurtosis		-1.036

The importance of the KBV is not ranked as “Extremely Unimportant”; in addition, just 0.6% of respondents ranked it as “Unimportant”. Moreover, 68.3% of respondents ranked the KBV as “Important” and “Extremely Important”. The distribution of the KBV is non-parametric, negatively skewed and platykurtic.

Figure 5-16: Distribution of the KBV



5.2.5.5. Strategy Formulation Approach

In this study, strategy formulation approaches have been researched from two perspectives; firstly, to investigate the association between the characteristics of high-tech SMEs and strategy formulation approaches and, secondly, to explore the relationship between strategy formulation approaches and the performance of high-tech SMEs.

In this regard, five factors are considered to identify the level of tendency towards formal or dynamic approaches to strategy formulation in high-tech SMEs. A 7-grade Symantec scale is

used for measuring this propensity. The order of rating is: 7 shows the highest tendency towards a dynamic approach and, in contrast, 1 rates the highest propensity towards a formal approach to strategy formulation. Point 4 shows neither attention to a formal approach nor attention to a dynamic strategy formulation, so 11 cases are excluded, and the number of SMEs falls from 357 to 346 for this hypothesis. A simple average of the answers to the factors indicates the grade of tendency towards formal or dynamic approaches to strategy formulation. Descriptive analysis for formal and dynamic approaches, including frequency and mean, is in table 5-23.

Table 5-23: Frequency of factors of strategy formulation approaches

		+ - - +								Mean
		1	2	3	4	5	6	7		
Strategy orientation	Internal orientation	13	26	144	-	21	47	54	External orientation	4.12
View to strategy	RBV	19	34	37	-	40	68	65	KBV	4.60
Control mechanism	Formal control system	28	71	44	-	50	54	34	Informal control system	3.97
Strategic looking	Elimination of potential barriers	25	18	61	-	43	31	46	Constantly looking to change	4.21
Unwritten or written strategy	Written strategy	82	27	20	-	19	89	39	Unwritten strategy	3.98

To identify the degree of tendency towards formal or dynamic approaches to strategy formulation as a whole, a new continuous variable is defined as "Strategy Formulation Approach" (SFAPPROACH). Values greater than 4 indicate a greater propensity towards a dynamic approach to strategy formulation than a formal approach and conversely values less than 4 represent a greater tendency towards a formal approach to strategy formulation than a dynamic approach. Descriptive analysis for formal and dynamic approaches and its strategy formulation approach as a whole, including central tendency, dispersion and distribution, is presented in table 5-24.

Table 5-24: Descriptive analysis of strategy formulation approach

(+)	Dynamic SF	
	Frequency	Percent
7	41	11.9
6	56	16.2
5	133	38.5
(-)	-	-
3	106	30.6
2	10	2.8
1	0	0.0
(+)	Formal SF	

	SF approach	Dynamic approach	Formal approach
N	346	188	158
Mean	4.177	5.303	2.837
S.D.	1.402	.735	.591
Skewness	.015	.137	-.155
Kurtosis	-1.214	-1.459	-.576

The results indicate that none of the SMEs demonstrates a complete tendency towards a formal approach to strategy formulation. Moreover, 66.6% of high-tech SMEs indicated their desire to pursue dynamic strategy formulation rather than a formal approach, for this reason the mean is pulled to be more than 4 (mean = 4.177). Distributions of formal and dynamic approaches and their strategy formulation approach as a whole show that they are non-parametric. They are

platykurtic but, regarding skewness, strategy formulation approach and dynamic approach are positively skewed and formal approach is negatively skewed (figures 5-17, 5-18 and 5-19).

Figure 5-17: Distribution of strategy formulation approach

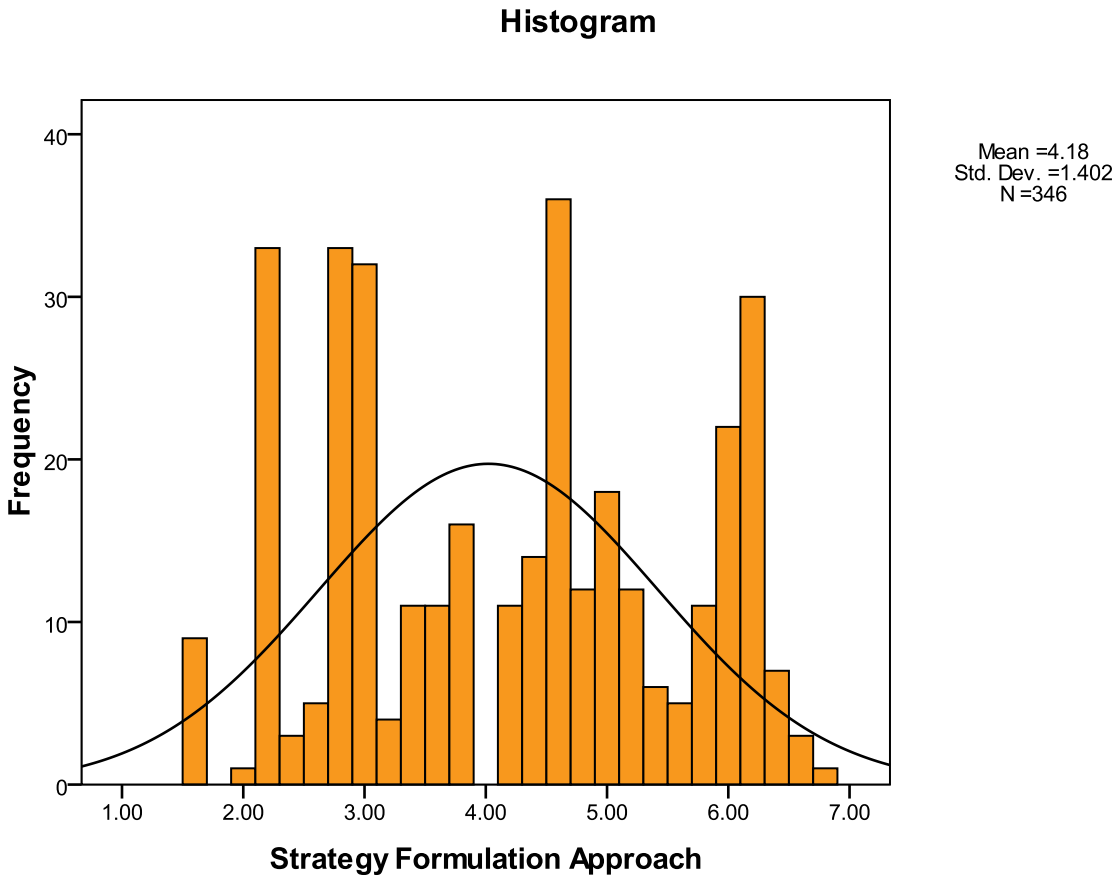


Figure 5-18: Distribution of dynamic strategy formulation

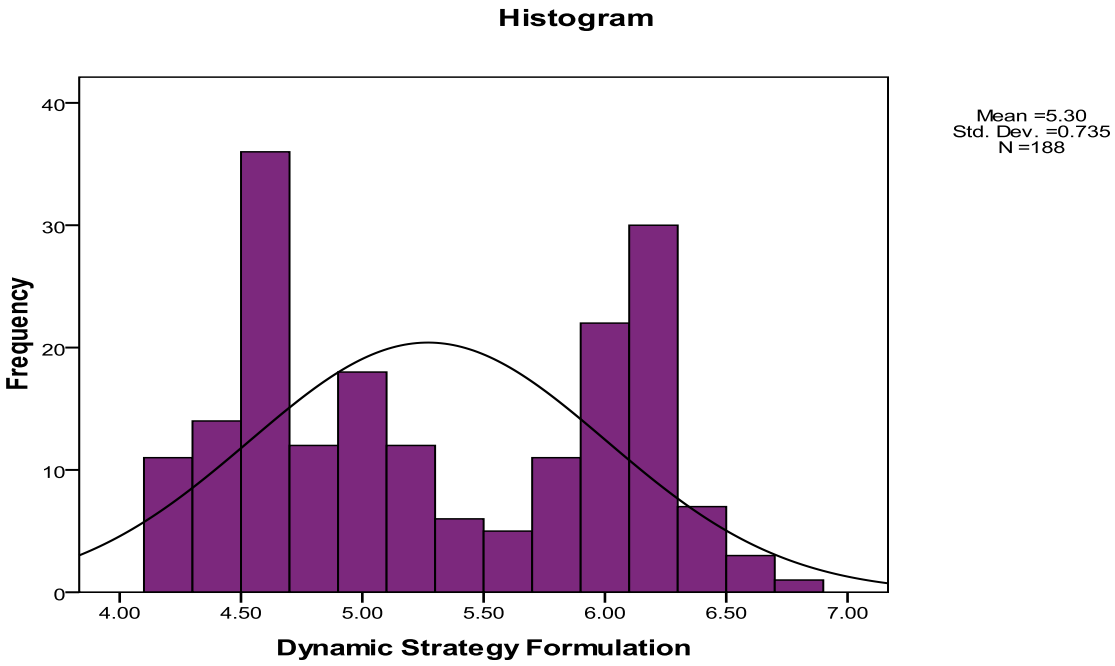
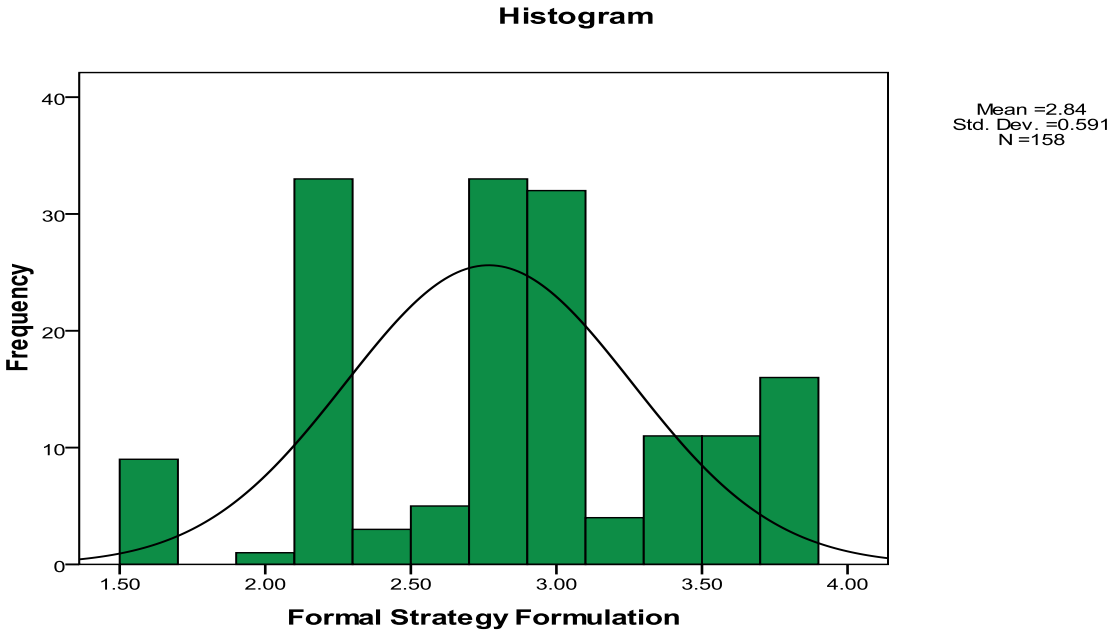


Figure 5-19: Distribution of formal strategy formulation



5.2.5.6. Performance

A balanced scorecard (BSC) is used for measuring the performance of high-tech SMEs in 4 perspectives: financial objectives, external relations, internal processes and learning and growth. Each perspective is determined by 5 factors, a total of 20 factors. The 5-degree Likert scale is used for rating the degree of each perspective's performance. Respondents are asked to assess their company's performance so that 1 is "Very Low" and 5 is "Very High".

For rating the overall performance of SMEs, a new continuous variable is defined as Performance (PERFORMANCE) by calculating a simple average of all the perspectives. According to the values of performance, three groups of SMEs with different levels of performance are identified:

- Low performance: with performance equal or smaller than 2.5 (X = < 2.5),
- Moderate performance: with performance greater than 2.5 and less than 3.5 (2.5< X < 3.5) and,
- High performance SMEs: with performance equal or greater than 3.5 (3.5 = < X).

Descriptive analysis for each factor of the BSC perspectives, including percentage and mean, is presented in table 5-25.

Table 5-25: Percentage and mean of factors of BSC perspectives

		Very low	Low	Moderate	High	Very high	Mean
Financial objectives	Operating income	10.6	14.6	28.0	37.0	9.8	3.21
	Return on investment	8.4	14.8	29.1	40.1	7.6	3.24
	Earnings per share	18.8	29.1	23.0	25.2	3.9	2.66
	Net present value	28.0	7.6	32.2	26.1	6.2	2.75
	Productivity growth	9.8	15.7	39.5	27.2	7.8	3.08
External relations	Customer satisfaction	0.0	1.4	23.0	58.5	17.1	3.91
	Customer retention	0.0	9.2	17.1	52.9	20.7	3.85
	Percentage of sales to new customers	3.1	21.3	24.6	31.7	19.3	3.43
	Market share growth	17.6	24.6	27.2	23.8	6.7	2.77
	On-time delivery	1.1	12.0	25.5	32.2	29.1	3.76
Internal processes	Job rotation	46.2	26.9	16.5	7.8	2.5	1.94
	Operation process	14.0	23.2	25.2	33.9	3.6	2.90
	Post sale service process	11.2	20.7	10.6	42.6	14.8	3.29
	Quality control	1.4	2.8	12.6	54.3	28.9	4.06
	R&D	3.1	37.5	7.3	17.6	34.5	3.43
Learning and growth	Employee satisfaction	.8	3.1	23.0	49.6	23.5	3.92
	Employee productivity	0.0	3.1	25.5	47.9	23.5	3.92
	Training hours per employee	10.4	34.7	26.6	19.0	9.2	2.82
	Sales growth	2.2	13.7	43.4	19.3	21.3	3.44
	Percentage revenue per employee	9.2	4.8	45.9	26.1	14.0	3.31

Additionally, descriptive analysis for each perspective of the BSC for each level of performance and for performance as a whole, including percentage and mean, is presented in table 5-26.

Table 5-26: Percentage and mean of perspectives of BSC

		Low Performance	Moderate Performance	High Performance	Performance
N		91	94	172	357
Financial objectives	Mean	1.77	2.83	3.71	2.99
	Very high	0.0	1.1	11.0	5.6
	High	0.0	13.8	78.5	41.5
	Moderate	0.0	78.7	10.5	34.4
	Low	37.3	5.3	0.0	10.9
	Very low	28.6	1.1	0.0	7.6
External relations	Mean	2.77	3.32	4.08	3.55
	Very high	0.0	2.1	32.0	16.0
	High	0.0	77.7	68.0	53.2
	Moderate	94.5	20.2	0.0	28.8
	Low	5.5	0.0	0.0	2.0
	Very low	0.0	0.0	0.0	0.0
Internal processes	Mean	2.00	2.94	3.82	3.12
	Very high	0.0	0.0	18.0	8.7
	High	0.0	34.0	75.6	45.4
	Moderate	59.3	61.7	6.4	34.4
	Low	35.2	4.3	0.0	10.1
	Very low	5.5	0.0	0.0	1.4
Learning and growth	Mean	2.70	3.24	4.02	3.48
	Very high	0.0	6.4	35.5	18.8
	High	2.2	67.0	64.5	49.0
	Moderate	94.5	22.3	0.0	30.2
	Low	3.3	4.3	0.0	2.0
	Very low	0.0	0.0	0.0	0,0

According to table 5-25, the following figures are provided for better understanding of the numbers (figures 5-20, 5-21 and 5-22).

Figure 5-20: Percentage of perspectives of BSC in low performance SMEs

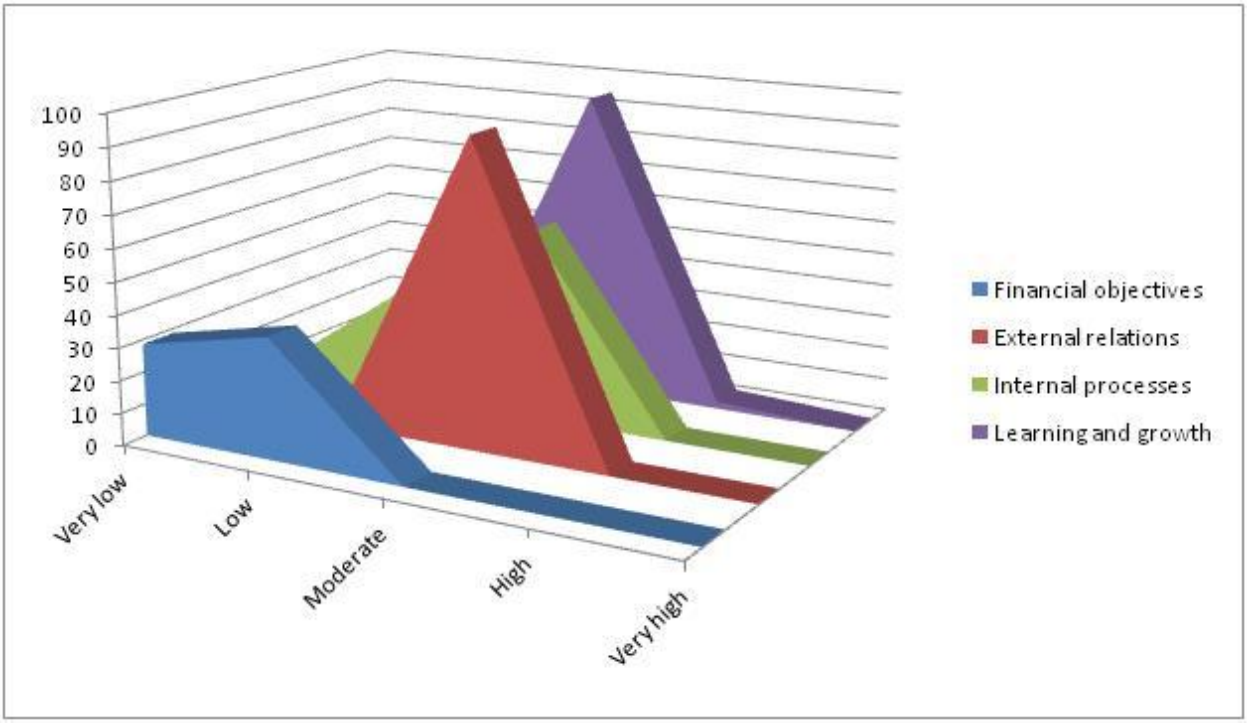


Figure 5-21: Percentage of perspectives of BSC in moderate performance SMEs

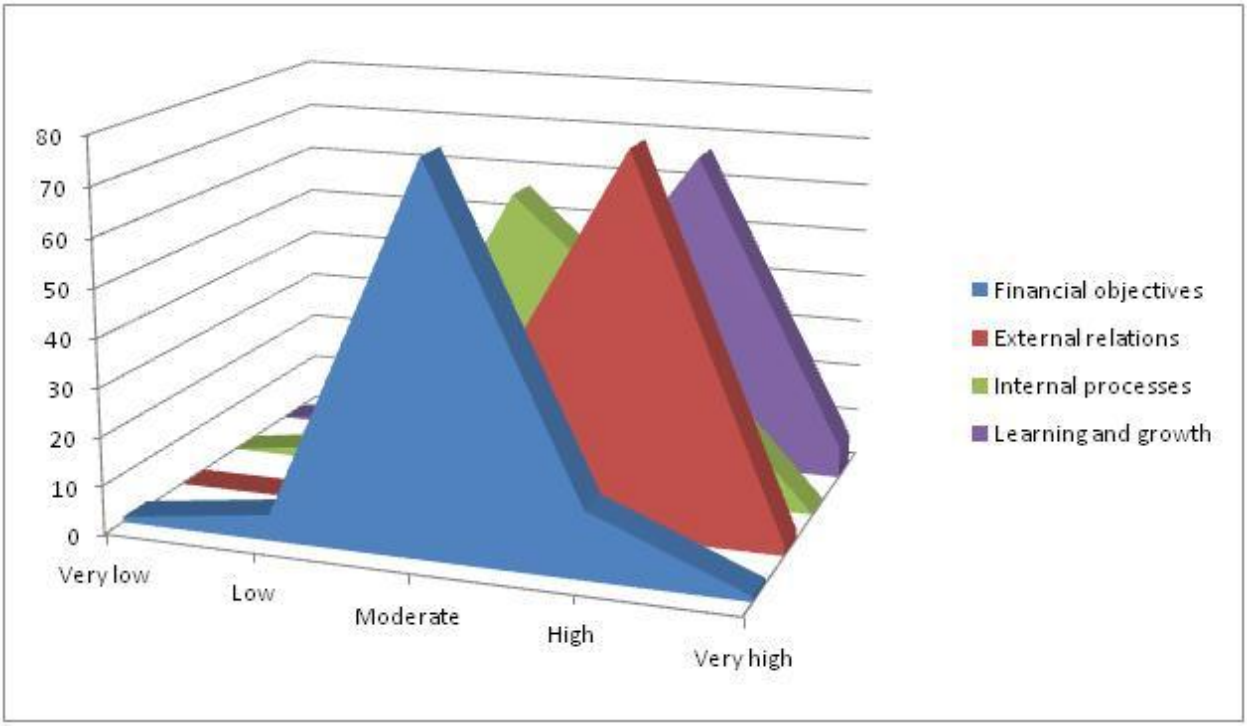
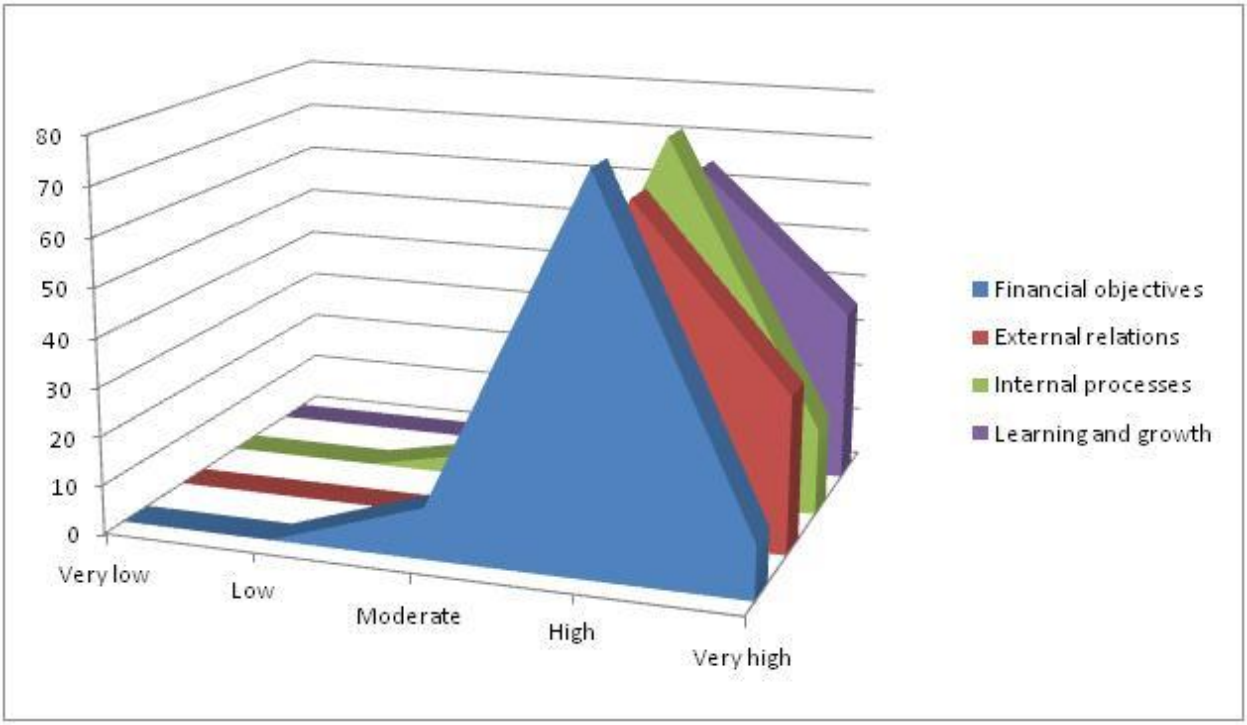


Figure 5-22: Percentage of perspectives of BSC in high performance SMEs



As can be seen, in low performance SMEs there is unevenness between perspectives of performance, whilst their performance is mostly in the low or very low range. In moderate performance SMEs, the average performance of each perspective has moved towards the moderate range and there is more balance between the performances of perspectives. In high performance SMEs, all perspectives have an average in the range of "high", and above this, all perspectives of performance are balanced and harmonious.

