

**Supply Management Capabilities and Operations
Performance of UK Manufacturing Small and Medium Sized
Enterprises (SMEs)**

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“It always seem impossible until it’s done”

Nelson Mandela

Embarking on the PhD journey was a strategic decision, herculean task, self-sacrifice, financial torture, all of which projected an uncertain outcome. It seemed so impossible from the start of the journey but through thick and thin with optimism, the mission is successfully accomplished. This wouldn't have been possible without the support and encouragement from several quarters which are hereby acknowledged.

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Dedication

Dedicated to Magdalene, Ryan and Kendra

Abstract

It has been largely expressed in the operations and supply chain management literature that supply management is a significant business performance enhancer. Though capabilities are perceived to underlie operational excellence, not much is known about the capabilities in supply management necessary to support operations performance. Besides, the majority of the supply-management-related studies are large-firm-oriented to the neglect of small and medium sized enterprises (SMEs). In view of this, the present study attempts to explore the constitution of supply management capabilities in the context of SMEs and determine how these capabilities might influence the operations performance of firms.

The dynamic capabilities view, together with the relational view of the firm, formed the basis for the theoretical framework of the study. A critical realist philosophical stance informed the mixed methodology approach adopted for the study. Using a sequential mixed-methods strategy, an initial exploratory qualitative study was complemented with a large scale quantitative study to arrive at findings. The qualitative component involved interviews in 15 manufacturing SMEs located in the Yorkshire region of the United Kingdom (UK). In the quantitative component, a total of 132 cases of valid survey responses were used in the analysis. The survey respondents included owner-managers and senior managers of manufacturing SMEs in different industrial sectors, spread across the UK. The analyses operationalised the supply management capabilities construct. It further explored the inter-relationships among three research constructs, namely, firm attributes, supply management capabilities and operations performance.

Firm attributes were measured by the dimensions, firm age, firm size (turnover), ownership involvement and dedicated supply function. The dimensions measuring supply management capabilities were: long-term collaborative supplier orientation; open communication between exchange partners; close working relationship with limited number of suppliers; integration between supply strategy and corporate strategic objectives; application of information technology in supply management; and highly skilled and empowered purchasing staff. Operations performance was measured by five dimensions. These dimensions were, quality, cost, speed, flexibility and dependability.

UK manufacturing SMEs' capabilities in supply management were found to be largely demonstrated in: long-term collaborative supplier orientations, open communication between exchange partners, and close working relationship with limited number of suppliers. The adoption of supply management thinking by senior managers was found to underlie the significant presence of supply management capabilities in a firm. Some statistically significant relationships were established among the research constructs via multiple regression analysis. Between firm attributes and supply management capabilities, only having a "dedicated supply function" as a firm attribute was found to make unique statistically significant contribution to supply management capabilities. Having a "dedicated supply function" was found to be statistically influential on all the dimensions of supply management capabilities except 'application of information technology in supply management'.

Regarding the relationship between supply management capabilities and operations performance, "open communication between exchange partners", "integration between supply strategy and corporate strategic objectives" and "highly skilled and empowered purchasing staff" were found to make statistically significant contributions to the "quality", "flexibility", "dependability" and "speed" dimensions of operations performance. "Open communication between exchange partners" and "integration between supply strategy and corporate strategic objectives" made unique statistically significant contribution to "speed" and "flexibility" respectively. "Highly skilled and empowered purchasing staff" on the other hand, made statistically significant contribution both the "quality" and "speed" dimensions. Based on these findings, practical research implications have been made and research contributions highlighted. Finally, limitations of the study are acknowledged and directions for future research have been proposed.

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Chapter 1

General Introduction

1.1 Chapter overview

This chapter of the thesis introduces the general frame of thoughts that were fundamental to the entire research process. The chapter first discusses the motivation for the research interest which leads on to highlight the research context within which the present study is located. The key research issues are explained and followed with the statement of the research questions. The chapter further explains the implications of the study and concludes with the thesis outline.

1.2 Motivation for the research

This study started with an original research idea to examine how important the purchasing function might be to the performance of an organisation. After an initial review of the purchasing literature, it emerged that a relatively good amount of work has been done with respect to the research idea. However, in the literature review process, my attention was diverted onto supply management with focuses on buyer-supplier relationship management as a potential source of capability development. A subsequent review of the supply management literature revealed that, the management of the buyer-supplier dyad has been a major competitive weapon used mainly by large firms to facilitate better organisational performance in recent times. Supply management was thus found to be an important value-adding activity in large firm-oriented to the neglect of SMEs.