As previously described, performance is calculated by a simple average of the BSC perspectives and it is divided into three levels: low, moderate and high. The distribution of low, moderate and high performance SMEs, and their performance as a whole, shows that they are non-parametric. Regarding skewness, high performance distribution is positively skewed and low and moderate

performance and performance are negatively skewed; and regarding kurtosis, moderate performance and performance are platykurtic, and low and high performance distributions are leptokurtic (table 5-27, Figures 5-23, 5-24, 5-25 and 5-26).

Table 5-27: Central tendency, dispersion and distribution of performance and its levels

	Low performance	Moderate performance	High performance	performance
N	91	94	172	357
Mean	2.312	3.082	3.908	3.284
S.D.	.221	.203	.306	.713
Skewness	-1.261	-.207	1.395	-.174
Kurtosis	.881	-.816	2.361	-.800

Figure 5-23: Distribution of low performance SMEs

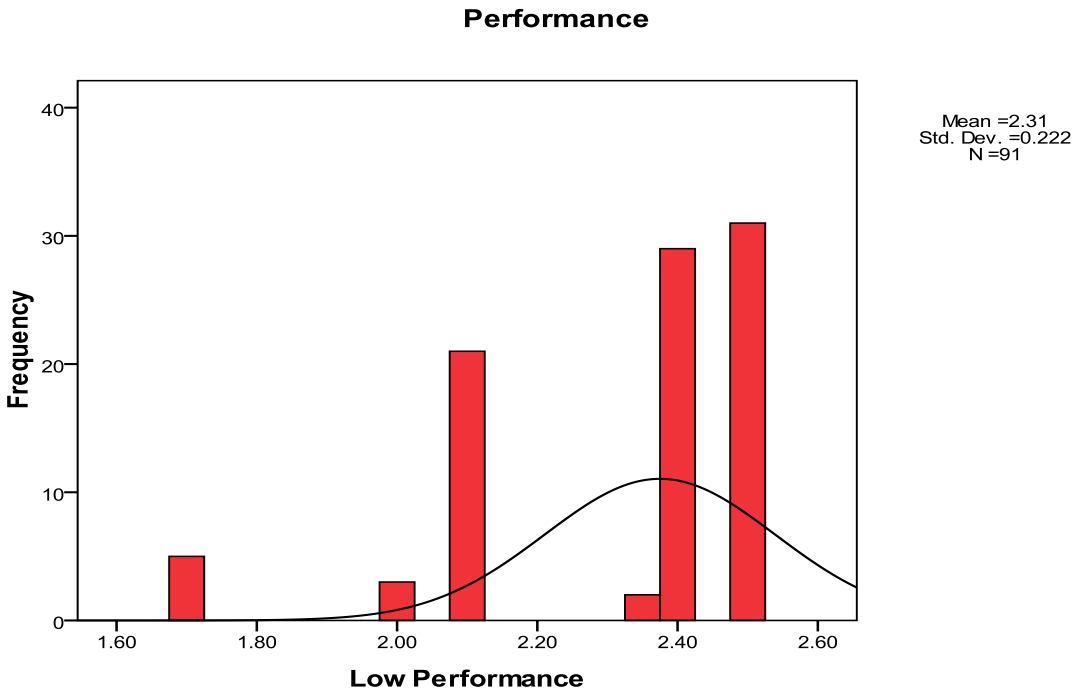


Figure 5-24: Distribution of moderate performance SMEs

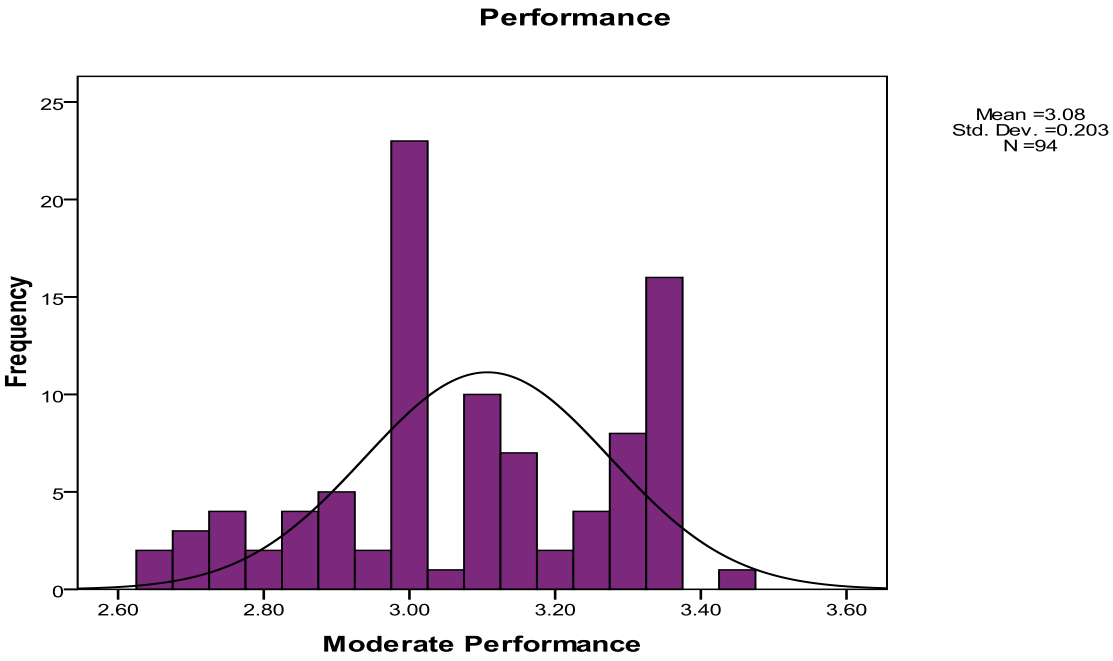


Figure 5-25: Distribution of high performance SMEs

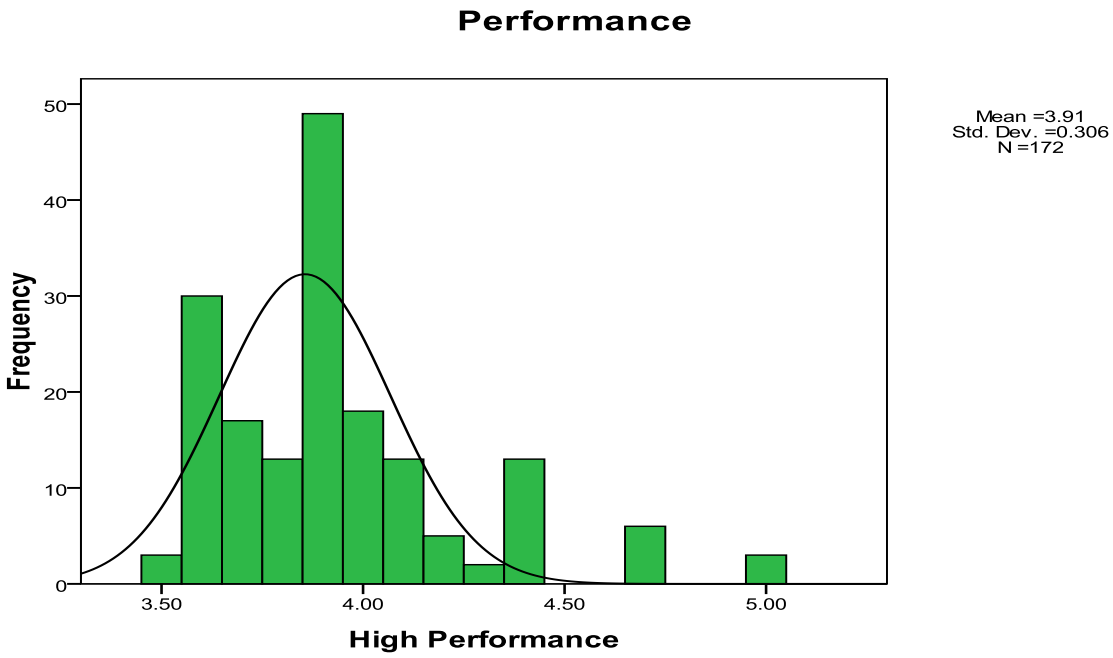
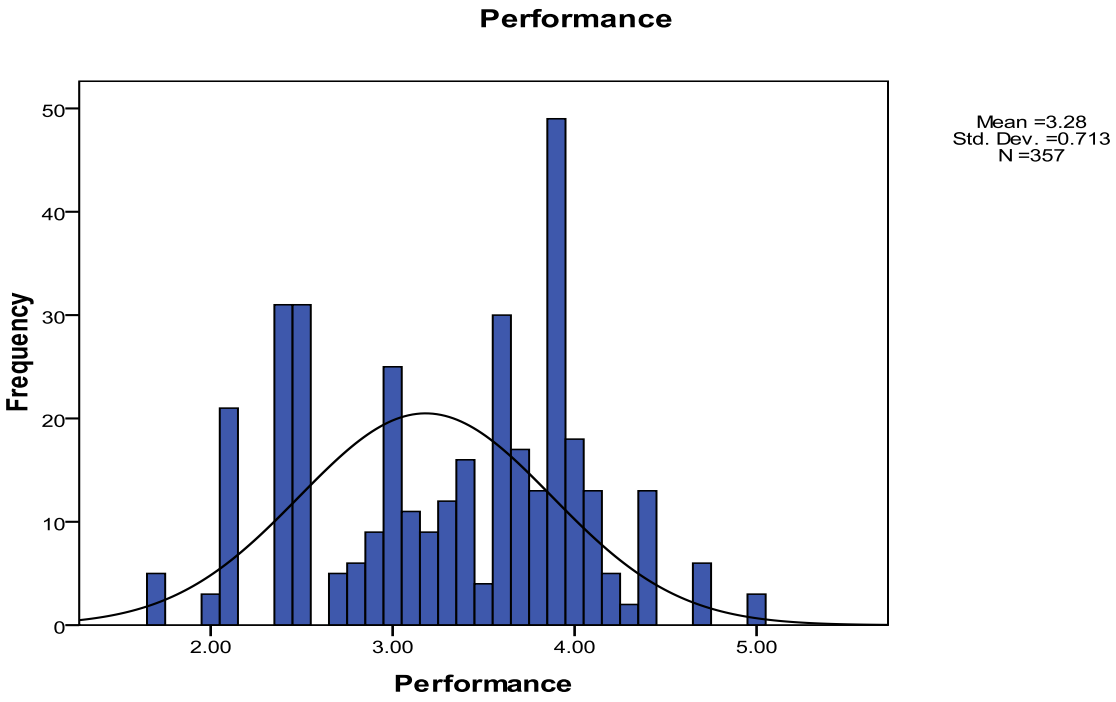


Figure 5-26: Distribution of performance in high-tech SMEs



5.3. Correlation Analysis

The second section of Chapter Six contains correlation analysis; in this section the correlation between independent and dependent variables of each hypothesis is separately analysed and examined. Hence, this section has seven parts, which examine correlation analysis from the first to the seventh hypothesis.

As mentioned in the descriptive analysis section, all considered variables in this study are non-parametric; therefore, the Spearman rho test is used for analysing the correlation. The Spearman correlation coefficient is used as a measure of the linear relationship between two sets of data. It

is a non-parametric measure of statistical dependence between two variables. The Spearman correlation coefficient (r), like all other correlation coefficients, can take values between -1 and +1. The sign of the Spearman correlation coefficient indicates the direction of association between X (the independent variable) and Y (the dependent variable). If Y tends to increase when X increases, the Spearman correlation coefficient is positive, r = +1 is a perfect positive correlation. If Y tends to decrease when X increases, the Spearman correlation coefficient is negative, r = -1 is a perfect negative correlation. A Spearman correlation coefficient of zero indicates that there is no tendency for Y to increase or decrease when X increases (Altman, 1991). Cohen (1988) suggests a guideline for ranking the correlation between two variables as follows:

- Small/Low: r = .10 to .29
- Moderate: r = .30 to .49
- Large/Strong: r = .50 to 1.0

5.3.1. Environmental Scanning and Performance of SMEs (H_1)

The first hypothesis of this study sought to explore the relationship between types of environmental scanning and performance in high-tech SMEs in the UK. Its null and alternative hypotheses are as follows:

- $H_{1,0}$: There is a significant relationship between the type of environmental scanning and the levels of the SMEs' performance.

- $H_{1,1}$: There is no significant relationship between the type of environmental scanning and the levels of the SMEs' performance.

Regarding this hypothesis, the relationships between environmental scanning as a whole and its types with the performance of SMEs are investigated (tables 5-28 to 5-31).

Table 5-28: Correlation between environmental scanning and performance of SMEs (N=357)

	Mean	S.D.	(1)	(2)
Environmental Scanning (1)	1.84	.645	1	
Performance (2)	3.284	.713	.451* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-29: Correlation between types of environmental scanning and low performance of SMEs (N=91)

	Mean	S.D.	(1)	(2)	(3)	(4)
Irregular Scanning (1)	4.597	.418	1			
Periodic Scanning (2)	2.611	.468	-	1		
Continuous Scanning (3)	3.243	.620	-	-	1	
Low Performance (4)	2.312	.221	.858* (.000)	-.705* (.000)	-.285* (.006)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-30: Correlation between types of environmental scanning and moderate performance of SMEs (N=94)

	Mean	S.D.	(1)	(2)	(3)	(4)
Irregular Scanning (1)	3.338	.710	1			
Periodic Scanning (2)	3.657	.671	-	1		
Continuous Scanning (3)	3.521	.758	-	-	1	
Moderate Performance (4)	3.082	.203	-.287* (.005)	.320* (.002)	-.145 (.162)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-31: Correlation between types of environmental scanning and high performance of SMEs (N=172)

	Mean	S.D.	(1)	(2)	(3)	(4)
Irregular Scanning (1)	2.984	.712	1			
Periodic Scanning (2)	4.280	.586	-	1		
Continuous Scanning (3)	3.108	.615	-	-	1	
High Performance (4)	3.908	.306	-.045 (.561)	-.005 (.945)	.228* (.003)	1

* Correlation is significant at p<0.01 level (2-tailed).

According to the results, there is a significant and positive correlation between environmental scanning and the performance of SMEs (r = .451). A low performance level of SMEs has a significant and negative correlation with periodic and continuous environmental scanning (r = -.705, r = -.285) and a significant and positive correlation with irregular environmental scanning (r = .858). A moderate performance level of SMEs has a significant and negative relationship with irregular types of environmental scanning (r = -.287), and significant and positive correlations with periodic environmental scanning (r = .320). Finally, a high

performance level of SMEs has only significant and positive correlations with continuous types of environmental scanning (r = .228).

It is clear, the correlation between types of environmental scanning and levels of performance has both positive and negative aspects. Surely, all research, including this research, has been conducted in order to increase performance and to recognise the factors which affect performance. Hence, the only correlations that can increase the performance of SMEs (r > 0) have been accepted (Figures 5-27 and 5-28).

Figure 5-27: Scatter plot of correlation between environmental scanning and performance

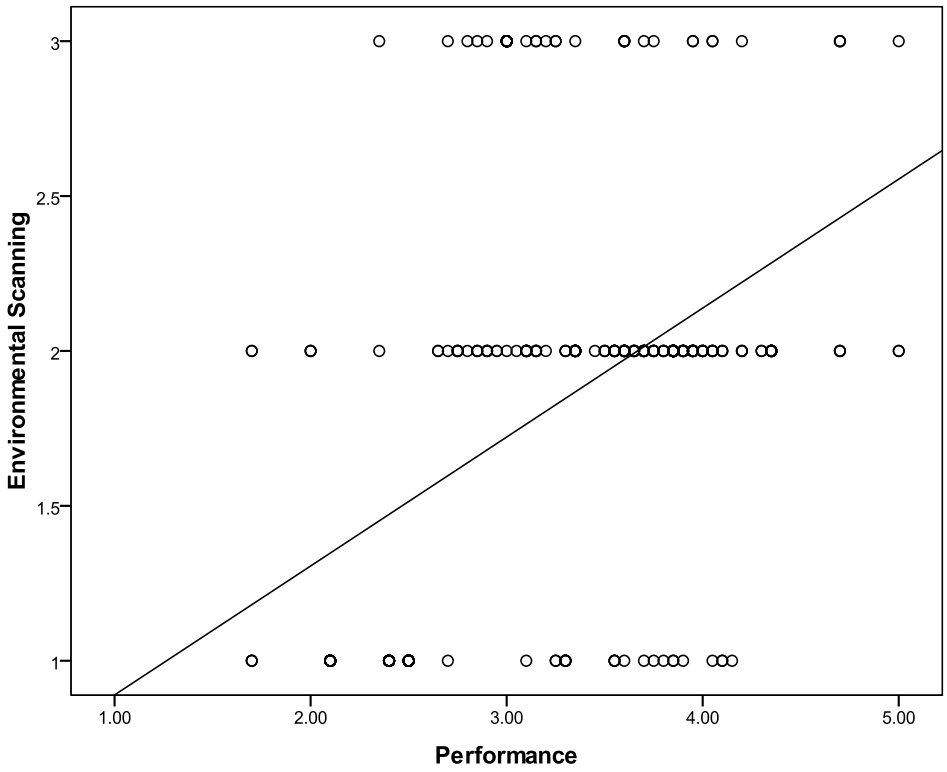
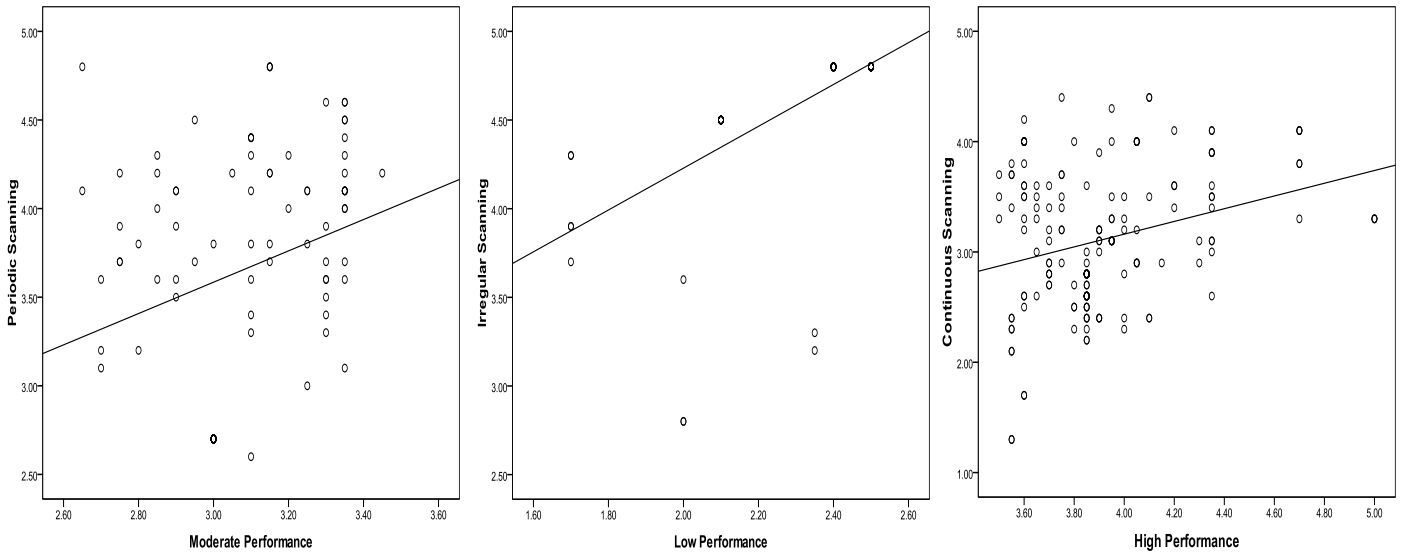


Figure 5-28: Scatter plot of correlation between types of environmental scanning and levels of performance



Based on these results, there is a significant relationship between environmental scanning and performance as a whole. In addition, there is significant relationship between types of environmental scanning and levels of performance. Accordingly, $H_{1,\,0}$ "There is a significant relationship between type of environmental scanning and levels of SMEs' performance" is supported.

5.3.2. Mission Statement and Performance of SMEs (H_2)

H_2 seeks to investigate the relationship between mission statement and performance as well as any correlation between non-measurable and measurable elements of mission statement

and the performance of SMEs. The null and alternative hypotheses regarding the relationship between mission statement and the performance of SMEs, are as follows.