The literature generally seems to suggest that supply management is a source of operations-related capabilities with significant value-adding potential. The literature was however silent on these latent supply management capabilities and the extent to which they exist in either SMEs or large firms. Thus, the constitution of supply management capabilities either in the context of SMEs or Large firms have not been operationalised in the literature. Because most supply management studies were found to be large company-centred, I made the choice to investigate supply management capabilities in the context of manufacturing SMEs in the UK. This choice was informed by the criticality of the purchasing spend to manufacturing and the importance of manufacturing to the UK economy. Within the manufacturing

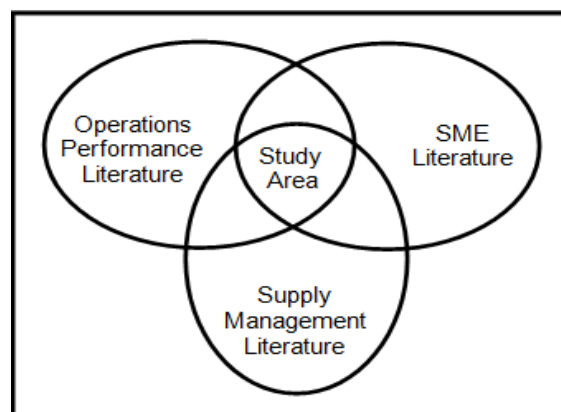
sector, the purchasing spend usually assumes about 65% of the sales turnover on the average. Relative to employment and Gross Domestic Product (GDP), manufacturing SMEs make significant contribution to the UK economy. It has been observed by the present coalition government that the manufacturing sector has the capacity to improve the resilience of the UK economy to enable it to withstand sector-specific shocks.

Manufacturing SMEs' efficient operations performance is therefore paramount if they are to make any meaningful economic contribution. Developing organisational capabilities is necessary to enable such firms maximise value as capabilities are believed to underlie operations excellence. One such set of organisational capabilities is supply management capabilities that the present study investigates. The understanding of the 'supply management capabilities' (SMC) construct and how such capabilities impact on the operations performance of firms was envisaged to make a good theoretical and practical research contributions. An exploration of the 'supply management capabilities' construct in the context of manufacturing SMEs offers new theoretical understanding of buyer-supplier relationship management for both practitioners and academics. It must be emphasized that the hypotheses being tested in the present study are original and have never been tested either in the context of SMEs or large firms to the best of my knowledge

1.3 Research context

The study is positioned within the context of the supply management, SME and operations performance literatures as depicted in Figure 1.1.

Figure 1.1: Context of research



1.3.1 Supply management

Many studies (e.g. Su and Gargeya, 2012; Ou *et al.*, 2010; Cousins, 2005; Chen *et al.*, 2004; Narasimhan and Das, 2001; Carr and Pearson, 1999) have discovered that supply management contributes significantly to the overall performance of the firm when placed at the strategic level. Cousins and Spekman (2003) define supply management as a function in the organisation responsible for activities that concerns the flow of goods and services through the organisation. This management role should be focussed on providing better satisfaction for the end-customer than competition. The supply management concept assumes a holistic view of the entire supply process. The emphasis on the supply process is important because it reveals supply management as a boundary-spanning activity that permeates inter- and intra-organisational processes (Day and Lichtenstein, 2006). The supply management concept in its fully-developed form goes beyond the transactional focus of traditional purchasing, incorporating into its meaning, long-term collaborative relationships with suppliers and a strategic focus for procurement (Lao, Hong and Rao, 2010). The concept hinges on the idea of building and managing buyer-supplier relationships as a strategy for effectively and efficiently managing input resources (Chen *et al.*, 2004).

According to Novack and Simco (1991), increasingly, firms are becoming dependent on their capabilities in supply management to deliver better competitive value. Supply management capabilities are defined as “bundles of skills and resources that are developed through a strategic supply approach” (Bowen *et al.* 2001:176). The literature contains views that possessing good capabilities in supply management can have a significant impact on the bottom-line (Bag, 2012; Bernardes and Zsidisin, 2008; Chen *et al.*, 2004; Carter and Narasimhan, 1996). The impact of these capabilities are believed to be more significant in the manufacturing sector where Cousins and Spekman (2003) argue that, the supply management function on average controls 65% of the value of total sales revenue as expenses on supplies. Supporting this view, Cusumano and Takeishi (1991) maintain that managing supply relationships strategically is important when purchased materials significantly affect the quality of goods sold to the consumer. It can be deduced from the fore-going argument that it is the capabilities in supply management that constitute an important value-adding resource and not the supply management function in itself.