- ***$H_{2,0}$:*** High performance SMEs place more emphasis on the measurable elements of their mission statement when developing their business strategies.

- ***$H_{2,1}$:*** High performance SMEs do not place more emphasis on the measurable elements of their mission statement when developing their business strategies.

According to the null hypothesis, the relationship between mission statement and its non-measurable and measurable elements within the performance of SMEs is tested (tables 5-32 to 5-34).

Table 5-32: Correlation between mission statement and performance of SMEs (N=349)

	Mean	S.D.	(1)	(2)
Measurable and Non-measurable elements (1)	4.649	1.482	1	
Performance (2)	3.265	.700	.607* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-33: Correlation between measurable elements of mission statement and performance of SMEs (N=224)

	Mean	S.D.	(1)	(2)
Measurable (1)	5.611	.862	1	
Performance (2)	3.549	.472	.511* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-34: Correlation between non-measurable elements of mission statement and performance of SMEs (N=125)

	Mean	S.D.	(1)	(2)
Non-measurable (1)	2.926	.408	1	
Performance (2)	2.755	.752	.415* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

There is a significant and positive correlation between mission statement and the performance of SMEs (r = .607). The relationship between measurable elements of mission statement and the performance of SMEs is significant and positive (r = .511). In addition, there is a significant and positive relationship between non-measurable elements of mission statement and the performance of SMEs (r = .415). Although, the relationship between non-measurable elements of mission statement and the performance of SMEs seems positive, due to the type of question, which is Symantec, the rating of non-measurable elements is in the opposite direction or, in other words, the positive sign of the correlation coefficient indicates a negative relationship between

non-measurable elements of mission statement and SMEs performance. Thus, greater emphasis on non-measurable elements of mission statement can reduce the performance of high-tech SMEs. Scatter plots of these correlations show movement from non-measurable elements of mission statement toward measurable elements of mission statement and these can increase the performance of SMEs (figures 5-29 and 5-30).

Figure 5-29: Scatter plot of correlation between mission statement and SMEs performance

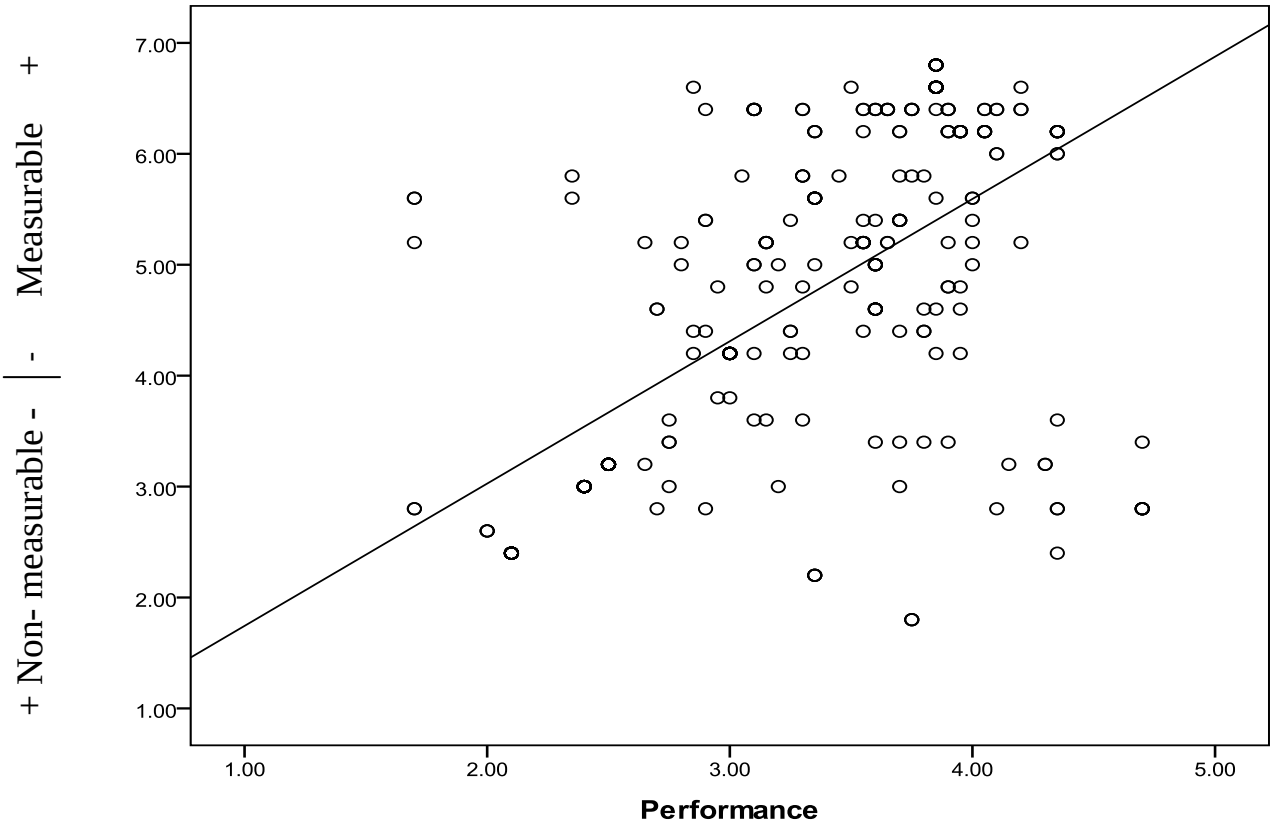
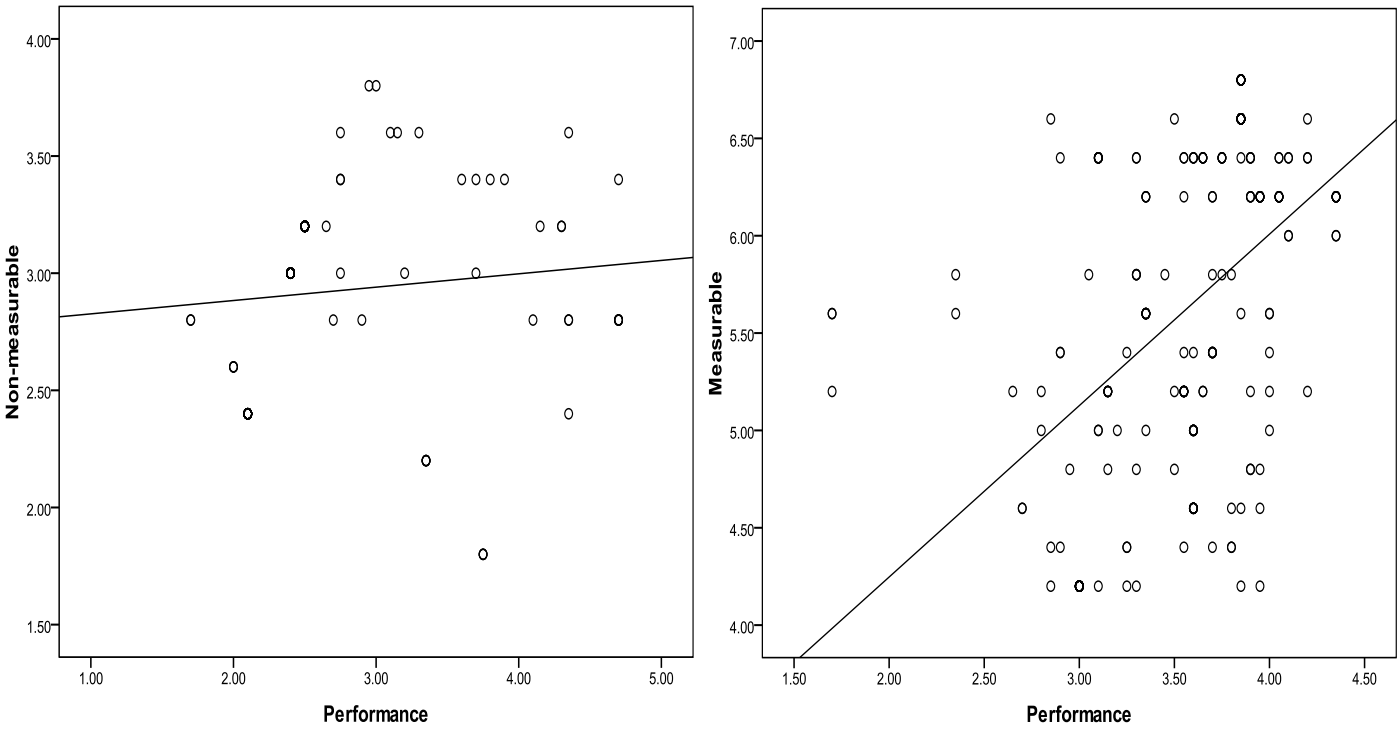


Figure 5-30: Scatter plots of correlation between elements of mission statement, non-measurable and measurable, and performance of SMEs



It is clear that less emphasis on non-measurable elements of mission statement or, in other words, a greater emphasis on measurable elements of mission statement can help to increase the performance of high-tech SMEs. As a result, $H_{2,\ 0}$ **"**High performance SMEs place more emphasis on measurable elements of mission statement when developing their business strategies" is supported and the alternative hypothesis is rejected.

5.3.3. Type of Strategy and Performance of SMEs (H_3)

The third hypothesis seeks to discover a relationship between generic types of strategy and the performance of SMEs. As previously described, although there are four generic types of competitive strategies, cost leadership, differentiation, cost leadership-focus and differentiation-focus, the number of SMEs that chose cost leadership and differentiation were very low (N=3 and N=15). Hence, only the correlations between the cost leadership-focus and differentiation-focus types of competitive strategy are tested with regard to the performance of SMEs. The null and alternative hypotheses regarding the relationship between type of strategy and performance, are as follows.

- $H_{3,\ 0}$: There is a significant relationship between the type of strategy and the SMEs' performance.

- $H_{3,\ 1}$: There is no significant relationship between the type of strategy and the SMEs' performance.

According to the null and alternative hypotheses the correlations between generic competitive strategies as a whole and its two types, cost leadership-focus and differentiation-focus, and the performance of SMEs have been tested. The results are presented as follows (tables 5-35 to 5-37).

Table 5-35: Correlation between generic type of competitive strategy and performance of SMEs (N=339)

	Mean	S.D.	(1)	(2)
Type of strategy (1)	1.69	.462	1	
Performance (2)	3.284	.710	.610* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-36: Correlation between cost leadership-focus type of strategy and performance of SMEs (N=107)

	Mean	S.D.	(1)	(2)
Cost leadership-Focus (1)	4.243	.356	1	
Performance (2)	2.639	.554	-.178* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-37: Correlation between differentiation-focus type of strategy and performance of SMEs (N=232)

	Mean	S.D.	(1)	(2)
Differentiation-Focus (1)	4.133	.618	1	
Performance (2)	3.581	.562	.407* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

The results show that there is a significant and positive relationship between the generic type of competitive strategy and the performance of SMEs (r = .610). In addition, there is a significant and positive correlation between the differentiation-focus type of strategy and the performance of SMEs (r = .407); however, the relationship between the cost leadership-focus type of competitive strategy and the performance of SMEs is significant and negative (r = -.178). The scatter plots of correlations between generic competitive strategy and its types and the performance of SMEs follow (figures 5-31 and 5-32):

Figure 5-31: Scatter plot of correlation between generic competitive strategy and performance of SMEs

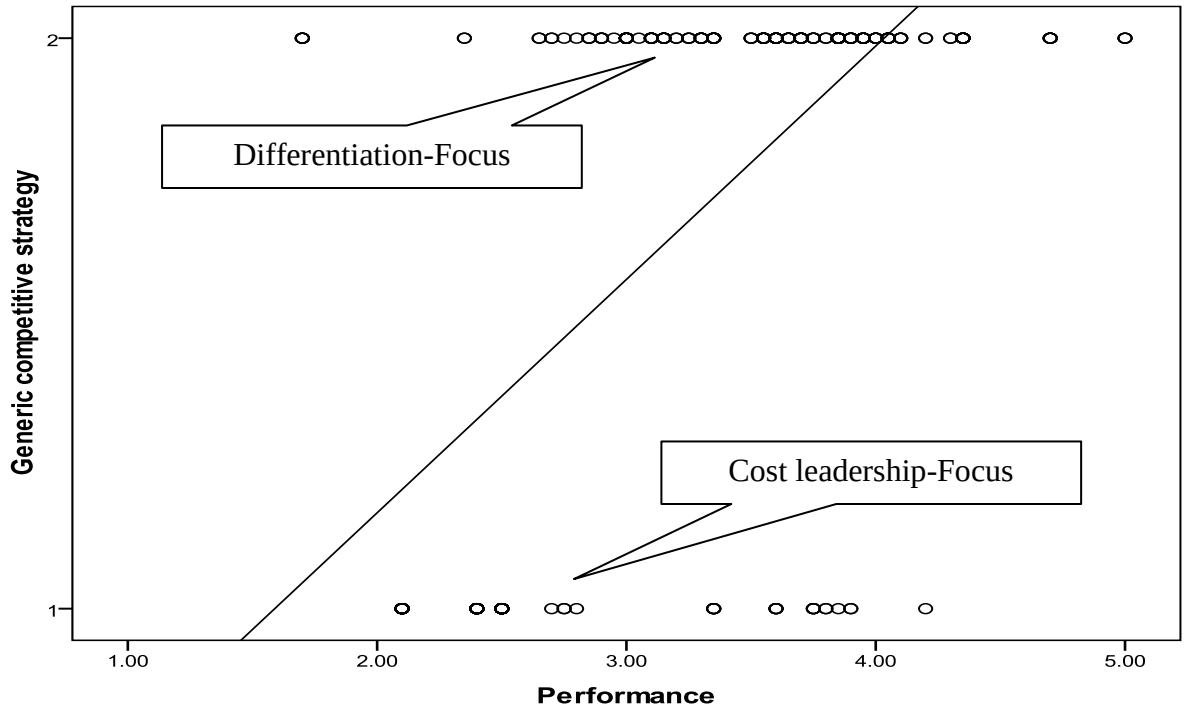
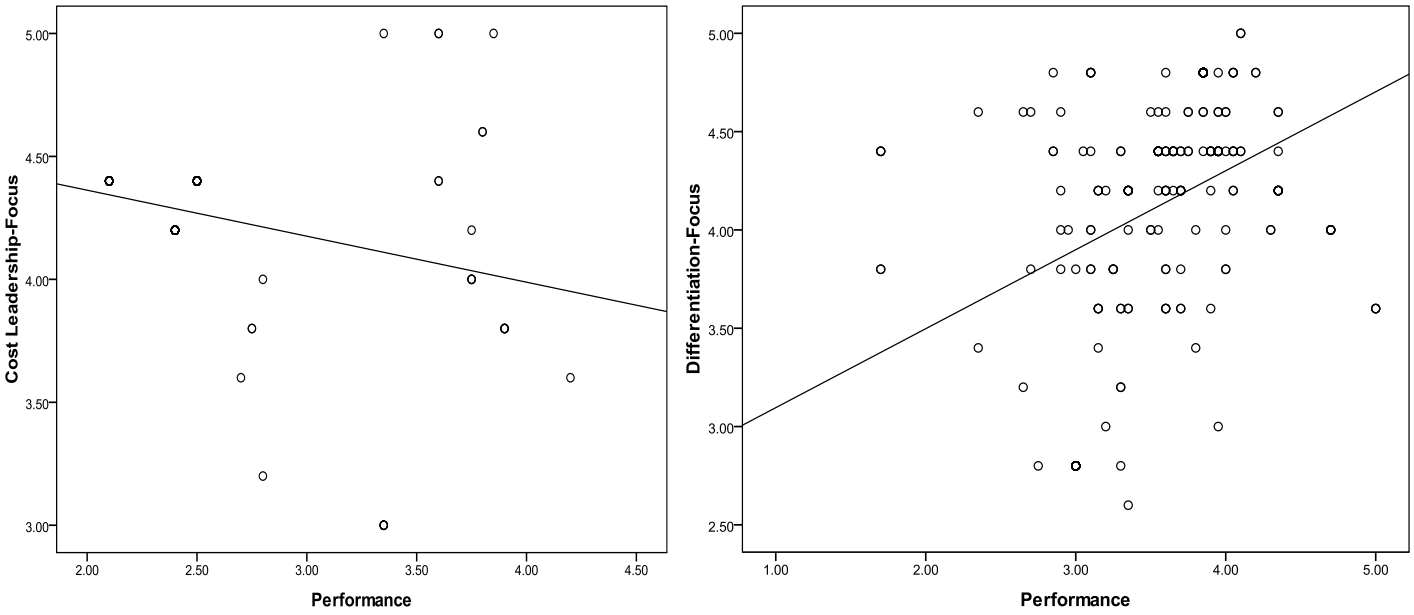


Figure 5-32: Scatter plots of correlation between types of competitive strategy, cost leadership-focus and differentiation-focus, and performance of SMEs



It is apparent, in accordance with the significant negative correlation between the cost leadership type of strategy, that giving more importance to this kind of competitive strategy reduces the performance of SMEs but, in contrast, giving more importance to the differentiation-focus strategy and adoption of this type of competitive strategy increases the performance of SMEs. Additionally, as an overview, it can be seen that the movement from cost leadership-focus strategy toward differentiation-focus improves the level of the performance of SMEs. Finally, although the relation between cost leadership-focus and the performance of SMEs is negative, there is a significant relationship between the type of strategy and the performance of high-tech SMEs. Consequently, $H_{3,\,0}$ "There is a significant relationship between types of strategy and SMEs' performance" is supported and the alternative hypothesis is rejected.

5.3.4. Knowledge-Based View (KBV) and Performance of SMEs (H_4)

H_4 endeavours to investigate the relationship between the knowledge-based view and performance. The null and alternative hypotheses regarding the relationship between the knowledge-based view and performance, is following.

- $H_{4,\ 0}$: There is a significant relationship between a knowledge-based view to the formulation of strategy and the SME's performance.

- $H_{4,\ 1}$: There is no significant relationship between a knowledge-based view to the formulation of strategy and the SME's performance.

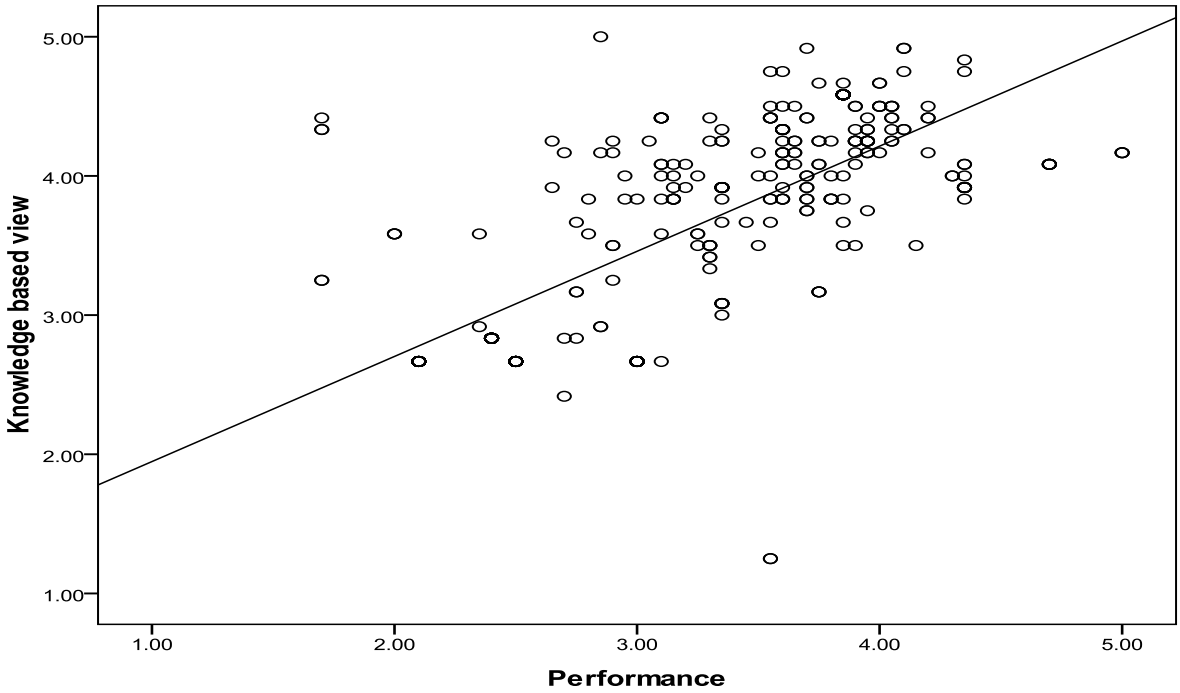
The correlation between the KBV and the performance of SMEs is tested, and the result is as follows (tables 5-38). Additionally, figure 5-33 shows a scatter plot of the relationship between the KBV and the performance of SMEs.

Table 5-38: Correlation between Knowledge-based view and performance of SMEs (N=357)

	Mean	S.D.	(1)	(2)
Knowledge Based View (1)	3.673	.757	1	
Performance (2)	3.284	.713	.712 * (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Figure 5-33: Scatter plot of correlation between KBV and performance of SMEs



The result shows that there is a significant and positive correlation between the knowledge-based view and the performance of SMEs (r = .712). Hence, $H_{4,\,0}$ "There is a significant relationship between a knowledge-based view to the formulation of strategy and the SME's performance" is supported.

5.3.5. SMEs' Characteristics and Strategy Formulation Approaches (H_5)

The fifth hypothesis seeks to investigate the relationship between the characteristics of SMEs and strategy formulation approaches, both formal and dynamic. As previously explained, age and size are selected as the two main features of a firm. The relationship between

characteristics of SMEs and strategy formulation approaches can show different approaches to strategy formulation in different ages and different sizes of firm or, in other words, can indicate an association between the life cycle of SMEs and approaches to strategy formulation. The null and alternative hypotheses, regarding this issue, are following.

- $H_{5,0}$: There is a significant relationship between the characteristics of SMEs and their strategy formulation approach.

- $H_{5,1}$: There is no significant relationship between the characteristics of SMEs and their strategy formulation approach.

The correlation between the characteristics of SMEs and formal and dynamic approaches to strategy formulation are tested and the results are presented in the following tables (tables 5-39 and 5-40).