Since the presence of supply management capabilities are associated with the existence of a strategic supply function (Chen *et al.*, 2004; Bowen *et al.*, 2001), it might appear that, the possession of these capabilities will be the preserve of large organizations where strategic supply management frequently occurs. The literature holds that the nature of supply management in SMEs is far from being strategic (Quayle, 2002). This situation begs the question, does the absence of strategic supply management in SMEs (manufacturing) suggest less-developed supply management capabilities in such firms? Further, to what extent are supply management capabilities relevant to manufacturing SMEs' operations performance dimensions? These questions form the basis of the unknown regarding the research interest that this thesis attempts to address.

1.3.2 Operations performance

Firms generally acquire resources (inputs), such as raw materials, components, and sub-assemblies; and apply labour to these to transform them into outputs – products and services. The unique way these inputs are managed to deliver customer satisfaction can result in a superior competitive performance. (Edwards *et al.* 2004). The process of transformation is anchored on some operations performance dimensions which include quality, cost, flexibility, innovation, dependability and service (Slack *et al.*, 2010). Leong *et al.*, (1990) reviewed the manufacturing strategy literature and concluded that it is generally accepted that the key dimensions of manufacturing performance are quality, speed, dependability, cost and flexibility.

Manufacturing performance entails a chain of value-oriented activities (Simpson *et al.* 2001) which should be carried out efficiently and effectively. This chain of activities consolidates into what Porter (1985:11-15) describes as the value chain. Porter's value chain concept is based on the process view of organisations, which identifies a manufacturing (or service) organisation as a system, made up of subsystems each with inputs, transformation processes and outputs. Within Porter's value chain, procurement and for that matter, supply management is identified as an activity in a firm that influences performance. To provide unity, integration, and direction to resources and operations practices needed to enhance operations performance, organisational and operations capabilities are required (Flynn *et al.* 2010). One of such set of capabilities according to Grant (1996) is supply management capabilities. Paulraj (2011) argues that possessing unique firm-specific capabilities in supply management enables a firm to pursue advanced

supply management practices, which are believed to improve organisational performance.

Large manufacturing organisations are said to deploy efficient supply management underlined by latent capabilities to capture relational rents (Dyer and Singh, 1998) and promote customer responsiveness, all of which positively influence their value creation potential. The literature is however silent on the constitution and the degree to which SMEs or large firms possess these supply management capabilities. Given the importance of operations performance to the long term survival of the firm, this study aims to investigate the extent to which supply management capabilities exist and how they might affect the operations performance of manufacturing SMEs in the UK.

1.3.2.1 UK manufacturing operations

Manufacturing is of vital economic importance to the economy of the UK. It accounts for 50% of all UK's exports and represents the third largest sector in the UK economy, after business services and the wholesale/retail sector in terms of share of UK Gross Domestic Product (BIS, 2010). In 2009, manufacturing was estimated to have generated some £140bn in gross value added, representing a little over 11% of the UK economy. In 2010, the contribution of manufacturing to UK's GDP increased to 14% although this is a decline from about 20% some two decades ago (The Independent, 2010). Currently, manufacturing employs an estimated 2.6 million people, representing over 8% of total UK employment (BIS, 2010). Given these statistics, it is apparent that manufacturing plays a vital role in the socio-economic development of the UK.

In spite of the performance statistics given above, manufacturing in the UK is thought to have declined from what it was prior to the 1990s. The need therefore to improve UK's competitive manufacturing position has become a matter of national importance. This concern has engaged policy makers, practitioners and academics in the UK in a national debate on how to improve the innovation and productivity performance of the country (Edwards *et al.* 2004). As a result, successive governments since the 2000s have made conscious efforts to improve the image of UK manufacturing. Pursuing the manufacturing improvement agenda, the current coalition government in its plan to rebalance the economy has positioned manufacturing as being key to UK growth and prosperity (IfM, 2012). Some studies have thus been undertaken in recent times to ascertain how UK firms might be encouraged to create more value through enhanced performance. Notable among

these studies were the Porter Report published in 2003 (Porter and Ketels, 2003) and the DTI¹ Review of UK Manufacturing Policy published in 2004 (Edward *et al.*, 2004). Both reports stressed the need for the UK to become a high value economy² and emphasised the need for innovation in UK firms to make the transition from competing on the basis of costs to competing on the basis of value creation.

Improving firm value creation inevitably requires innovations in operations to create efficient and responsive flexible manufacturing operations delivering high quality products to satisfy customers. In this regard, there is the need for research to generate industry-specific knowledge on efficient and cost-effective operations of manufacturing SMEs. It is this need that particularly makes this study significant. The study fits into the conundrum of efforts to develop a highly competitive manufacturing base for the UK economy by contributing to finding ways of making manufacturing SMEs more value-oriented.