Table 5-39: Correlation between the characteristics of SMEs and dynamic approaches to strategy formulation (N=188)

	Mean	S.D.	(1)	(2)	(3)
Size of Company (1)	1.54	.665	1		
Age of Company (2)	2.73	1.467	.522 * (.000)	1	
Dynamic SF (3)	5.30	.735	-.272 * (.000)	-.189 * (.009)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-40: Correlation between the characteristics of SMEs and formal approaches to strategy formulation (N=158)

	Mean	S.D.	(1)	(2)	(3)
Size of Company (1)	1.46	.604	1		
Age of Company (2)	1.99	1.347	.676 * (.000)	1	
Formal SF (3)	2.84	.59116	-.149 (.061)	-.244 * (.002)	1

* Correlation is significant at p<0.01 level (2-tailed).

As can be seen, the correlation between a dynamic approach to strategy formulation and size and age of SMEs is significant and negative (r = -.272 and r = -.189). The relationship between a formal approach to strategy formulation and the age of SMEs is significant and negative (r = -.244), but the relationship between this approach to strategy formulation and the size of SMEs is insignificant or, in other words, the correlation is not confirmed. The scatter plots of correlations between SMEs characteristics and strategy formulation approaches follow (figures 5-34 and 5-35).

Figure 5-34: Scatter plot of correlation between age of SMEs and approaches to strategy formulation

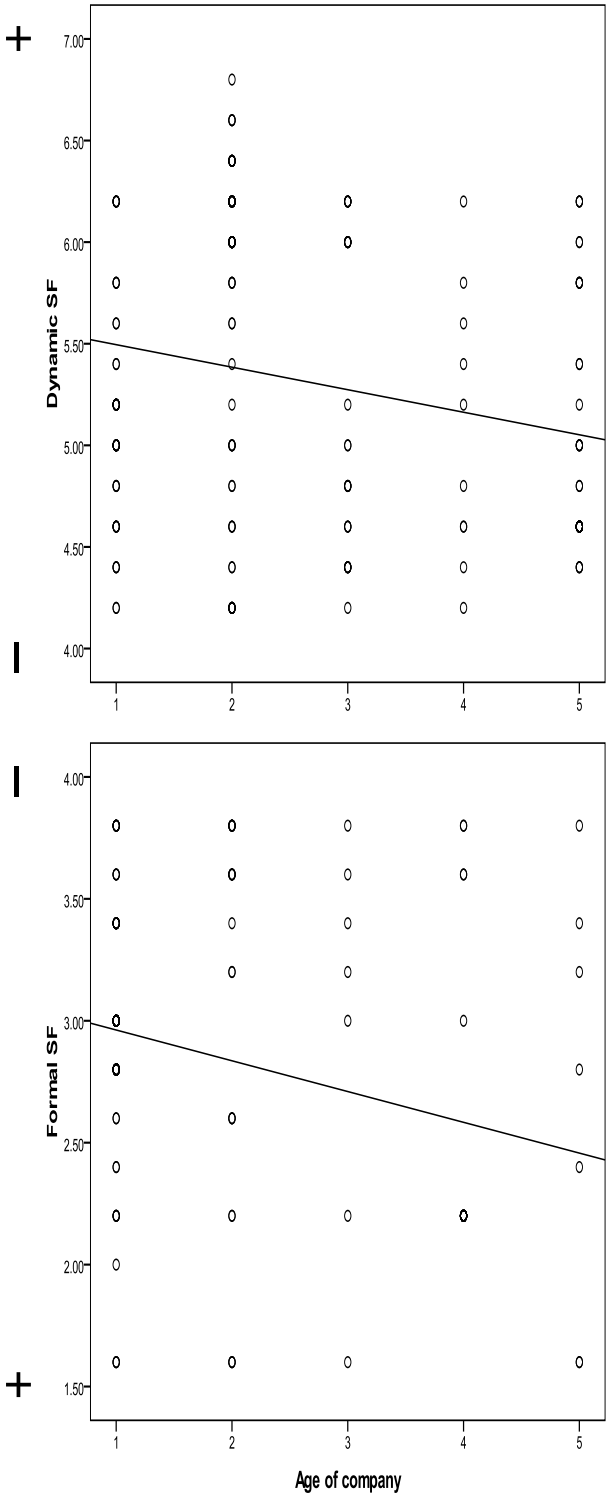
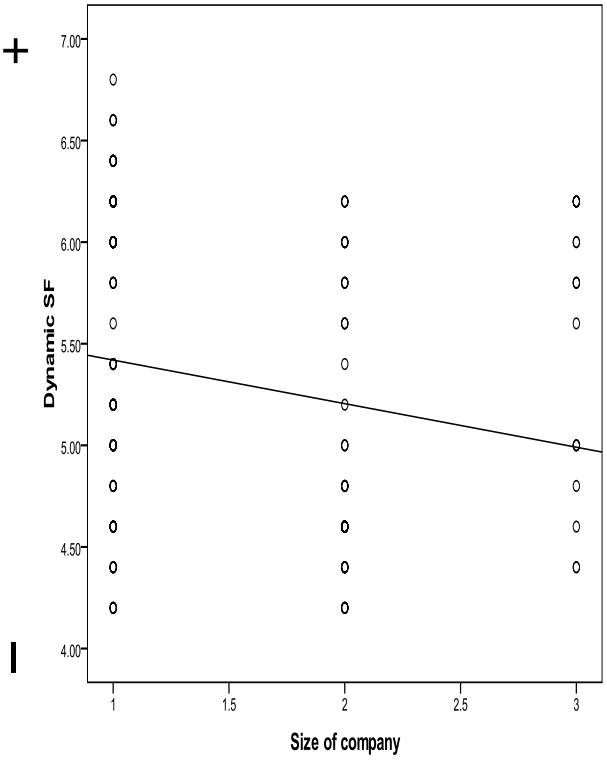


Figure 5-35: Scatter plot of correlation between size of SMEs and approaches to strategy formulation



Based on the results, by increasing the age and size of firms, a dynamic approach to strategy formulation will be less important for them or, in other words, SMEs are moving away from a dynamic approach to strategy formulation. The relationship between the age of SMEs and their formal strategy formulation is significant and negative. As previously mentioned, the type of questions regarding a strategy formulation approach is Symantec; this means the rating of a formal approach to strategy formulation is in the opposite direction. Therefore, the negative sign of the correlation coefficient indicates a positive relationship between the age of SMEs and a formal strategy approach. Thus, by increasing the age of SMEs, their tendency towards formal strategy formulation is increasing or, in other words, by increasing the age of the SMEs, they are moving away from a dynamic toward a more formal approach to strategy formulation. The effect of changes in the size of SMEs on formal approaches to strategy formulation is not confirmed. As previously mentioned, according to the results, it has just been confirmed that by increasing the size of SMEs, they are moving away from dynamic strategy formulation, which does not mean it is giving more importance to formal approaches to strategy formulation. Consequently, there is a significant correlation between the characteristics of SMEs and approaches to strategy formulation, hence, $H_{5,0}$ "There is a significant relationship between the characteristics of SMEs and their strategy formulation approach" is partially supported and the alternative hypothesis is rejected.

5.3.6. Approach to Strategy Formulation and Performance of SMEs ($H_{6\,\&\,7}$)

H_6 and H_7 look to explore the relationship between approaches to strategy formulation and SMEs performance. Therefore, the correlations are tested between the strategy formulation

approach as a whole, and dynamic and formal approaches to strategy formulation with the performance of SMEs. The null and alternative hypotheses, regarding this topic follow.

- $H_{6,0}$: High performance SMEs place more emphasis on dynamic strategy formulation.

- $H_{6,1}$: High performance SMEs do not place more emphasis on dynamic strategy formulation.

- $H_{7,0}$: High performance SMEs place more emphasis on formal strategy formulation.

- $H_{7,1}$: High performance SMEs do not place more emphasis on formal strategy formulation.

According to the null and alternative hypotheses the correlations between the strategy formulation approach as a whole and its two types, dynamic and formal, and the performance of SMEs are tested; the results are presented as follows (tables 5-41 to 5-43).

Table 5-41: Correlation between strategy formulation approach and performance of SMEs (N=346)

	Mean	S.D.	(1)	(2)
Strategy formulation approach (1)	4.177	1.402	1	
Performance (2)	3.274	.714	.370* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-42: Correlation between dynamic strategy formulation and performance of SMEs (N=188)

	Mean	S.D.	(1)	(2)
Dynamic SF (1)	5.3032	.73549	1	
Performance (2)	3.4886	.54222	.363* (.000)	1

* Correlation is significant at p<0.01 level (2-tailed).

Table 5-43: Correlation between formal strategy formulation and performance of SMEs (N=158)

	Mean	S.D.	(1)	(2)
Formal SF (1)	2.8367	.59116	1	
Performance (2)	3.0184	.80534	.118* (.001)	1

* Correlation is significant at p<0.01 level (2-tailed).

The scatter plots of correlations between the strategy formulation approach as a whole and its types, dynamic and formal, with regard to the performance of SMEs are following (figures 5-36 and 5-37).

Figure 5-36: Scatter plot of correlation between strategy formulation approach and performance of SMEs

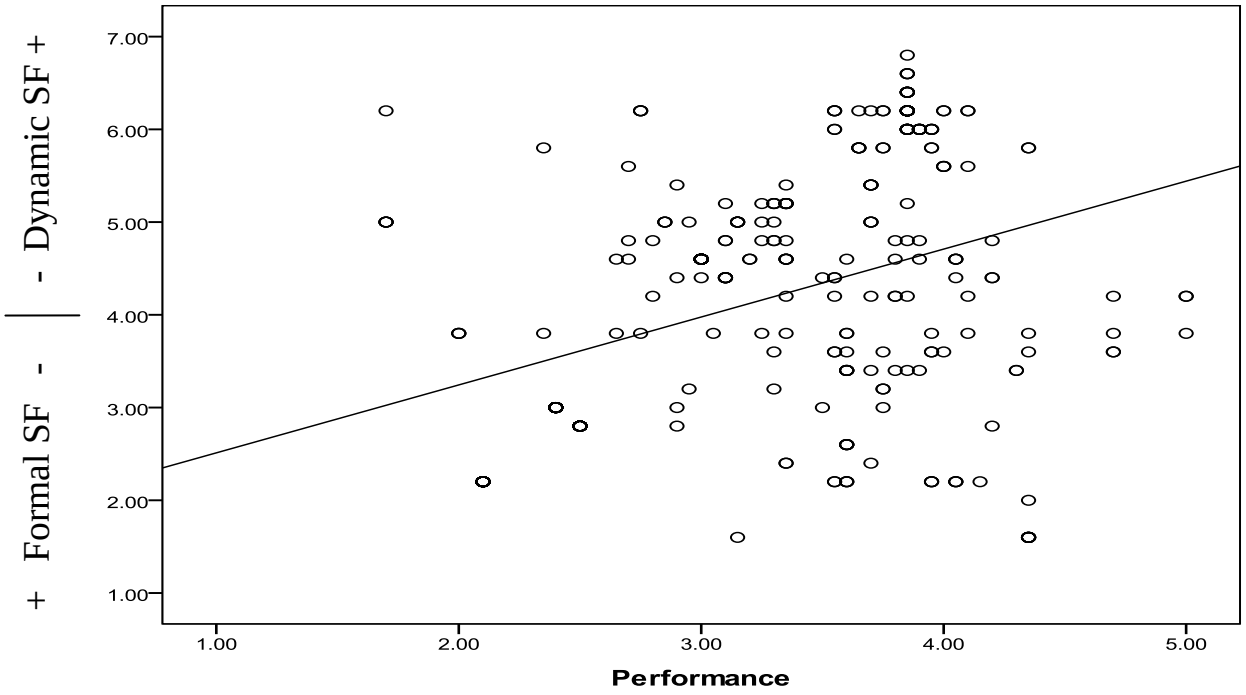
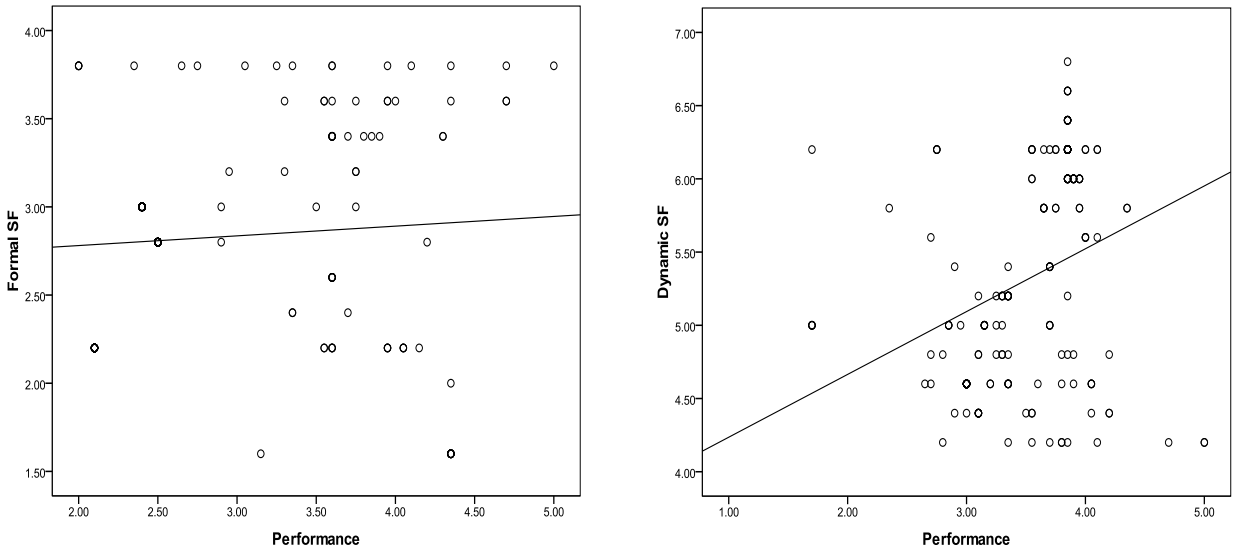


Figure 5-37: Scatter plot of correlation between dynamic and formal strategy formulation approaches with performance of SMEs



The results show that the relationship between strategy formulation approach as a whole and the performance of SMEs is significant and positive (r = .370); additionally, the correlation between dynamic and formal approaches to strategy formulation and the performance of SMEs is significant and positive (r = .363 and r = .118). These correlations confirm that giving more importance to dynamic approaches to strategy formulation can increase the performance of SMEs or, in other words, high performance SMEs in high-tech industry place more emphasis on a dynamic approach to strategy formulation, instead of a formal approach to strategy formulation. Therefore, $H_{6,\ 0}$ "High performance SMEs place more emphasis on dynamic strategy formulation" and $H_{7,\ 1}$ "High performance SMEs do not place more emphasis on formal strategy formulation" are supported and $H_{6,\ 1}$ and $H7_{,\ 0}$ are rejected.

5.4. Multiple Regression Analysis

In this section, regression analysis is performed. This research aims to explore and optimise a strategy formulation model and the relationship between factors of this model with the performance of high-tech SMEs in the UK. Hence, in this section multiple regression analysis is applied, in order to investigate the relationship between a strategy formulation model and the performance of SMEs. As previously stated, Karami's two-stage strategic management model (2007) is selected for this research. Therefore, the strategy formulation model, for this research, stems from this strategic management model (Karami, 2007).

Multiple regression is a statistical technique that allows us to predict someone's score on one variable on the basis of their scores on several other variables. In addition, multiple regression allows us to identify a set of predictor variables which together provide a useful estimate of a participant's likely score on a criterion variable.

Multiple regression analysis is performed in order to measure the effect of the strategy formulation model's factors (independent variables) on the performance of SMEs (dependent variable). Running multiple regression for the first time gave a Mahalanobis Distance greater than the required critical chi-square value ($D^2 = 27.198 > 20.52$, df = 5, $p<.001$). Mahalanobis is a metric measure for calculating the distance of an observation to the mean of a distribution. It is used to detect outliers, especially in the development of the linear regression model; in addition, when using Mahalanobis Distance, it does not require the distribution to be normal (Tabachnick, et al., 2007). Hence, for optimisation of the multiple regression model, Mahalanobis Distance

measure and SPSS Casewise Diagnostics table have been used. After three times of running multiple regression analysis and eliminating nine cases, the model optimised. These cases were eliminated because the model did not predict their performance very well or, in the other words, their performance was so low that the model could not predict. Table 5-44 summarises the results of multiple regression analysis.

The variance inflation factor (VIF) index shows no significant multicollinearity problem (Hair et al., 2006). The independent variables (environmental scanning, mission statement, type of strategy, knowledge-based view, strategy formulation approach) are regressed across the SMEs performance. The multiple regression linear model was derived as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where:

Y= Performance
α = Constant
β = Coefficient
X_1 = Environmental scanning
X_2 = Mission statement
X_3 = Type of strategy
X_4 = Knowledge-based view
X_5 = Strategy formulation approach
ε = Error term

Table 5-44: Results of multiple regression analysis on SMEs performance

Variable	R^2	Adj R^2	F	Sig.F	β	Std. Error β	VIF	t-value	Sig.*
Model	**.754**	**.750**	**195.424**	**.000**					
α					.320	.102	-	3.150	.002
Environmental scanning					.233	.038	1.703	6.158	.000
Mission statement					.053	.023	3.153	2.343	.020
Type of strategy					.251	.071	3.027	3.557	.000
Knowledge-based view					.690	.043	2.897	16.003	.000
Strategy formulation approach					.034	.017	1.659	1.972	.049

*****$p<0.05$

5.4.1. Interpretation of Multiple Regression Analysis

According to the multiple regression analysis results (Table 5-43), it is found that all factors of strategy formulation variables are linearly related to the performance of SMEs (dependent variable). The regression results indicate the model is significant (F-value = 195.424, p =.000). The R^2 equal 0.754 signifies 75.4% of the variation in the performance of SMEs is explained by independent variables. All the variables of the strategy formulation model are positively and significantly related to performance of SMEs. In descending order they are, knowledge-based view ($\beta = 0.690$, $p< 0.05$), type of strategy ($\beta = 0.251$, $p < 0.05$), environmental scanning ($\beta = 0.233$, $p < 0.05$), mission statement ($\beta = 0.053$, $p < 0.05$) and strategy formulation approach ($\beta =$

0.034, $p < 0.05$). The highest value of variance inflation factor (VIF = 3.153 < 10) suggests there is no serious multicollinearity problem in the model (Pallant, 2007).

5.5. Summary

In this chapter, collected data is statistically analysed in three areas: descriptive, correlation and regression. In the descriptive section, general characteristics of SMEs and hypotheses are analysed. The correlation part of this chapter separately studied the relationship between independent and dependent variables of each hypothesis. Finally, regression analysis examined the research model and its relationship with performance of SMEs.

The information shows, 99.4% of respondents have managerial jobs in SMEs, and about 60% (57.7%) of biotechnology and pharmaceutical SMEs are placed in science and biotechnology parks across the UK. 92.2% of biotechnology and pharmaceutical SMEs are of a small size (57.4% micro and 34.8% small), and 7.8% are medium-sized, which is consistent with HM Government Statistics, 2010.

The information gained from strategic management descriptive analysis of high-tech SMEs in the UK shows that SMEs are able to foresee the next 3 years of the biotechnology and pharmaceutical industry in the UK and, based on their predictions about the future, they are attempting to formulate their strategy for this period and, similarly, they are revising their strategy every 3 years or less. The relationship between the formulation and implementation of strategic management is very important, particularly in high-tech SMEs, as the implementation

stage is included in the evaluation process, and its feedback is very important for revising strategies, particularly in a dynamic environment.

The results of descriptive analysis regarding the type of environmental scanning and the performance of SMEs show that the vast majority of high-tech SMEs are periodically scanning their environment. Correlation analysis between environmental scanning and the performance of SMEs shows that there is significant and positive correlation between them. In addition, there are significant and positive correlations between the types of environmental scanning and the levels of performance in high-tech SMEs.

The results of descriptive and correlation analysis on mission statement and its elements show, that most high-tech SMEs place emphasis on measurable elements and 35.8% on non-measurable elements of mission statement. The correlation between mission statement and the performance of high-tech SMEs shows that there is a significant and positive relationship between them. Moreover, measurable elements of mission statement has a significant and positive relationship with performance of high-tech SMEs, and it explains that greater emphasis on measurable elements of mission statement can increase the performance of high-tech SMEs. In addition, the relationship between the non-measurable elements of mission statement and performance of SMEs is significant and negative.

The descriptive analysis data shows that, a small number of SMEs use non-focus competitive strategies; 3 companies use cost leadership and 15 firms use differentiation strategies, which is just 5% of the sample. 95% of SMEs, by comparison, are using focus competitive strategies,

differentiation-focus and cost leadership-focus competitive strategies. SMEs that have chosen to use focus competitive strategy tend to focus on both a narrow area of the market (82%) as well as a specific range of products (91.9%). Correlation analysis between the differentiation-focus type of competitive strategy and the performance of SMEs confirms a significant and positive relationship, whereas the correlation between the use of cost leadership-focus strategy and the performance of SMEs is significant and negative.

Descriptive and correlation analysis was carried out in order to find a relationship between the knowledge-based view (KBV) and high-tech SMEs performance. The result shows that the majority of SMEs are emphasising the importance of the KBV in their companies (68.9%). The correlation between the KBV and the performance of SMEs is significant and positive.

Based on descriptive analysis, 66.6% of SMEs are interested in using a dynamic approach to strategy formulation and 33.4% have emphasised a need for a formal strategy formulation approach.

The results show that the correlation coefficients between the age and size of SMEs and their dynamic strategy formulation are significant and negative. This means that, by increasing the age and size of SMEs, they are moving away from dynamic strategy formulation. The relationship between the age of SMEs and formal strategy formulation is significant and positive. Thus, by increasing the age of SMEs their tendency towards formal strategy formulation is increasing. The effect of changes in size of SMEs on formal approaches to strategy formulation is not confirmed. Therefore, according to the results, it has just been confirmed that, by increasing the size of

SMEs, they are moving away from dynamic strategy formulation, which does not mean they are giving more importance to formal approaches to strategy formulation.

Correlation analysis between strategy formulation approaches and the performance of SMEs shows that there is a significant and positive correlation between the strategy formulation approach and the performance of SMEs. In addition, the correlation between dynamic strategy formulation and the performance of SMEs is significant and positive (r = .363 and r = .118). However, the correlation between formal strategy formulation and the performance of SMEs is significant and negative.

Table 5-45 shows a summary of hypothesis testing using Spearman's correlation coefficient between independent and dependent variables.

Table 5-45: Summary of hypothesis testing

Hypothesis	Associations between variables	Significance	Conclusion
H_1	Types of environmental scanning Vs SMEs performance	Yes	Supported
H_2	Elements of mission statement Vs SMEs performance	Yes	Supported
H_3	Types of competitive strategies Vs SMEs performance	Yes	Supported
H_4	Knowledge-based view (KBV) Vs SMEs performance	Yes	Supported
H_5	SMEs characteristics Vs Formal Strategy formulation	Yes	Partially Supported
H_6	Dynamic strategy formulation Vs SMEs performance	Yes	Supported
H_7	Formal strategy formulation Vs SMEs performance	Yes	Rejected

Multiple regression analysis has tested the strategy formulation model for finding relationships between factors of the model and performance of SMEs. The regression results indicate the model is significant (F-value = 195.424, p = .000) and 75.4% of the variation in the performance of SMEs is explained by independent variables ($R^2 = 0.754$). According to the result, all factors of strategy formulation variables are linearly, positively and significantly having an effect on the performance of SMEs. In descending order, their influence on the performance of SMEs are; knowledge-based view ($\beta = 0.690$), type of strategy ($\beta = 0.251$), environmental scanning ($\beta = 0.233$), mission statement ($\beta = 0.053$) and strategy formulation approach ($\beta = 0.034$). The highest value of variance inflation factor (VIF = 3.153 < 10) suggests that there is no serious multicollinearity problem in the model (Pallant, 2007).

Chapter 6

Discussion

6.1. Introduction

This chapter discusses data analysis and interprets the implications of the research results. Six research questions and associated hypotheses are discussed in six sections respectively.

Discussion is conducted in three parts. The first part contains discussion about the general demographic and strategic management profiles of high-tech SMEs in the biotechnology and pharmaceutical industry in the UK. The second part includes discussion about research questions and the relationship between independent and dependent variables, set in the context of the reviewed theoretical framework. Finally, the third part is a discussion relating to the prepared strategy formulation model for high-tech SMEs in the UK. The last section summarises discussions relating to the research questions, hypotheses and the research model.

6.2. General Demographic and Strategic Management Profile of High-Tech SMEs

The basic information supplied by respondents exhibits that 99.4% of respondents have managerial jobs in SMEs, and 57.7% of biotechnology and pharmaceutical SMEs are placed in science and biotechnology parks across the UK.

92.2% of biotechnology and pharmaceutical SMEs are of a small size (57.4% micro and 34.8% small), and 7.8% are medium-sized, which is in line with HM Government Statistics for 2010.

The age structure of high-tech SMEs in the biotechnology and pharmaceutical industry in the UK shows that the vast majority of SMEs are up to 10 years old (63.6%), 21.9% of SMEs in this industry are in the middle period of their life (11 to 20 years old), and the remaining (14.6%), are over 21 years old.

Descriptive analysis of general strategic management profiles of high-tech SMEs in the UK informs us that most SMEs (53.2%) can foresee the future of the biotechnology industry in the UK for 3 years or less and, based on their predictions for the future, they can attempt to formulate the SMEs' strategy. Similarly, they are revising their strategies every 3 years or less. 23.8% of SMEs can predict the future of the biotechnology and pharmaceutical industry in the UK for 6 to 12 months, and they tend to prepare and revise their strategy for the same period. The percentage of SMEs which forecast the future of the industry for less than 6 months ahead and those which forecast for a period of 3 to 5 years is almost the same, namely, about 11%. The percentage of SMEs that can foresee the future of the biotechnology and pharmaceutical industry for a period of more than 5 years is very small, almost zero.

As the relationship between the formulation and implementation of strategic management is very important, particularly in high-tech SMEs (Ansoff, 1991; Mintzberg, 1994; Feurer and Chaharbaghi, 1995; Mintzberg et al., 2005; Sardana, 2007; Wanjare, 2008; Ndara, 2009), respondents were asked to determine the interval between formulation and implementation of strategy in their company. The results show that the interval between these stages in the vast majority of SMEs is less than 6 months (82.4%), for 9.0% of high-tech SMEs this is 6 to 12 months and for 8.7% this is more than 1 year. It can be seen that, in 91.4% of high-tech SMEs

the interval between the formulation and implementation stages of strategic management is less than 12 months, which is the main characteristic of strategic management in dynamic and rapidly changing environments.

6.3. Research Questions

6.3.1. Types of Environmental Scanning and Performance of SMEs

The first question of this study, and its related hypotheses, is about the relationship between environmental scanning and performance of SME as follows:

R1. What is the influence of different types of environmental scanning on the SMEs performance?

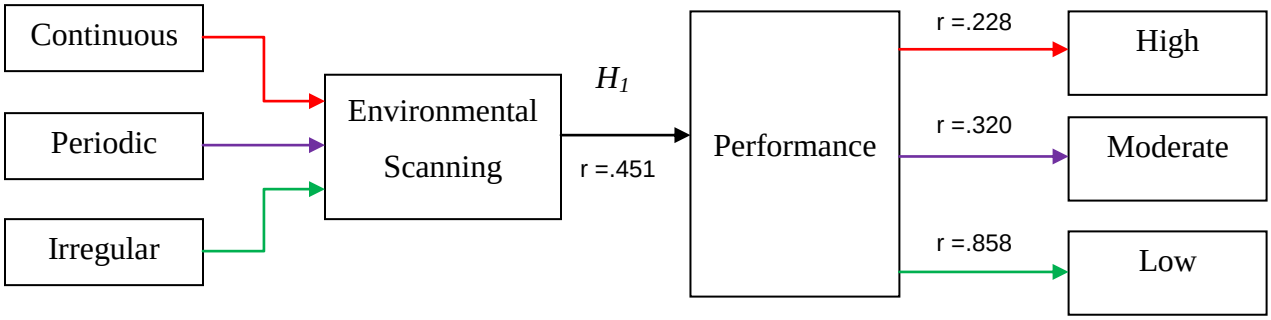
❖ ***H_1:*** There is a significant relationship between the type of environmental scanning and the levels of the SMEs' performance.

To answer this research question, the relationship between types of environmental scanning irregular, periodic and continuous should be specified.

The results of descriptive analysis regarding the type of environmental scanning and the performance of SMEs show that the vast majority of high-tech SMEs are periodically scanning their environment (irregular = 30%, periodic = 56% and continuous = 14%). Correlation analysis

between environmental scanning and the performance of SMEs shows that there is a significant and positive correlation between them (r = .451). In addition, there are significant and positive correlations between the types of environmental scanning and the levels of performance in high-tech SMEs, irregular environmental scanning and low performance SMEs (r = .858), periodic environmental scanning and moderate performance SMEs (r = .320) and continuous environmental scanning and high performance SMEs (r = .228) (figure 6-1).

Figure 6-1: Correlation between environmental scanning and its type with different levels of performance



According to these results, it can be concluded that the performance of SMEs is positively associated with the type of environmental scanning and high-tech SMEs, in order to improve their level of performance, need to carry out environmental scanning (Hough et al., 2004; Berard and Delerue, 2010; Parnell et al., 2012). In other words, it is worthwhile for SMEs to be conscious of their environment, and this requirement will be greater for industries that are facing high levels of ambiguity, such as the biotechnology and pharmaceutical industry, which is one sort of high-tech industry in the UK; this is a reaffirmation of the findings of Bourgeois (1985), Zahra and Bogne (2000), Franco et al. (2011) and Olamade (2011). In addition, according to regression analysis of the designed model for strategy formulation, environmental scanning is

one of the main components of this model which has a significant effect on the performance of SMEs, and employing environmental scanning is critical for high-tech SMEs if they wish to achieve a better level of performance (Fredrickson, 1984; Bourgeois and Eisenhardt, 1988; Dean and Sharfman, 1993; Berard and Delerue, 2010; Olamade, 2011; Franco et al., 2011). Environmental scanning is one of the five factors of a strategy formulation model; this finding is consistent with the findings of Hambrick (1982), Liao et al. (2008) and Pelham et al. (2011). Hence, it is confirmed that collecting data from an effective type environmental scanning, to achieve higher performance, is important and crucial for high-tech SMEs (Bourgeois 1985; Zahra and Bogne 2000; Liao et al., 2008; Pelham et al., 2011).

The result shows that there is a positive association between irregular environmental scanning and a low performance level in SMEs. Emphasis on an irregular type of environment scanning reduces the SMEs performance; conversely, moving away from irregular environmental scanning improves the performance of SMEs.

Certainly some of the features of this irregular type of environmental scanning cannot increase the SMEs performance. Based on Fahey et al. (1981), irregular systems are characterised by the reactive nature of planning as well as environmental scanning; in addition, an irregular type of environmental scanning methodologically relies on simplistic tools, and primarily utilise information from the past. Companies in high-tech industries, because of their dynamic environment and changeability, need a proactive attitude towards environmental scanning (Dutton and Jackson, 1987; Berard and Delerue, 2010; Olamade, 2011), and this attitude can produce supplementary information which can be used by managers to speed up the decision-

making process and, subsequently, improve performance (Eisenhardt, 1989, Liao et al., 2008, Olamade, 2011). It is clear that simplistic analysis of past data, with short-term horizons on specific events, are characteristic of irregular types of environmental scanning; more adherence to these kinds of features will strengthen the irregular type of environmental scanning and will lead to low performance in high-tech SMEs.

The results of correlation analysis confirm the positive relationship between a periodic type of environmental scanning and a moderate level of performance in high-tech SMEs. This result not only demonstrates that giving more importance to periodic environmental scanning increases the level of performance, it also confirms that placing more stress on continuity and regularity, and moving away from an irregular type of environmental scanning towards a periodic type, can increase the performance of SMEs. This outcome confirms that there is a positive relationship between unstable environments and the regularity of environmental scanning, and this was previously investigated by Sawyerr (1993) and Abiodun (2009) in Nigeria, Ebrahimi (2000) in Hong Kong, Brew and Purohit (2007) in America and South Africa and Anchor and Aldehayyat (2010) in Jordan.

A periodic type of environmental scanning looks more toward the future, but it emphasises near-term environmental changes, and, for this reason, the forecasts that this type of scanning produces are limited in their scope and methodologies but its forecasting orientation is broader and wider than irregular scanning and it stresses economic and sales projections (Fahey, et al, 1981). Although, this type is more beneficial to the performance of SMEs than irregular type, but environmental scanning is a process used for searching and gathering information about a

particular subject, as well as monitoring the environment without any limitation (Aguilar, 1997; Abebe et al., 2010; Sanzo et al., 2011).

The results show that there is a positive correlation between a continuous type of environmental scanning and the high performance levels of high-tech SMEs. This result also places further emphasis on the strong relationship between the continuity of environmental scanning activities and the level of the performance of SMEs. Hence, this result is a reaffirmation of the fact that increasing the frequency of environmental scanning, when there is environmental unpredictability, shows the importance of continuous environmental scanning for high-tech SMEs (May et al., 2000; Liao et al., 2008; Teece, 2009; Alam, 2011).

A continuous type of environmental scanning is an ideal type for high-tech SMEs because it shifts from problem-solving, which is a feature of the periodic type, to opportunity-finding and the realisation that this type of scanning contributes to the growth and survival of high-tech SMEs in a proactive way (Fahey et al., 1981). In other words, this type of environmental scanning attempts to enhance the organisation's capability and its ability to handle the influences of environmental uncertainty (Aaker, 1989; Gibbons and O'Connor, 2005; Gassmann and Becker, 2006; Wang et al., 2010; Adema and Roehl, 2010).

The discussion certainly leads to this outcome: by persisting with continuous environmental scanning, using more advanced prediction tools and methodologies for longer-term horizons, SMEs can change environmental information into knowledge about the environment which can direct SMEs toward better levels of performance (Fahey et al. 1981; Berard and Delerue, 2010;

Olamade, 2011; Parnell et al., 2012). This discussion confirms the claim of Hough et al. (2004), Liao et al., (2008) and Alam, (2011) that there is a positive relationship between environmental uncertainty and environmental scanning activities. When environmental uncertainty is increasing in reaction to this, scanning activity will also increase.

Moreover, the results reject the follower role of SMEs by using large companies scanning models for environmental scanning as stated by Baumard (1991); Franco et al. (2011) and Olamade (2011). A firm's size cannot have an impact on performance; the main factor is the continuity of environmental scanning activities and outlook.

6.3.2. Mission Statement and Performance of SMEs

The second question of this research is investigating the relationship between mission statement and the performance of high-tech SMEs. The following hypothesis is designed in this regard.

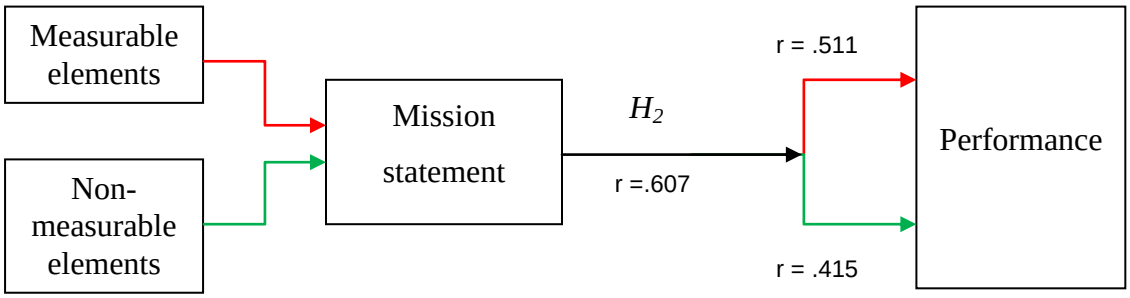
Q2. What is the effect of mission statement on the SMEs' performance?

❖ ***H_2:*** High performance SMEs place more emphasis on the measurable elements of their mission statement when developing their business strategies.

The results of the conducted descriptive and correlation analysis on mission statement and its elements show that, 64.2% of high-tech SMEs place their emphasis on measurable elements and 35.8% on non-measurable elements of mission statement.

The correlation between mission statement and the performance of high-tech SMEs shows that there is a significant and positive relationship between them (r = .607) (figure 6-2). This result goes against Bartku et al. (2006) who revealed that there is no relationship between mission statement and a firm's performance, but this result is consistent with Bart and Baetz (1998) and Crott et al. (2005), who found that there is a relationship between a firm's performance and its formal mission statement. However, the study of Bartku et al. (2006) was about large enterprises (LEs), and this dissimilarity might be the cause of this difference. In addition, based on the result of multiple regression, it can be claimed that a unique and well-designed mission statement is required for an effective strategy formulation model for achieving better performance in high-tech SMEs (David, 2001; Kemp and Dwyer, 2002; Kirk and Beth Nolan, 2010). Without a mission statement, high-tech SMEs have no way of determining whether they are making progress (Baetz and Bart, 1998; Crott et al., 2005). Moreover, the claim of Pearce and David (1987) and Alavi and Karami (2009) is still true when it states that high performance high-tech SMEs place more emphasis on mission statement than low performers.

Figure 6-2: Correlation between mission statement and its elements with performance of SMEs



Although mission statement is a common standard map which can show organisational values and priorities to all its stakeholders, and can help all the people in an organisation to have a general idea about organisational purposes and how to attain these targets (Klemm et al. 1991; Williams, 2008), weighting factors are very important. As mentioned in Chapter Two, in many studies just two major issues have been investigated; the relation between mission statement and a firm's financial performance, or the association between a mission statement's financial components and a firm's performance. This research endeavoured to change the absolute financial view of mission statement and the performance of SMEs to a broader view. For this reason, in a mission statement, its elements are divided into measurable and non-measurable elements and, in terms of performance, the balance scorecard (BSC) is used, where financial performance is one of its four perspectives.

The measurable elements of mission statement have a significant and positive relationship with the performance of high-tech SMEs ($r = .511$), and this explains that placing more emphasis on measurable elements of mission statement can increase the performance of SMEs, in line with the results of Ackoff et al. (2001), Kemp and Dwyer (2002) and Kirk and Beth Nolan (2010). In addition, a positive relationship between the measurable elements of mission statement means an effective mission statement with emphasis on measurable elements can improve a high-tech SME's performance in four perspectives including the financial perspective (Falsey, 1989; Rarick, 1995; Bart and Baetz, 1998; Kemp and Dwyer, 2002; Crott et al., 2005; Kirk and Beth Nolan, 2010).

On the other hand, the relationship between non-measurable elements of mission statement and the performance of SMEs is significant and positive (r = .415). Although the relationship between non-measurable elements of mission statement and the performance of SMEs seems positive, because of the type of question which is Symantec, the rating of non-measurable elements is in the opposite direction, or in other words, the positive sign of the correlation coefficient indicates a negative relationship between non-measurable elements of mission statement and the performance of SMEs. Thus, placing more emphasis on non-measurable elements of mission statement can reduce the performance of high-tech SMEs. This result goes against Churchill and Lewis (1983) and Hashim et al. (2001), who claimed that there is no difference between the content of mission statement in high and low performance SMEs. Significantly, it can be claimed that there is a considerable distinction between the content of mission statement in high performance and low performance SMEs, which is the opposite of O'Gorman and Doran (1999), Dobbs and Hamilton (2007) and Alavi and Karami (2009).

Defining factors of non-measurable elements of mission statement are characterised by broad and general definitions of production, market, goals, level of competition and company objects. These characteristics are exactly the opposite of measurable elements of mission statement (Pearce and David, 1987; Bart, 1998; Williams, 2008; Khalifa, 2011). This means that less importance placed on non-measurable elements and more importance placed on measurable elements of mission statement, consequently increases the performance of SMEs.

6.3.3. Types of Competitive Strategies and Performance of SMEs

The third question, in this study, is about competitive strategies and their association with the performance of high-tech SMEs. The question and its hypothesis follow.

Q3. What is the relationship between the types of competitive strategy and the SMEs performance?

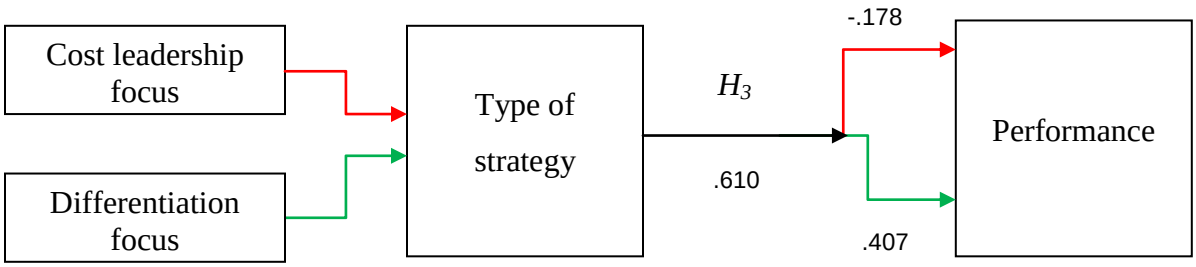
❖ ***H_3:*** There is a significant relationship between the type of strategy and the SMEs performance.

The results of descriptive analysis show that only 18 SMEs use non-focus competitive strategies, 3 companies use cost leadership and 15 firms use differentiation strategies; this is just 5% of the sample. While 95% of SMEs are using focus competitive strategies: differentiation-focus strategy with 232 frequencies and cost leadership-focus strategy with 107 frequencies.

In terms of market area, 82% of SMEs are choosing to focus on a narrow area of the market and 17.9% emphasise activity in all areas of the market. Regarding the range of products, 91.9% of respondents believe they should focus on a specific range of products, however 8.1% consider a broad range of products. Correlation analysis between the type of competitive strategy as a whole and the differentiation-focus type of competitive strategy with the performance of SMEs confirms a significant and positive relationship ($r = .610$, $r = .407$); whereas the correlation between cost leadership-focus strategy and the performance of SMEs is significant and negative

(r = -.178) (figure 6-3). Additionally, according to regression analysis of the designed model for strategy formulation, the type of competitive strategy is the second main component of this model (β = 0.251); this means choosing the right type of competitive strategy is critical and crucial for high-tech SMEs to achieve better performance.

Figure 6-3: Correlation between generic competitive strategy and its types with performance of SMEs



The overall view shows that an absolute majority of high-tech SMEs are using differentiation-focus competitive strategy (more than 68%) and about 32% of high-tech SMEs are using cost leadership-focus. Caloghirou et al. (2004) and Fernandez-Ortiz and Lombardo (2009) found a significant relationship between industry concentration and SMEs' profitability. Although in this study, the BSC is used as the performance-measuring model, because one of the perspectives in the BSC is financial, Caloghirou (2004) and Fernandez-Ortiz and Lombardo's (2009) results have been confirmed again.

The results show that there is positive relationship between differentiation-focus competitive strategy and the performance of high-tech SMEs. Porter (1985) and Karami (2007) stressed that a differentiation-focus type of competitive strategy is a very attractive strategy for all SMEs. In

addition, Homburg et al. (1999), Vorhies et al. (2009), Nandakumar et al. (2011) studied the relationship between differentiation-focus type of competitive strategy and the performance of SMEs; they found a differentiation-focus strategy has a positive impact on performance especially in a stable environment. This study reaffirms Porter (1985), Homburg et al. (1999), Karami (2007), Kumar et al. (2011) and Acquaah (2011) regarding the type of SMEs and the type of environment; however, it makes a further contribution to them. Based on the results, it can be claimed that a differentiation-focus type of competitive strategy is a very attractive strategy for high-tech SMEs not only in a stable environment but also in changeable environments, such as high-tech industries.

Regarding cost-leadership-focus competitive strategy, there is a negative correlation between this type of strategy and the performance of high-tech SMEs. This result has been approved already by Homburg et al. (1999), Vorhies et al. (2009); in a stable environment, they found no positive relationship between a cost leadership type of competitive strategy and any performance dimensions. Although the findings of Homburg et al. (1999) and Vorhies et al. (2009) are general with regard to the relationship between cost leadership and a firm's performance, in this study the results separately show that there is no positive association between focus or non-focus cost leadership competitive strategy in high-tech SMEs in the UK. Surely, firms are always looking to increase their performance, but cost leadership-focus strategy adversely affects their desire to improve. As a result, a cost leadership-focus competitive strategy is not an attractive strategy for high-tech SMEs, and this includes non-focus cost leadership and differentiation.

Although Porter (1985), Karami (2007) and Johnson et al. (2011) stressed that cost leadership-focus is possibly an attractive type of competitive strategy for small firms, the result does not confirm this claim. Therefore, based on the results, it is possible to redesign figure 2-4 for high-tech SMEs in the UK as follows (figure 6-4).

Figure 6-4: Generic competitive strategies and their attraction to high-tech SMEs

Competitive scope	**Competitive Advantage**	
	Cost leadership (not attractive)	**Differentiation** (not attractive)
	Cost leadership-focus (not attractive)	**Differentiation-focus** (attractive)

Source: compiled by author

6.3.4. Knowledge-Based View (KBV) to Strategy Formulation and Performance of SMEs

A knowledge-based view to strategy formulation and its relationship with SMEs performance is the subject of the fourth question in this study. The fourth research question and its hypothesis regarding this subject are as follows.

R4. Is there any relationship between a knowledge-based view (KBV) to formulation of strategy and the SMEs performance?

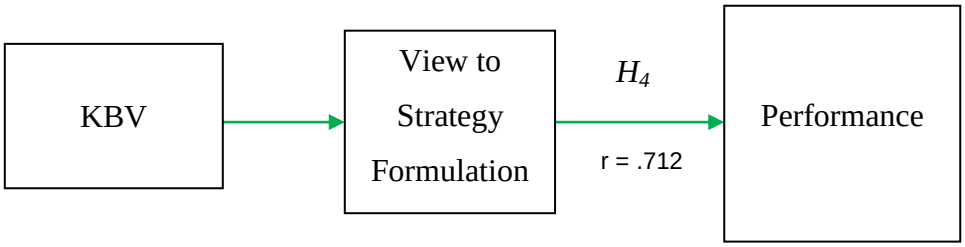
❖ ***H_4:*** There is a significant relationship between a knowledge-based view to the formulation of strategy and the SMEs performance.

The result of descriptive analysis regarding a knowledge-based view (KBV) to strategy formulation shows that, 68.3% of SMEs are emphasising the importance of a KBV in their company, 31.1% of SMEs are not sure about the importance of a KBV, and just 0.6% of SMEs evaluate a KBV as being unimportant. This means that the vast majority of high-tech SMEs use a KBV when they are formulating their strategy. Additionally, descriptive analysis of the processes of the SECI model shows that conversion between tacit and explicit knowledge in high-tech SMEs is important for them, and it re-confirms that high-tech SMEs require both kinds of knowledge in a competitive environment (Nonaka and Takeuchi, 1995). Sparrow (2000), Panyasorn et al. (2009) and Heavin and Adam (2012) reviewed the literatures regarding the KBV and found that the dynamic environment of the SMEs means that considerable attention has to be paid to organisational learning processes alongside knowledge storage, access and transfer. The current study finds exactly the same results and these have been ascertained by a quantitative study.

The correlation between a KBV to strategy formulation and the performance of SMEs is significant and positive (r =.712) (figure 6-5). Although the same result was found by McEvily et al. (2002) for low-tech firms in the adhesive industry, their findings can be also extend to high-tech SMEs as well, according to the results of this current research. Furthermore, a knowledge-based view to strategy formulation is the first component of the model for strategy formulation in high-tech SMEs ($\beta = 0.690$) and this gives the biggest contribution to the performance of high-

tech SMEs. This means, a knowledge-based view to strategy formulation in high-tech SMEs is critical and crucial because its variation has the greatest impact on their performance.

Figure 6-5: Correlation between a knowledge-based view and performance of SMEs



The positive correlation between a knowledge-based view to strategy formulation and the performance of SMEs illustrates that by creating a "spiral of interaction" in high-tech SMEs, as mentioned by several researchers (Nonaka and Takeuchi, 1995; Johnson and Scholes, 2002; Lynch, 2003; Rodgers, 2003; Li and Tsai, 2009) and by placing more emphasis on knowledge in these companies, they can generate advantages and increase their level of performance. It proves that tacit knowledge, which is the output of SECI, can improve the level of performance in high-tech SMEs. This discussion reaffirms the findings of studies which stated, that tacit knowledge is value creation for high-tech SMEs because competitors cannot duplicate this knowledge easily (Nonaka et al, 2000; Nonaka and Toyama, 2002; Teece, 2009; Simsek and Heavey, 2011).

6.3.5. Characteristics of SMEs and Their Strategy Formulation Approach

A combination of dimensions and elements when forming a firm's strategy can reflect its approach to strategy formulation (Dess and Lumpkin, 2001; Covin and Wales, 2011; Hitt et al.,

2011). Dimensions and elements of strategy formulation are a mixture of quantity, e.g. age, size and quality characteristics, e.g. the type of leadership and the kind of environment. Based on these characteristics, two main types of strategy formulation approach are forming: formal and dynamic. The fifth research question investigates the relationship between the quantity characteristics of SMEs, age and size, and their strategy formulation approach. The research question and its related hypothesis follow.

R5. What is the relationship between the characteristics of SMEs and their strategy formulation approach?

❖ ***H_5:*** There is a significant relationship between the characteristics of SMEs and their strategy formulation approach.

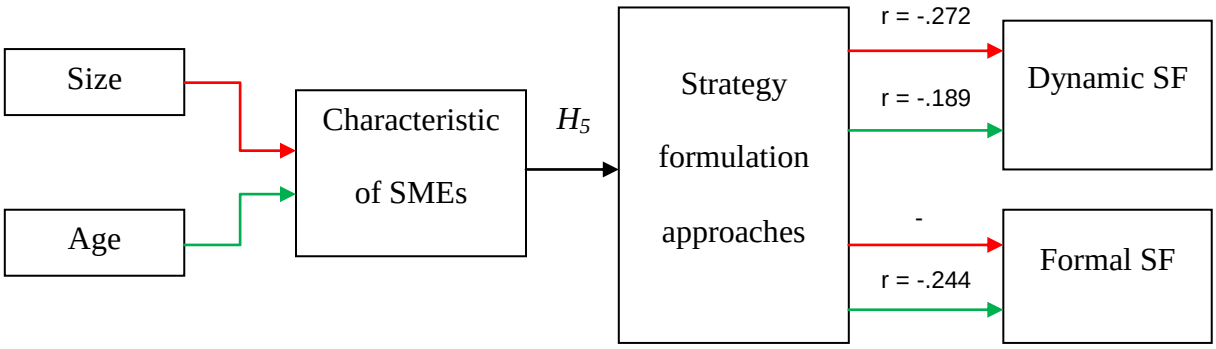
The results show that the correlation coefficients between age and size of SMEs and their dynamic strategy formulation approach are significant and negative (r = -.189 and r = -.272). This means that, by increasing the age and size of SMEs, a dynamic approach to strategy formulation will be less important for them or, in other words, SMEs are moving away from dynamic strategy formulation. This result shows the impact of the life cycle of a firm on its dynamic approach to strategy formulation, which is consistent with the findings of Aitken et al. (2003), Huang et al. (2010) and Juttner et al. (2010), but with two differences; Aitken, et al (2003) and Huang et al. (2010) studied low-tech firms lighting companies and also their research was carried out using all sizes of companies. Researchers believe proactiveness means taking the

initiative to recreate an environment best suited to one's competitive advantage and this definition is well suited to the introduction and growth stages of a firm (Dess and Lumpkin, 2001; Covin and Wales, 2011; Hitt et al., 2011). Hence, with the combination of characteristics of a firm's life cycle, proactiveness and dynamic approach to strategy formulation, it can be deduced that high-tech SMEs in the early stages of their life the introduction and growth stages have proactive competitive behaviour which is consistent with dynamic strategy formulation. Although this result has many similarities with Dess and Lumpkin (2001) and Covin and Wales (2011), their study was carried out in low-tech industries, e.g. accounting, advertising, real estate and so on, and all sizes of companies, both SMEs and LEs. Therefore, it can clearly be said that high-tech SMEs in the early stage of their life cycle are proactive and they have a dynamic approach to strategy formulation, and that by increasing their size and age they are moving away from this approach.

The relationship between the age of SMEs and their formal strategy formulation is significant and negative ($r = -.244$). The type of questions regarding the strategy formulation approach is Symantec; this means the rating of a formal approach to strategy formulation is in the opposite direction. Therefore, the negative sign of the correlation coefficient indicates a positive relationship between the age of SMEs, and their formal strategy approach. Thus, by increasing the age of SMEs their tendency towards formal strategy formulation is increasing, or in other words, by increasing the age of the SMEs, they are moving away from a dynamic approach towards a formal approach to strategy formulation. The effect of the changes in size of SMEs on formal approaches to strategy formulation has not been confirmed. As previously mentioned, according to the results it has just been confirmed that by increasing the size of SMEs, they are

moving away from dynamic strategy formulation, which does not mean they are giving more importance to a formal approach to strategy formulation (figure 6-6).

Figure 6-6: Correlation between characteristics of SMEs and strategy formulation approaches



Competitive aggressiveness is in contrast to proactiveness, it is characterised by a strong offensive posture directed at overcoming competitors and may also be quite reactive, for example when a firm defends its market position (MacMillan and Day, 1987; Bierly and Daly, 2007; Short et al., 2009; Tajeddini and Mueller, 2011). This is accomplished by, for example, taking bold steps to achieve market share goals, and can be seen as an elimination of potential barriers towards a formal approach to strategy formulation (Venkatraman, 1989; Rauch et al., 2009; Mahr and Kretschmer, 2009). In addition, firms, which display a competitive aggressive behaviour, create, acquire and leverage resources to achieve a sustainable advantage (Barney, 1991; Foss and Foss, 2008; Pitelis, 2009; Ling et al., 2011). In other words, they have a resource-based view when formulating their strategy, which is one of the characteristics of a formal approach to strategy formulation. According to Dess and Lumpkin (2001), Covin and Wales (2011) and Hitt et al. (2011), competitive aggressive behaviour is mostly fitting in companies which have reached a mature stage in their life cycle. This is consistent with Dess and Lumpkin

(2001) and Covin and Wales (2011) and confirms that high-tech SMEs with increasing age are moving towards competitive, aggressive behaviour and formal approaches to strategy formulation; some of the characteristics of this approach are: elimination of potential barriers, resource-based view to strategy formulation, formal control system and written strategy.

6.3.6. Strategy Formulation Approaches and Performance of SMEs

As mentioned earlier, strategy formulation approaches are a combination of the quantity and quality characteristics of high-tech SMEs (Dess and Lumpkin, 2001; Covin and Wales, 2011; Hitt et al., 2011). Dimensions and elements of strategy formulation are a mixture of quantity, e.g. age, size, and quality characteristics, e.g. the type of leadership and the kind of environment. Formal and dynamic strategy formulation approaches are identified by factors such as strategy orientation, view to strategy, control mechanism, strategic looking and written or unwritten strategy. Surely, having only knowledge of approaches to strategy formulation and no understanding of their effect on the performance of high-tech SMEs will not be beneficial. Most researchers seek to investigate the factors, which improve a firm's performance, so for this reason the sixth research question investigates the relationship between approaches to strategy formulation and high-tech SMEs performance. But, because there are two approaches to strategy formulation, the impact of each of them on the performance of SMEs has been investigated in separate hypotheses as follows.

R6. What is the association between different approaches to strategy formulation and the SMEs' performance?

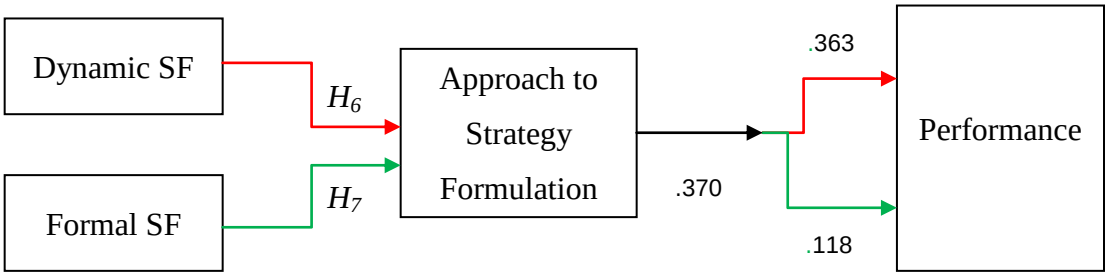
❖ ***H_6:*** High performance SMEs place more emphasis on dynamic strategy formulation.

❖ ***H_7:*** High performance SMEs place more emphasis on formal strategy formulation.

The results of descriptive analysis show that two-thirds of high-tech SMEs place more importance on a dynamic approach to strategy formulation (66.6%).

Based on these results, the relationship between both dynamic and formal approaches to strategy formulation with respect to the performance of high-tech SMEs is significant and positive (r = .370). Additionally, the correlation between both dynamic and formal approaches to strategy formulation within high-tech SMEs is significant and positive (r = .363 and r = .118). However, as previously described, the kind of questions relating to the strategy formulation approach is Symantec; this means that the rating of a formal approach to strategy formulation is in the opposite direction. So, the positive sign of the correlation coefficient demonstrates a negative relationship between formal strategy formulation and SMEs performance (Figure 6-7).

Figure 6-7: Correlation between approaches to strategy formulation and performance of SMEs



The association between a dynamic approach to strategy formulation and high-tech SMEs performance is positive; this means that changes are in the same direction. In other words, by giving more importance to dynamic strategy formulation, the performance of SMEs is improving. This result confirms the claim of Andersen and McAdam (2004) and Bititchi et al. (2010) that dynamic strategy formulation is an effective approach in a dynamic environment, such as in high-tech industries. This is consistent with some scientists such as; Ansoff (1991), Mintzberg (1994), Sminia (2009), Robertson (2009), Brinckmann et al. (2010), who stated that strategists who wished to achieve higher levels of performance in their companies changed their task to become strategy finders and knowledge generators, because one of the indicators of a dynamic approach to strategy formulation is a knowledge-based view to the formulation of strategy, particularly in high-tech industry. Moreover, this result is consistent with Feurer and Chaharbaghi (1997), Henderson et al. (2005), Sardana (2007), Wanjare (2008) who claimed that high performance in dynamic environments, such as high-tech industries, is a characteristic of SMEs and is constantly pursued through a process of change, in line with changes in the competitive environment, the values of the organisation and its capabilities.

One of the features of a dynamic approach to strategy formulation is that it is constantly seeking to change, which, according to the results, has a positive association with the performance of high-tech SMEs. In addition, Venkatraman (1989), Calantone et al. (2003), Patel and D'Souza (2009) and Pett and Wolff (2010) defined the behaviour of competitive proactiveness as seeking new opportunities, which may or may not be related to the present line of operations. Therefore, it can be concluded that competitive proactiveness behaviour is one of the prerequisites of a dynamic approach to strategy formulation.

The relationship between a formal approach to strategy formulation and the performance of high-tech SMEs, according to the results, is negative. In other words, by changing from a formal strategy formulation approach to a dynamic approach, the performance of SMEs decreases. Every SME wants to maximise performance, hence, according to this view, a formal approach to strategy formulation is not working for high-tech SMEs. It is clear that movement from a formal towards a dynamic approach to strategy formulation is gradually taking place. As stated in the literature, in an ambiguous and rapidly changing environment, formal strategy formulation needs to be continuous. This process of continuity increases organisational knowledge, flexibility and adaptation, which are the aims of strategy (Van der Heijden, 1996, Smith, 2011).

Some managers stated that a formal strategy approach is needed for a top-down approach in an organisation, (Acur et al. 2003; Acur and Englyst, 2006; Sirmon et al., 2011); this view leads to the exclusion of some staff and managers from the process of strategy formulation in the company. As it is a continuous formal strategy formulation process that leads to dynamic strategy formulation, this requires all members and managers to participate. They must work

together to improve the flexibility of SMEs (Bechtold, 1997; Theodoridis and Bennison, 2009; Kloviene and Gimzauskiene, 2009; Nikora, 2010) in order to improve the level of performance in high-tech industries.

Regarding written or unwritten types of strategy, O'Regan and Ghobadian (2002) and Bellamy (2009), found that there is a positive association between high performing SMEs and a written strategy, but the result in this current study shows that there is a negative association between written strategy and SMEs performance. This difference is probably because O'Regan et al. (2002) and Bellamy (2009) did not differ the industries in their study, but it is clear that in high-tech SMEs, greater emphasis on written strategy can lead to decreased performance.

It has been mentioned by O'Regan et al. (2002) that formal strategy formulation helps to eliminate potential barriers. Perhaps this feature of a formal approach to strategy formulation in low-tech industries is working, but surely, in high-tech industries, based on the results, this is not working. This approach to strategy formulation gives a follower role to high-tech SMEs (Baumard, 1991; Olamade, 2011; Franco et al., 2011) that leads to low performance in SMEs; instead high-tech SMEs need to find opportunities to avoid losing market share and they need to maintain or improve their level of performance.

6.4. Strategy Formulation Model

According to the strategic management model (Karami, 2007, Johnson et al., 2011), research questions and hypotheses, a strategy formulation model is designed. By correlation

analysis, the relationship between strategy formulation factors and the performance of SMEs is identified. To identify the cooperation of strategy formulation factors in a model and their relation with the performance of high-tech SMEs, regression analysis is performed.

Multiple regression analysis tested the strategy formulation model in order to ascertain factors which are related to SMEs performance. According to the results of the regression model, all the factors of the strategy formulation variables are linearly related to the performance of SMEs. In addition, the regression results indicate that the model is significant (F-value = 195.424, p =.000) and 75.4% of the variation in the SMEs performance is explained by independent variables ($R^2 = 0.754$).

All the variables of the strategy formulation model are positively and significantly related to SMEs performance. In descending order they are, knowledge-based view ($\beta = 0.690$, $p < 0.05$), type of strategy ($\beta = 0.251$, $p < 0.05$), environmental scanning ($\beta = 0.233$, $p < 0.05$), mission statement ($\beta = 0.053$, $p < 0.05$) and strategy formulation approach ($\beta = 0.034$, $p < 0.05$). The highest value of the variance inflation factor (VIF = 3.153 < 10) suggests there is no serious multicollinearity problem in the model (Pallant, 2007). Figure 6-8 shows the beta value for each factor of the strategy formulation model.

The results show that, the designed strategy formulation model with all its factors can lead to improvements in high-tech SMEs. Out of all the factors, the knowledge-based view has the highest positive impact on performance. This indicates that high-tech SMEs should stress the

knowledge of their company, both explicit and tacit. Surely, if they can change explicit knowledge to implicit, they will have even more success.

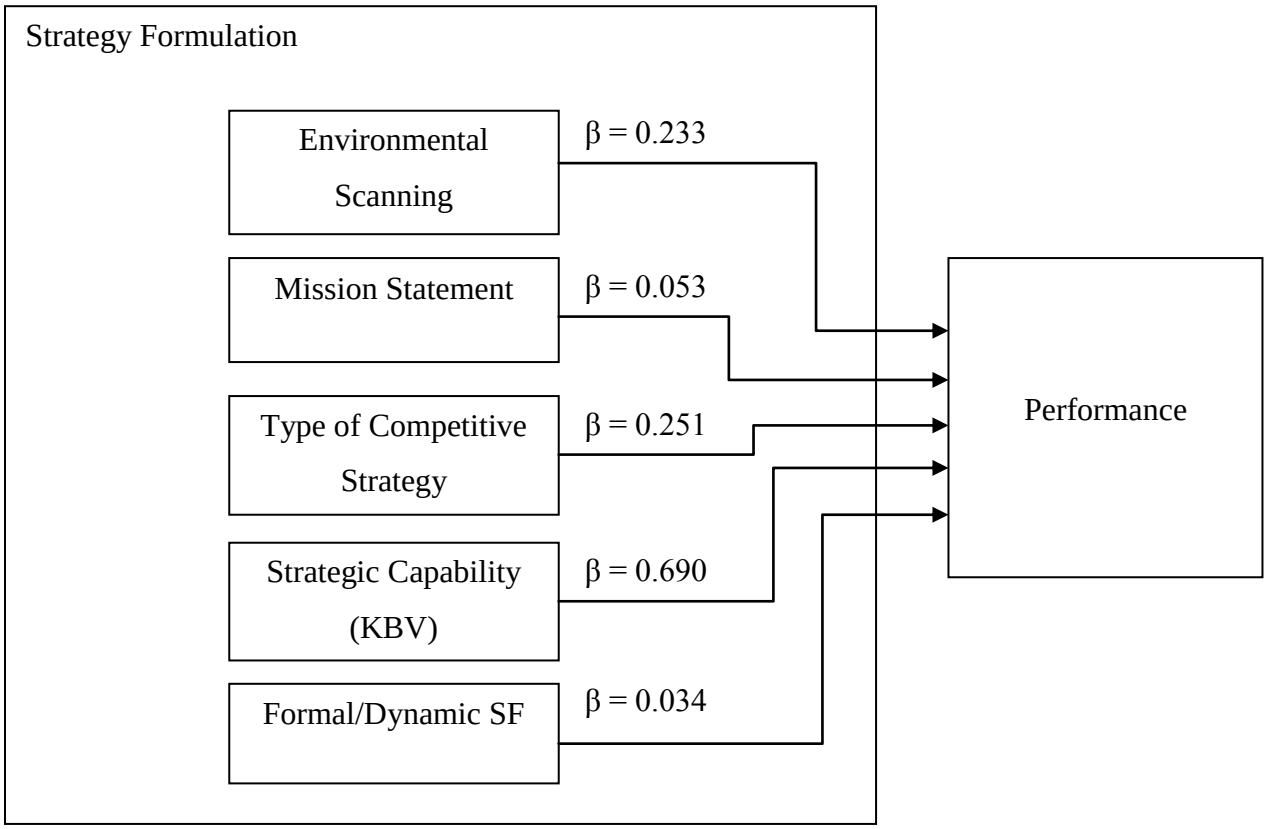
The type of competitive strategy is the factor that has the second greatest positive impact on the performance of high-tech SMEs. As described, differentiation-focus is the only attractive type of generic competitive strategy for improving the performance of high-tech SMEs. Therefore, high-tech SMEs, by giving more importance to a differentiation-focus type of competitive strategy can achieve greater performance.

The third factor, which positively affects the performance of SMEs in this model, is environmental scanning. Certainly, due to the ambiguities and uncertainties in the high-tech environment, continuous scanning of the environment can increase performance more effectively than other types of scanning.

Mission statement can have a positive impact on the performance of high-tech SMEs. By placing more emphasis on the measurable elements of a mission statement, high-tech SMEs can improve their performance.

The approach to strategy formulation is the last factor of this strategy formulation model and it has the least positive impact on the performance of high-tech SMEs, especially as giving more importance to a dynamic strategy formulation approach can help high-tech SMEs to achieve better levels of performance.

Figure 6-8: Strategy formulation model and influence of factors on performance of SMEs



Source: compiled by author

6.5. Summary

In this chapter, research questions and hypotheses based on the results and on the literature review have been discussed. These discussions were split into three sections.

The first section was a general discussion on the demographic and the strategic management profile of high-tech SMEs. In this section, the demographic characteristics of high-tech SMEs were discussed such as age, size, the position of respondents and so on. Discussion regarding the profile of strategic management in high-tech SMEs mostly concentrated on the match between

the foreseeing period, the strategy formulation period and the duration of revising formulated strategies. In addition, the interval between the formulation and implementation stages of strategic management was discussed.

The second section included separate discussions regarding six research questions and related hypotheses. In each part of this section, every research question, based on the results of this research and the findings of past research was discussed. Some of the results of past research were compatible with the results of this research. Most of the previous findings were concluded to be from different types of companies such as LEs or low-tech industries, so similarities only related to the compatibility of results.

With respect to the results of previous studies, some of the previous findings, according to the literature review went against the results of this study, or, in other words, those results were not reconfirmed and matched with the results of this study. The many reasons for this are specifically discussed. However, the most important reasons are the different approaches to strategy and the kind of sample firms selected for the study.

The third section of this chapter is a discussion about the designed strategy formulation model according to the results of multiple regression analysis. In this section, the effect of each model on the performance of high-tech SMEs is discussed. In addition, the amount of change in performance per unit change in factors of the designed strategy formulation model in high-tech SMEs is discussed.

The following chapter presents the findings of the research and the implications for theory and practice. Additionally, the limitations of this study and suggestions for future research regarding to strategy formulation in high-tech SMEs is presented.

Chapter 7

Conclusion

13.1. Introduction

This chapter presents the findings of the research and its implications for theory and practice. Additionally, the limitations of the study and some suggestions for future research relating to strategy formulation in high-tech SMEs are presented.

13.2. Major Findings

The aim of this research is to develop a strategy formulation model for high-tech SMEs in the UK. The research questions cover six factors relating to an effective strategy formulation model:

Q1. What is the influence of different types of environmental scanning on the SMEs performance?

Q2. What is the effect of mission statement on the SMEs performance?

Q3. What is the relationship between the types of competitive strategy and SMEs' performance?

Q4. Is there any relationship between a knowledge-based view (KBV) to the formulation of strategy and the SMEs performance?

Q5. What is the relationship between the characteristics of SMEs and their strategy formulation approach?

Q6. What is the association between different approaches to strategy formulation and SMEs' performance?

7.2.1. Type of Environmental Scanning and its Impact on Performance

The relevant literature presents a variety of types of environmental scanning. The typology of environmental scanning varies based on generic or informational views. To date, research on environmental scanning has tended to focus on the general side of scanning rather than on an informational view. The general side of environmental scanning pays attention to the environmental behaviour of internal factors of an organisation, whereas, to explore the relationship between the type of environmental scanning and a firm's performance. SMEs need to adopt an informational approach to environmental scanning rather than simply monitoring general data. So, to this end the typology of Fahey et al. (1981), who carried out a major study into the types of environmental scanning with an informational view, has been used. It should also be noted that the performance of high-tech SMEs can be classified into three levels: low, moderate and high.

Correlation analysis between irregular, periodic and continuous types of environmental scanning and the performance of SMEs shows that there are positive associations between an irregular type of environmental scanning and the low performance of SMEs, a periodic type of environmental scanning and the moderate performance of SMEs and a continuous type of environmental scanning and the high performance of SMEs. To conclude, greater persistence with regard to discipline and continuity in environmental scanning is needed, particularly in

high-tech industries; using more advanced prediction tools and methodologies for longer-term horizons can change environmental information into knowledge about the environment and that can lead SMEs toward a better level of performance.

7.2.2. Mission Statement and its Impact on Performance

A review of relevant literature shows that mission statement is important for SMEs for two major reasons. Firstly, without effective mission statement, development formulation, implementation and evaluation of strategy are futile, because simply by having an obvious and correct description of an organisation's missions and targets can be an effective way of developing realistic strategies. Secondly, appropriate mission statement can offer a standard for optimal allocation of corporate resources. However, another matter concerning mission statement, which is open to debate, is its contents and their impact on a firm's performance. Many researchers have conducted research into the contents of mission statement and their relationship with the performance of SMEs. In this research, the content of mission statement is divided into two main categories: measurable and non-measurable, and while studying the overall impact of mission statement on the performance of high-tech SMEs, the influence of each component of a mission statement on the performance of SMEs is reviewed.

The correlation between mission statement and the performance of high-tech SMEs shows that there is a significant and positive relationship between them ($r = .607$). The measurable elements of mission statement have a significant and positive relationship with the performance of high-tech SMEs ($r = .511$); but, on the other hand, the relationship between non-measurable elements

of the mission statement and the performance of SMEs is significant and negative (r = .415). Although the relationship between non-measurable elements of mission statement and the performance of SMEs seems positive, because of the type of question, which is Symantec, the rating of non-measurable elements is in the opposite direction, or in other words, the positive sign of the correlation coefficient indicates a negative relationship between non-measurable elements of mission statement and the performance of SMEs.

7.2.3. Types of Competitive Strategy and Their Impact on Performance of SMEs

According to the relevant literature, the best model, so far, has classified the competitive strategies into three generic competitive strategies (1985). This model helps us to understand how we can achieve competitive advantage and how we can generalise about the relative position of individual firms within an industry. This model recognises two basic types of competitive advantage, which a firm can utilise: cost leadership or differentiation. A combination of these two basic types of generic competitive strategy and the scope of activities a firm seeks to achieve lead to a third type of generic competitive strategy which is niche or focus: cost leadership-focus and differentiation-focus.

The results show that the vast majority of high-tech SMEs (95%) are using focus types of competitive strategy. This result, using descriptive analysis, indicates that non-focus cost leadership and differentiation are not attractive to high-tech SMEs in the UK. The correlation between generic types of competitive strategy and differentiation-focus with high-tech SMEs

performance is significant and positive. However, the relationship between a cost leadership-focus type of competitive strategy and the performance of SMEs is significant and negative. Therefore, the only competitive strategy which is attractive for high-tech SMEs, and which can improve the level of their performance, is differentiation-focus.

7.2.4. Knowledge-Based View to Strategy Formulation and its Influence on Performance of High-Tech SMEs

Knowledge is defined as awareness, consciousness or familiarity gained by experience or learning (Nonaka et al., 2000). In a complex and dynamic environment, such as a high-tech industry, organisations that are able to create and integrate knowledge better than their competitors are likely to gain advantage. Two important types of knowledge are explicit and tacit. Explicit knowledge is a kind of knowledge that is transmitted in formal systematic language. In contrast, tacit knowledge is personal, context-specific and therefore hard to formalise and communicate (Nonaka and Takeuchi, 1995). Scientists argue that truly innovative companies are the ones that can modify and enlarge the knowledge of individuals to create a "spiral of interaction" between tacit and explicit knowledge through the four processes of the Socialization–Externalization–Combination–Internalization (SECI) model (Nonaka and Takeuchi, 1995; Johnson and Scholes, 2002; Lynch, 2003).

Based on the results of descriptive analysis, 68.3% of SMEs are emphasising the importance of a KBV in their companies. This means that the vast majority of high-tech SMEs use a KBV when they are formulating their strategy. Additionally, descriptive analysis of processes of the SECI

model shows conversion between tacit and explicit knowledge in high-tech SMEs is important for them, and they are using this model to attain better results in their company. The correlation between a KBV to strategy formulation and the performance of SMEs is significant and positive.

7.2.5. Characteristics of SMEs and Their effect on the Strategy Formulation Approach

A mixture of dimensions and elements when forming a strategy can reflect a firm's approach to strategy formulation (Dess and Lumpkin, 2001). Dimensions and elements of strategy formulation are a mixture of quantity, e.g. age, size, and quality characteristics, e.g. the type of leadership and the kind of environment. Based on these characteristics, two main types of strategy formulation approach are developed: formal and dynamic.

The results show the correlation coefficients between the age and size of SMEs and their dynamic strategy formulation are significant and negative. This means, by increasing the age and size of SMEs, dynamic approaches to strategy formulation will be less important for them or in other words, SMEs are moving away from dynamic strategy formulation.

On the other hand, the relationship between the age of SMEs and their formal strategy formulation is significant and negative. However, because the type of question in this regard is Symantec, this means that the rating of a formal approach to strategy formulation is in the opposite direction. Therefore, the negative sign of the correlation coefficient indicates a positive

relationship between the age of SMEs and their formal strategy approach. The effect of changes in size of SMEs on a formal approach to strategy formulation has not been confirmed.

Thus, by increasing the age of SMEs, their tendency towards formal strategy formulation is increasing, or in other words, by increasing the age of the SMEs, they are moving away from a dynamic approach towards a formal approach to strategy formulation. Regarding the relationship between the size of high-tech SMEs and their performance, it has just been confirmed that, by increasing the size of SMEs, they are moving away from dynamic strategy formulation, which does not mean they are giving more importance to a formal approach to strategy formulation.

7.2.6. Strategy Formulation Approaches and Their Impact on Performance of SMEs

Based on the relevant literature, some characteristics of formal strategy formulation are: external orientation (a view from outside to inside), a resource-based view, using strategy as a control mechanism, strategy for the elimination of potential barriers, a written document and an instrument for staff creativity (O'Regan and Ghobadian, 2002). In addition, it is also stressed that a formal strategy formulation process, as a continuous process, needs to be updated with the participation of all members of the organisation. Members of the organisation who have different knowledge, skills and experience can develop an organisation's strategy-making process. However, ultimately, continuous formal strategy formulation leads to a dynamic approach to strategy formulation.

A dynamic strategy formulation approach is considered effective in dynamic environments (Andersen, 2004). In dynamic environments, the task of the strategists in organisations has changed so now they have become strategy finders, knowledge generators and organisers of change instead of planners and creators of strategy. An effective dynamic approach to strategy formulation depends on two key infrastructures: firstly, a strong internal environment that presents a high degree of constancy whilst at the same time offering a high level of flexibility to respond quickly to external changes; secondly, qualified organisation learning mechanisms and a knowledge-based view in the organisation.

The results of descriptive analysis show that two-thirds of high-tech SMEs are placing more importance on a dynamic approach to strategy formulation (66.6%).

Based on these results, the relationship between approaches to strategy formulation and the performance of high-tech SMEs is significant and positive. Additionally, the correlation between both dynamic and formal approaches to strategy formulation within high-tech SMEs is significant and positive. However, the kind of questions that relate to strategy formulation approaches is Symantec; this means that the rating of formal approaches to strategy formulation is in the opposite direction. Therefore, the positive sign of the correlation coefficient demonstrates a negative relationship between a formal strategy formulation and the performance of SMEs.

7.2.7. Strategy Formulation Model and its Influence on Performance of High-Tech SMEs

Based on the strategic management model (Karami, 2007), research questions and hypotheses, a strategy formulation model is designed. By correlation analysis, the relationship between strategy formulation factors and the performance of SMEs is identified. To identify the cooperation of strategy formulation factors in a model and their relation with the performance of high-tech SMEs, regression analysis is performed.

The strategy formulation model includes five factors: environmental scanning, mission statement, the type of competitive strategy, a knowledge-based view to strategy formulation and the approach to strategy formulation. After running multiple regression analysis, the result shows that all five factors of the strategy formulation model significantly and positively have an impact on the performance of high-tech SMEs. In descending order, a knowledge-based view has the greatest and a strategy formulation approach has the least influence on high-tech SMEs in the UK. Additionally, this strategy formulation model and its factors are able to interpret 75% of the changes in high-tech SMEs.

7.3. Theoretical Contributions

- The literature reveals a number of variables in examining the typology of environmental scanning and its impact on a firm's performance. Studies can be divided into two categories,

each containing two dimensions: generic and informational. Most of the research into environmental scanning has so far tended to focus on scanning in general terms, rather than adopting an informational view in order to examine the actual monitoring behaviour. By thinking in general terms about the typology of environmental scanning, we will only be able to gather information about the scanning behaviour of managers, such as: "Tell us how often you generally receive useful information from external written sources" (Daft, et al., 1988, p. 129) or "Rate the approximate frequency with which each type of information comes to your attention" (Hambrick, 1982, p. 172). An informational view of the types of environmental scanning was instigated by Aguilar (1967). He stated that there are four types of environmental scanning: Unpredicted viewing, Conditioned viewing, Informal search and Formal search, which are carried out according to the complexity of environmental scanning. Jain (1984) carried out further studies from this viewpoint. He identified four phases according to one's awareness of the importance of environmental scanning and subsequent methods for scanning the environment: Primitive phase, Situational phase, Reactive phase and Proactive phase. However, the type of environmental scanning used by this study is based on, Fahey, et al. (1981), who classified environmental scanning into three types irregular, periodic and continuous, with a combination of general and informational perspectives. This study examines the types of environmental scanning and their effects on a firm's performance in high-tech SMEs in the UK, and, to date, this kind of study has not been carried out in any other related research. Factors such as the motivation for environmental scanning, the scope of scanning, the temporal nature of environmental scanning, the types of forecasts and forecasting methods and their impact on high-tech SMEs have been studied.

- Regarding the role of mission statement in high-tech firms, one of the best studies that has been carried out is Bart's (1996), in which he concluded that the differences between high and low-tech firms' mission statement can be shown in three axes: "definition of success; definition of the firm's business and selected behaviour standards" (p. 221). He referred to the relationship between mission statement and performance in high-tech SMEs. Toftoy and Chatterjee (2004) believe that having a mission statement is among the first necessities of SMEs, if they wish to improve their performance. However, O'Gorman and Doran (1999) believe there are no considerable distinctions between the contents of mission statement in high performance and low performance SMEs. There are two major shortcomings in this regard as all of these studies consider mission statement in general terms and they do not focus on the elements of the mission statement in relation to the performance of SMEs; in these studies, they have only considered financial gain. This particular study has investigated the relationship between measurable and non-measurable elements of a mission statement in relation to the overall performance of high-tech SMEs in the UK.

- Many studies such as Porter (1985) and Karami (2007), claim that the most attractive competitive strategy in SMEs is focus: cost leadership-focus and differentiation-focus. Also some researchers, such as Caloghirou (2004), investigated the type of competitive strategy and the SME's profitability or, in other words, its financial performance. This study contributes to the literature regarding the relationship between generic competitive strategies and a firm's performance, particularly in high-tech SMEs in the UK.

- A knowledge-based view (KBV) to a strategy formulation model and its impact on the performance of high-tech SMEs has been developed in this study. Sparrow (2000) theoretically reviewed the literature regarding a KBV and achieved this result; that the dynamic environment of SMEs creates a considerable need to pay attention to organisational learning processes alongside knowledge storage, access and transfer, but this current study finds the same result in action and within a quantitative study. Additionally, McEvily, et al. (2002) studied the association between a knowledge-based view and a low-tech firm's performance but their findings can be extended to include high-tech SMEs as well, according to the results of this current research.

- The literature shows that a combination of dimensions and elements are used when forming a firm's strategy and these reflect the firm's approach to strategy formulation (Dess and Lumpkin, 2001). Dimensions and elements of strategy formulation are mixture of quantity, e.g. age, size, and quality characteristics, e.g. the type of leadership and the kind of environment. So it is clear that, approaches to strategy formulation, on one hand, are affected by the size and age of a company, and on the other hand, they can affect the firm's performance. However, these relationships had not been investigated previously in the literature.

Regarding the relationship between the life cycle of a firm and its approaches to strategy formulation, many studies have been conducted. The most important of these studies are Aitken, et al. (2003), Chen, et al. (1995) and Lumpkin, et al.(2001). Some of these studies were carried out in low-tech companies (Aitken, et al., 2003) and most of them were carried

out in all sizes of company. This study specifically investigates the relationship between the age and size of companies and their approaches to strategy formulation in high-tech SMEs in the UK.

Concerning the impact of strategy formulation approaches on a firm's performance, dynamic and formal approaches to strategy are identified by factors such as strategy orientation, view to strategy, control mechanism, strategic outlook and written or unwritten strategy. Andersen (2004) stated that dynamic strategy formulation is an effective approach in a dynamic environment, but he carried out his research in the food industry. In addition, Ansoff (1991) and Mintzberg (1994) pointed to the changed task of strategists in firms as now being one of strategy finders and knowledge generators. As the food industry is not listed in the high-tech sector by the OECD's definition, so the results of this study (Andersen, 2004) are not valid for high-tech industries such as the biotechnology and pharmaceutical industry. This study shows the relationship between a dynamic approach to strategy formulation and a firm's performance, particularly with regard to high-tech SMEs in the UK.

The literature implies that continuity is required for formal strategy formulation, especially in ambiguous and rapidly changing environments such as the high-tech sector; this process of continuity increases organisational knowledge, flexibility and adaptation, which are the targets of strategy (Van der Heijden, 1996). This current research, which investigates the relationship between formal strategy formulation and the performance of high-tech SMEs, has tried to develop the literature in this regard.

7.4. Practical Implications

– The identified strategy formulation model indicates that activities relating to strategy formulation in high-tech SMEs are knowledge oriented in all areas and strongly associated with understanding the business environment. In other words, more business managers need to be aware of any changes taking place in business environment. The lack of knowledge about changes within the business environment may result in losing the opportunities in the market. Therefore, the SMEs managers need to analyse the factor influencing their business performance constantly.

– The SMEs managers need to revise their business plans and how to implement them on regular bases. This will help them to cope with unexpected changes in business environment. The result of this research indicates that the long-term planning and strategy review in the biotechnology and pharmaceutical industry is for between one and three years, however to achieve better results formulated strategies should be implemented within six months. In other words, the practitioners of high-tech SMEs who adopt the practice of continuous evaluation and monitoring of their business environments can increase their performance.

– The mission statement is undoubtedly one of the most important factors of strategy formulation. Based on these results, the measurable elements of a mission statement have more impact on the performance of high-tech SMEs. In order to develop a meaningful mission statement, the practitioners should put more emphasis on the following measurable factors on the content of the mission statement:

- Specific financial objectives
- Specific offered products
- Specific served market
- One big goal for high-tech SMEs
- Unique competitive position

– The results of the study show that choosing an appropriate competitive strategy will lead to improved level of performance and practitioners can learn from this research the correct strategy to adopt. The results show that a small number of high-tech SMEs are employing non-focus competitive strategies. The vast majority of firms are using strategies, cost leadership-focus and differentiation-focus. The relationship between differentiation-focus and performance of SMEs is positive. This means high-tech SMEs should focus on a narrow area of the market as well as on a specific range of product for better performance.

– The model of strategy formulation developed for this research enables practitioners to adopt a knowledge-based view. Based on the result of this study the learning point for practitioners to enhance the business performance are as follow:

- Personal interaction and face-to-face meeting with customers
- Formal inter-team discussion about customer needs and analysis these needs
- Systematic distribution of customer needs knowledge in the organisation
- Formal inter-team discussion about technologies in the organisation and assessment of technical and technological requirements

- Systematic distribution of technical knowledge
- Informal meetings in the organisation
- Collective decision making processes
- Formal business and technical education
- New production practices

– The results show that the relationship between the age and size of high-tech SMEs in relation to their performance is negative. Hence, by expanding the size of SMEs from micro to small and small to medium they are moving away from a dynamic toward formal approach to strategy formulation. In addition, this is found that by increasing the age of high-tech SMEs they are moving away from a dynamic toward formal approach to strategy formulation. It can be suggested to the practitioners to establish more informal strategic management approach to enhance their business performance.

– The results show that, the relationship between strategy formulation approaches and performance of high-tech SMEs are significant. These associations confirm that giving more importance to dynamic approach to strategy formulation can increase performance of high-tech SMEs, or in other words, high performance SMEs place more emphasis on a dynamic approach to strategy formulation instead of a formal approach to that.

7.5. Limitations of Study

- One of the limitations of this study was that the opinions on strategy formulation were sought only from the managers. This replicates prior research is considered to give an accurate overview of the firm, its strategy formulation process and performance (Snow and Hrebiniak, 1980; Bowman and Ambrosini, 1997; Nandakumar et al., 2010; Kunc and Bandahari, 2011). Zahra and Covin (1993) and Kunc and Bhandari (2011) argue that it is justifiable to use an organization's CEO as a single source of information if the business is either small, specialized or not diversified. The argument being that, in these cases, the CEO is likely to be very conversant with the strategy of his/her organization (Bowman and Ambrosini, 1997; Nandakumar et al., 2010; Kunc and Bhandari, 2011). Since almost all, the respondents in this study are managers of high-tech SMEs the information they have provided about the strategies of their organisations can be considered to be accurate. This approach is extensively used in strategic management research (Nandakumar et al., 2010; Kunc and Bhandari, 2011).

- The second limitation of this study was how to measure the SMEs performance. For this reason a wide range of performance measurement systems have been reviewed and finally the balanced scorecard (BSC) as a widely used performance measurement system has been selected. The balanced scorecard (BSC) as a performance measuring-model has many advantages compared to other models, due to the combination of qualitative and quantitative indicators in this model, but one of the limitations of this performance-measuring model is self-reporting performance evaluation. To carry out the BSC in

SMEs, managers should evaluate the performance of their company relating to perspectives of the BSC: customer, learning and growth, financial and, internal business processes. Access to financial information about LEs regarding the financial perspective of the BSC is possible, but, in SMEs, access to this information is dependent on the response of managers. Fortunately, the results of reliability analysis show that managers of the studied high-tech SMEs honestly and carefully evaluated all perspectives of their performance.

- The absence of a compiled list, which contains information about biotechnology and pharmaceutical companies across the UK, was another limitation of this study. To overcome this limitation, information regarding biotechnology and pharmaceutical SMEs was collected from lists of tenants in each Science, Innovation or Biotechnology Park and from the list of members of biotechnology and pharmaceutical associations across the UK. These include over 133 websites.

- Using scientific and professional terms in the questionnaire seemed to be a limitation for some managers, especially those without academic degrees in management, such as the managers of biotechnology and pharmaceutical SMEs who, in this profession, mostly have biology and medical degrees. To solve this limitation, some technical terms were reworded to make them understandable and to avoid reducing the response rate.

- As the life sciences industry has grown over recent years, the sector classification of pharmaceutical, biotechnology and medical technology has become increasingly difficult.

Similarly, as can be seen, the Standard Industrial Classification (SIC) codes used by the Office for National Statistics (ONS) do not provide a comprehensive picture of the life sciences industry and its specialist support organisations. Although the SIC coding has a precise definition of all sorts of biotechnology and pharmaceutical companies in the UK, based on this classification, diagnosis between low and high-tech firms was difficult.

7.6. Suggestions for Further Research

- The sample population in this study is limited to SMEs operating in the biotechnology and pharmaceutical industry. In order to investigate and capture a full picture of strategy development in SMEs, further studies could attempt to expand the sample to cover all others industries in SMEs sector.

- In this research, the main focus was to investigate strategy formulation in SMEs. Since the strategic management process includes formulation as well as implementation of strategy, a further research can be carried out to explore the notion of strategy implementation in high-tech SMEs. For instance, an investigation into the leadership, information technology (IT), and human resources strategies by successful SMEs would yield interesting result.

- This study focused on exploring the CEOs perception of the strategy formulation in high-tech SMEs. A number of further studies could be carried out to study the relationship

between the whole process of strategic management, strategy formulation and implementation, in SMEs sector.

7.7. Summary

In this chapter, the major findings, the contribution of the study to theory and practice, the limitations of the study and some suggestions for further research have been discussed.

The first section of this chapter concluded the findings of this research in the areas of environmental scanning, mission statement, generic competitive strategies, a KBV and strategy formulation approaches and their relationship with the characteristics of high-tech SMEs and their performance.

In this chapter of the study, limitations of the research have been discussed. Most of these limitations are in the outer limits and most are related to data collection, such as a lack of official databases and quantitative and identifying information about SMEs.

In the last section of this chapter and of this research, some suggestions for further and future study are given. Some suggestions relate to new topics for future study, and others relate to different techniques for further study regarding the relationship between strategy formulation and the performance of high-tech SMEs.

Appendices

Appendix A-1: Covering Letter for the Questionnaire (PhD Candidate)

YSGOL BUSNES BANGOR
BANGOR BUSINESS SCHOOL

PRIFYSGOL
BANGOR
UNIVERSITY

25/Jan/2011

The General Manager

Dear Sir/Madam

I am PhD student at Bangor Business School undertaking research into "Strategy Formulation framework in SMEs: the case of high tech industry in the UK".

I am currently researching with a view to assessing the overall affect of strategy and its formulation on SMEs performance. I am hoping to assess a good framework for formulation of strategy in SMEs to introduce excellent performance for them.

To assist with my research I am using a questionnaire to gather the required information and would like to invite you to participate.

I would like to emphasize that your participation is very important for the researcher. The result of this research will be presented in aggregate form, and in such a way that no single respondent can be recognized.

Please note that all information gathered in this survey will be held in the strictest confidence, and will never be disclosed to a third party. More specifically, the gathered data will be used solely for academic and scientific purposes.

I enclosed a copy of the questionnaire and would be grateful if you would complete it and return it in the enclosed stamped addressed envelope.

If you would like any additional information or clarification then please do not hesitate to contact me by the following ways:

By post at the below address
By telephone: 01248-388869 (Office), 07527986963 (Mobile)
By E-mail: h.izadi@bangor.ac.uk

I would like to thank you in advance for participation in this research.
Yours truly,

Hossein Izadi

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YR ATHRO / PROFESSOR PHILIP MOLYNEUX
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Appendix A-2: Covering Letter for the Questionnaire (Supervisor)

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The General Manager

January 25, 2011

Dear Sir/Madam

Re : Mr. Hossein Izadi's Doctoral Research

I have the pleasure of informing you that Mr. Hossein Izadi is carrying out a research for his PhD on "Strategy Formulation in Small and Medium Enterprises (SMEs)" at the Bangor Business School, Bangor University, UK.

Your firm has been selected, from among all firms operating in the sector, to take part in this research. I would like to emphasize that your participation is very important for the researcher. The result of this research will be presented in aggregate form, and in such a way that no single respondent can be recognized. Please note that all information gathered in this survey will be held in the strictest confidence, and will never be disclosed to a third party. More specifically, the gathered data will be used solely for academic and scientific purposes.

Hossein is an able and committed researcher. He had completed a number of researches for various organizations in the UK and overseas. I am confident that he will conduct the research according to the highest professional standards and I will be most grateful if you can facilitate the process by giving your support. Your approval will be highly appreciated.

I would like to take this opportunity to thank you in advance for your approval and assistance. Please do not hesitate to contact me if you require further information.

Yours sincerely

Dr. A. Karami

Academic Supervisor
The Director of the PhD Programmme in Business and Management

YSGOL BUSNES BANGOR
BANGOR BUSINESS SCHOOL
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Appendix B: Questionnaire

1. General Information

My name is Hossein Izadi. I am a PhD student at "Bangor University,Business School" undertaking research into the Strategy Formulation Process by High Tech SMEs in the UK. The research will assist in analysing some variables for better performance in SMEs. The result of this research will be presented in aggregate form, and in such a way that no single respondent can be recognized. Please note that all gathered data will be used solely for academic and scientific purposes.

1. What is the name of your company? (Optional)

2. Where is your company based?

- ◯ Science or technology park
- ◯ Based on its own
- ◯ Other (please specify)

3. What is your job position?

- ◯ CEO/Senior Manager
- ◯ Middle manager
- ◯ Supervisor
- ◯ Other (please specify)

4. Do you consider your company to be a high-tech company?

◯ Yes ◯ No

5. How many employees do you have?

◯ 1 to 9 ◯ 10 to 49 ◯ 50 to 249 ◯ 250 or more

6. How many years has this company been in operation?

◯ 1 to 5 ◯ 6 to 10 ◯ 11 to 15 ◯ 16 to 20 ◯ +21

2. Type of the market and other competitors monitoring

Please select one of the factors in each question and indicate its importance to achieving excellent performance when you are employing market and competitors monitoring.

Appendix B: Questionnaire

7. What is your motivation for monitoring your market and competitors?

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely important
Crisis-initiated	○	○	○	○	○
Problem solving	○	○	○	○	○
Opportunity finding	○	○	○	○	○

8. According to which below events do you employ monitoring your market and competitors?

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely important
Specific events	○	○	○	○	○
Selected events	○	○	○	○	○
Broad range of environmental systems	○	○	○	○	○

9. Which time-frame do you use when monitoring your market?

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely important
Retrospective	○	○	○	○	○
Current & retrospective	○	○	○	○	○
Current & prospective	○	○	○	○	○

10. Which time-frame do you consider when analysing how your decisions impact on the company?

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely important
Short term (< = 1 year)	○	○	○	○	○
Middle term (+ 1 to 3 years)	○	○	○	○	○
Long term (+ 3 years)	○	○	○	○	○

11. Which types of forecast do you employ when you are monitoring your market and competitors?

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely important
Budget oriented	○	○	○	○	○
Economic and sales oriented	○	○	○	○	○
Political, economical, social, technological, environmental, legal oriented	○	○	○	○	○

12. Which forecasting method do you use for monitoring your market and competitors?

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely important
Simplistic data analysis	○	○	○	○	○
Statistical forecasting method	○	○	○	○	○
Many "futuristic" methodologies	○	○	○	○	○

3. Mission statement

Appendix B: Questionnaire

Please mark a number on each question to indicate your emphasis on following factors which influence your company to achieving excellent performance.

13. We focus on specific non-financial objectives for our company=1.2.3.4.5.6.7=We focus on specific financial objectives for our company

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Objectives	○	○	○	○	○	○	○

14. We focus on general definition of production for our company=1.2.3.4.5.6.7=We focus on specific product for our company

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Production definition	○	○	○	○	○	○	○

15. We concentrate on general market definition for our operation=1.2.3.4.5.6.7=We concentrate on specific market for our operation

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Market definition	○	○	○	○	○	○	○

16. We focus on general goals for our company=1.2.3.4.5.6.7=We focus just on one big goal for our company

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Company goal	○	○	○	○	○	○	○

17. We are looking for general competitive position in our market=1.2.3.4.5.6.7=We are looking for unique competitive position in our market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Competitive position	○	○	○	○	○	○	○

4. Type of competitive strategy

18. We compete with our competitors according to.....strategy.

○ Lower cost ○ Higher quality

5. Cost leadership strategy

Please answer question 19 or 20.If you selected "Lower cost" in question 18 please answer question 19 or if you selected "Higher quality" in question 18 please answer question 20.

19. According to your lower cost competitive strategy, please select the importance of the following factors to achieve excellent performance.

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely Important
Unit cost reduction	○	○	○	○	○
Change production process	○	○	○	○	○
Overhead cost control	○	○	○	○	○
Operating efficiency	○	○	○	○	○
Raw material cost	○	○	○	○	○

Appendix B: Questionnaire

6. Differentiation strategy

20. According to your higher quality competitive strategy, please select the importance of the following faetors to achieve exeellent performanee.

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely Important
Refine products	○	○	○	○	○
Manufacturing innovations	○	○	○	○	○
First to new product	○	○	○	○	○
R&D	○	○	○	○	○
Compete by quality	○	○	○	○	○

7. Foeus strategy

21. Which area of your market is your main target?

○ Narrow area of the market ○ All areas of the market

22. Which range of products is your main target for production?

○ Concentrate on specific range of products ○ Broad range of products

8. Knowledge Based View (KBV)

Appendix B: Questionnaire

23. Please select the importance of the following factors in your company to achieve excellent performance?

	Extremely Unimportant	Unimportant	Not sure	Important	Extremely Important
Capital	○	○	○	○	○
Technology	○	○	○	○	○
Machinery	○	○	○	○	○
Geographic dispersion	○	○	○	○	○
Company location	○	○	○	○	○
Brand	○	○	○	○	○
Patents/Licences/Rights	○	○	○	○	○
Personal interaction with customers	○	○	○	○	○
Face-to-face meeting	○	○	○	○	○
Informal meeting in organisation	○	○	○	○	○
Formal inter-team discussion about customer needs	○	○	○	○	○
Formal inter-team discussion about relevant technologies	○	○	○	○	○
Collective decision making processes	○	○	○	○	○
Systematic technical knowledge	○	○	○	○	○
Systematic customer needs knowledge	○	○	○	○	○
Formal business education	○	○	○	○	○
New production practices	○	○	○	○	○
Assessment of technical requirements	○	○	○	○	○
Customer needs analysis	○	○	○	○	○

9. Formal and Dynamic strategy - 1

Please mark a number on each question to indicate your emphasis on following factors to achieving excellent performance when you are formulating your company strategy.

24. Our view is from our market to inside of the company =1.2.3.4.5.6.7=Our view is from inside of the company to our market

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Kind of view	○	○	○	○	○	○	○

25. We focus on our company resources =1.2.3.4.5.6.7=We focus on our company knowledge

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Concentration of view	○	○	○	○	○	○	○

26. We use formal control system=1.2.3.4.5.6.7=We use informal control system

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Control system	○	○	○	○	○	○	○

Appendix B: Questionnaire

27. We constantly eliminate potential barriers=1.2.3.4.5.6.7=We constantly looking to change

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
View to change	◯	◯	◯	◯	◯	◯	◯

28. We have a written strategy in our company=1.2.3.4.5.6.7=We have an unwritten strategy in our company

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Kind of strategy	◯	◯	◯	◯	◯	◯	◯

10. Formal and Dynamic strategy - 2

29. For how long is it possible to design strategy ahead in your company?

◯ < = 6 month ◯ +1 to 3 years ◯ +5 years
◯ +6 to 12 month ◯ +3 to 5 years

30. How long is it possible to foresee your business change?

◯ < = 6 month ◯ +1 to 3 years ◯ +5 years
◯ +6 to 12 month ◯ +3 to 5 years

31. What is the time taken between strategy formulation and implementation in your company?

◯ < = 1 month ◯ +3 to 6 month ◯ +12 month
◯ +1 to 3 month ◯ +6 to 12 month

32. How often are you going to revise your company strategy?

◯ Every < = 6 month ◯ Every +1 to 3 years ◯ Every +5 years
◯ Every +6 to 12 month ◯ Every +3 to 5 years

11. Performance

Appendix B: Questionnaire

33. What is your evaluation of your company's performance according to strategies implemented?

	Very low	Low	Moderate	High	Very high
Operating income	○	○	○	○	○
Return on investment	○	○	○	○	○
Earning per share	○	○	○	○	○
Net present value	○	○	○	○	○
Productivity growth	○	○	○	○	○
Customer satisfaction	○	○	○	○	○
Customer retention	○	○	○	○	○
Percentage of sales to new customer	○	○	○	○	○
Market share growth	○	○	○	○	○
On-time delivery	○	○	○	○	○
Job rotation	○	○	○	○	○
Operation process	○	○	○	○	○
Post sale service process	○	○	○	○	○
Quality control	○	○	○	○	○
R&D	○	○	○	○	○
Employee satisfaction	○	○	○	○	○
Employee productivity	○	○	○	○	○
Training hours per employee	○	○	○	○	○
Sales growth	○	○	○	○	○
Percentage revenue per employee	○	○	○	○	○

Appendix C: Pilot Study's Feedback Form

Feedback Form

Please answer the following questions. Your comments will be extremely useful for modifying the questionnaire further. If you prefer to give a verbal feedback instead of writing down your comments, please write your contact telephone number below and I will call you.

Tel. No.:

1. How much time did you spend to fill in the questionnaire?
2. Do you think that the contents of the questionnaire are relevant to your organisation and to your principal industry? YES NO

   If your answer t the above question is "NO"; please explain which items are not relevant:

3. Did you have any difficulty in understanding the meaning of the questions?
   YES NO

   If your answer to the above question is "YES"; please indicate which questions were difficult to understand:

4. If you have any suggestion for improving the questionnaire please write them in the space provided below:

Appendix D: Data dictionary

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
General information					
General information	2	1	COMPLA	Company place	1= Science or technology park 2= Based on its own 3= Other
	3	2	JOBPOS	Job position	1= CEO/Senior manager 2= Middle manager 3= Supervisor 4= Other (Please specify)
	4	3	HITECH	High-tech	1= Yes 2= No
	5	4	SIZE	Size of company	1= 1 to 9 2= 10 to 49 3= 50 to 249 4= +249
	6	5	AGE	Age of company	1= 1 to 5 2= 6 to 10 3= 110 to 15 4= 16 to 20 5= 21 and more
H_1: Type of environmental scanning					
Drives for scanning	7	6	CRIINI1	Crisis-initiated	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		7	PROSOL2	Problem solving	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		8	OPPFIN3	Opportunity finding	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Scope of Scanning	8	9	SPEEVE1	Specific events	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Scope of Scanning	8	10	SLEEVE2	Selected events	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		11	BRORAN3	Broad range of environmental systems	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Time-frame for data	9	12	RETROS1	Retrospective	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		13	CURRET2	Current and retrospective	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		14	CURPRO3	Current and prospective	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Time-frame for decision impact	10	15	SHOTER1	Short term (< 1 year)	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		16	MIDTER2	Middle term (+1 to 3 years)	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		17	LONTER3	Long term (+3 years)	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Types of forecast	11	18	BUDORI1	Budget oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		19	ECOORI2	Economic and sales oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		20	PESTEL3	Political, economical, social, technological, environmental, legal oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Methodological sophistication	12	21	SIMANA1	Simplistic data analysis	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		22	STAORI2	Statistical forecasting oriented	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		23	FUTMET3	Many “futuristic” methodologies	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
H_2: Mission statement					
Measurable and non-measurable	13	24	COMOBJ	Definition of company objectives	7=Complete attention to specific financial objectives 6=Intensive attention to specific financial objectives and little attention to non-financial objectives 5=More attention to specific financial than non-financial objectives 4=Neither emphasis on both specific financial and non-financial objectives 3=More attention to specific non-financial than financial objectives 2=Intensive attention to specific non-financial objectives and little attention to financial objectives 1=Complete attention to specific non-financial objectives
	14	25	PRODEF	Production definition	7=Complete attention to specific product offered 6=Intensive attention to specific product offered and little attention to general definition of production 5=More attention to specific product offered than general definition of production 4=Neither emphasis on both specific product offered and general definition of production 3=More attention to general definition of production than specific product offered 2=Intensive attention to general definition of production and little attention to specific product offered 1=Complete attention to general definition of production

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Measurable and non-measurable	15	26	MARDEF	Market definition	7=Complete attention to specific market served 6=Intensive attention to specific market served and little attention to general market definition 5=More attention to specific market served than general market definition 4=Neither emphasis on both specific market served and general market definition 3=More attention to general market definition than specific market served 2=Intensive attention to general market definition and little attention to specific market served 1=Complete attention to general market definition
	16	27	GOLDEF	Goals definition	7=Complete attention to one big goal for company 6=Intensive attention to one big goal for company and little attention to general company goals 5=More attention to one big goal for company than general company goals 4=Neither emphasis on all company goals 3=More attention to general company goals than one big goal for company 2=Intensive attention to general company goals and little attention to one big goal for company 1=Complete attention to general company goals
	17	28	COMDEF	Definition level of competition	7=Complete attention to unique competitive position 6=Intensive attention to unique competitive position and little attention to general competitive position 5=More attention to unique competitive position than general competitive position 4=Neither emphasis on unique and general competitive position 3=More attention to general competitive position than unique competitive position 2=Intensive attention to general competitive position and little attention to unique competitive position 1=Complete attention to general competitive position

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
H_3: Type of strategy					
	18	29	TYPSTE	Type of strategy	1=Cost leadership 2=Differentiation
Cost leadership	19	30	UNTCOS	Unit cost reduction	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		31	CHAPRO	Change production process	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		32	LOWPRI	Overhead cost control	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		33	OPREFF	Operating efficiency	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		34	RAWCOS	Raw material cost	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Differentiation	20	35	REFPRO	Refine products	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		36	MANINN	Manufacturing innovations	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Differentiation	20	37	NEUPRO	First to new product	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		38	RANDD	R&D	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		39	COMQUA	Compete by quality	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
Focus	21	40	MARARE	Market area	1= Narrow area of the market 2= All areas of the market
	22	41	RANPRO	Range of products	1= Concentrate on specific range of products 2= Broad range of products
H_4: Knowledge-Based View (KBV)					
RBV	23	42	CAPIMP	Importance of capital	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		43	TECIMP	Importance of technology	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		44	MACIMP	Importance of machinery	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		45	GEOIMP	Importance of geography dispersion	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
RBV	23	46	LOCIMP	Importance of company location	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		47	BRAIMP	Importance of brand	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		48	PATIMP	Importance of Patents/ licences/rights	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
KBV	23	49	CUSINT	Personal interaction with customers	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		50	F2FMIT	Face-to-face meeting	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		51	INFMIT	Informal meeting in organisation	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		52	FORCUS	Formal inter-team discussion about customer needs	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		53	FORTEC	Formal inter-team discussion about relevant technologies	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
KBV	23	54	COLDEC	Collective decision making processes	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		55	SYSTEC	Systematic technical knowledge	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		56	SYSCUS	Systematic customer needs knowledge	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		57	FOREDU	Formal business education	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		58	NEWPRO2	New production practices	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		59	TECREQ	Assessment of technical requirements	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important
		60	CUSNID	Customer needs analysis	1= Extremely Unimportant 2= Unimportant 3= Not sure 4= Important 5= Extremely Important

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
$H_{6\&}H_7$: Formal and Dynamic strategy					
Formal and Dynamic strategy	24	61	STRORI	Strategy orientation	7=Complete attention to external orientation 6=Intensive attention external orientation and little attention to internal orientation 5=More attention to external orientation than internal orientation 4=Neither attention to external and internal orientation 3=More attention to internal orientation than external orientation 2=Intensive attention to internal orientation and little attention to external orientation 1=Complete attention to internal orientation
	25	62	VIWSTR	View to strategy	7=Complete attention to KBV 6=Intensive attention to KBV and little attention to RBV 5=More attention to KBV than RBV 4=Neither attention to KBV and RBV 3=More attention to RBV than KBV 2=Intensive attention to RBV and little attention to KBV 1=Complete attention to RBV
	26	63	CONMEC	Control mechanism	7=Complete attention to informal control system 6=Intensive attention to informal control system and little attention to formal control system 5=More attention to informal control system than formal control system 4=Neither attention to informal and formal control system 3=More attention to formal control system than informal control system 2=Intensive attention to formal control system and little attention to informal control system 1=Complete attention to formal control system

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Formal and Dynamic strategy	27	64	STRLOK	Strategic looking	7=Complete attention to "constantly looking to change" 6=Intensive attention to "constantly looking to change" and little attention to "elimination of potential barriers" 5=More attention to "constantly looking to change" than "elimination of potential barriers" 4=Neither attention to "constantly looking to change" and "elimination of potential barriers" 3=More attention to "elimination of potential barriers" than "constantly looking to change" 2=Intensive attention to "elimination of potential barriers" and little attention to "constantly looking to change" 1=Complete attention to "elimination of potential barriers"
	28	65	WRISTR	Unwritten or written strategy	7=Complete attention to unwritten strategy 6=Intensive attention to unwritten and little attention to written strategy 5=More attention to unwritten than written strategy 4=Neither attention to unwritten and written strategy 3=More attention to written than unwritten strategy 2=Intensive attention to written and little attention to unwritten strategy 1=Complete attention to written strategy
Supplementary questions	29	66	DESPER	Design strategy period	1= < = 6 month 2= +6 to 12 month 3= +1 to 3 years 4= +3 to 5 years 5= + 5 years
	30	67	FORPER	Forecast business evolution period	1= < = 6 month 2= +6 to 12 month 3= +1 to 3 years 4= +3 to 5 years 5= + 5 years
	31	68	SF2SIMP	Interval between formulate and implement of strategy	1= < = 1 month 2= +1 to 3 month 3= +3 to 6 month 4= +6 to 12 month 5= +12 month

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Supplementary questions	32	69	REVPER	SF revising period	1= Every < = 6 month 2= Every +6 to 12 month 3= Every +1 to 3 years 4= Every +3 to 5 years 5= Every +5 years
Performance (Balanced Score Card)					
Financial objectives	33	70	OPRINC	Operating income	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		71	ROI	Return on investment	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		72	EPS	Earnings per share	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		73	NPV	Net present value	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		74	PROGRO	Productivity growth	1= Very low 2= Low 3= Moderate 4= High 5= Very high
External relations	33	75	CUSSAT	Customer satisfaction	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		76	CUSRET	Customer retention	1= Very low 2= Low 3= Moderate 4= High 5= Very high

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Customer	33	77	SALNEW	Percentage of sales to new customers	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		78	MARSHR	Market share growth	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		79	ONTIME	On-time delivery	1= Very low 2= Low 3= Moderate 4= High 5= Very high
Internal business processes	33	80	JOBROT	Job rotation	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		81	OPRPRO	Operation process	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		82	POSSAL	Post sale service process	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		83	QUACON	Quality control	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		84	RNDEXP	R&D	1= Very low 2= Low 3= Moderate 4= High 5= Very high

	Number of question	Number of variable	Variable code name in SPSS	Variable	Measurement scale
Learning and growth	33	85	EMPSAT	Employee satisfaction	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		86	EMPPRO	Employee productivity	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		87	TRAEMP	Training hours per employee	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		88	SALGRO	Sale growth	1= Very low 2= Low 3= Moderate 4= High 5= Very high
		89	REVEMP	Percentage revenue per employee	1= Very low 2= Low 3= Moderate 4= High 5= Very high

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