1.3.3 Small and Medium-sized Enterprises (SMEs)

Different criteria have been used in different countries to define a SME. Some of these criteria include sales turnover, investment, capital structure, total net assets, employment etc. Ayyagari *et al.* (2003) observe that even on the basis of the same criteria, definitions still vary among countries. Ayyagari *et al.* (2003) argue that while some countries define SME to be an enterprise with less than 500 employees, others define the cut-off to be 250 employees. To define what constitutes a SME in this study, the definition by the Department for Business Innovation and Skill's (BIS-UK) is adopted, as the study is UK-based.

In the UK, the definition of a SME uses the employment criterion. A statistical release from the UK's BIS department in May 2013 titled "Business population estimates for the UK and regions 2010" define a SME as any organisation having between 0-249 employees. The statistical release describes firms with 250 or more employees as large companies. At the start of 2013, there were an estimated 4.9 million private sector businesses which employed 24.3 million people with a

¹ Department of Trade and Industry (DTI) is currently known as the Department for Business Innovation and Skills

² An economy with the ability to produce innovative products and services using cutting edge technology (Edwards *et al.* 2004)

combined turnover of £3.300 billion in the UK. Out of this figure, SMEs together accounted for 99.9% of all enterprises, 59.3% of private sector employment and 48.1% of private sector turnover. Specifically in the UK manufacturing industry, SMEs accounted for 33.3% of turnover and 58.1% of employment in the private sector ([http://stats.bis.gov.uk/ed/bpe/BPE 2013](http://stats.bis.gov.uk/ed/bpe/BPE_2013)). SMEs are therefore vital component of the UK economy as they act as drivers of innovations, source of competition and employment, and an avenue for flexibility in labour. To this end, examining the research issues in this study in the context of manufacturing SMEs is reasonably justified.

The current study focuses on manufacturing SMEs employing between 10 – 249 people and excludes firms employing 0 - 9 people (micro firms). The exclusion of micro firms was largely due to envisaged access difficulty and scepticism of the potential of such firms to contribute to the study. Accessing micro firms for research purposes is usually difficult as limited information exist on them in major business databases. In addition, Pressey *et al.*, (2009) argue that purchasing formality is generally thought to be very low in micro firms. Hence, it was thought that involving such firms may not generate the needed insight into the phenomenon under investigation.

1.4 The research issues

A number of studies have established the positive impact of strategic supply management on organisational performance (Ou *et al.*, 2010; Bernardes and Zsidisin, 2008; Chen *et al.*, 2004; Carter and Narasimhan 1996; Cooper and Ellram, 1993). Strategic supply management is thought to be a major source for developing supply management capabilities (Chen *et al.* 2004). Supply management capabilities are important competitive resources (Paulraj, 2011). These resources enable a firm to pursue advanced supply management practices capable of influencing firm performance.

Even though much work has been done on capabilities in general, (Schreyogg and Kliesch-Eberl, 2007; Winter, 2003; Teece *et al.* 1997; Grant, 1996), little has been done with regards to specific capabilities in supply management. The extant purchasing literature primarily focuses on purchasing's involvement in the corporate planning process, its impact on corporate performance and its significance in creating collaborative relationships. The SMC construct therefore appears to be under-researched. In view of this, this study contributes to the supply management

literature by attempting to operationalise the SMC construct and measure its level of existence among manufacturing SMEs in the UK.

Unlike large companies, SMEs generally tend to reflect the personality, values, character, education or background of their owners-managers. Hammann *et al.*, (2009) argue that there is a strong connection between the owner-manager and his/her company. This strong tie, the authors maintain, influences the strategies, practices, decisions and behaviour of the company. Owners-managers of SMEs can hardly be separated from their organisations; they are the company and the company is them. Entrialgo (2002) explains that SMEs owners-managers believe matching company's activities with their personal characteristics is a precondition for corporate success. If activities in SMEs are tailored to the personal characteristics of owners-managers as suggested by Entrialgo (2002), the implication is that SME operations performance will reflect owners-managers' attributes. This logic is confirmed in Spence and Rutherford (2004) who note that the attributes of SME owners-managers, to some extent, influence their supply networks, employee and customer relations. In addition, age and size of the firm are considered to be important performance influencing factors in the literature. Again the literature point to strategic supply function as having the capacity to improve firm performance . Strategic supply function is however dependent on the existence of a dedicated supply function. Thus firm age, size, ownership involvement and the existence of a dedicated supply function are known to be influential factors on firm performance. Based on this premise, the current study attempts to examine the influences these firm attributes (age, size, ownership involvement, and dedicated supply function) may have on the existence of supply management capabilities.

Finally, the literature view that SMEs generally tend to reflect the characteristics of the owner suggest that SME owner-managers may target operations performance dimensions consistent with their believes. In this regard, it would be interesting to know how SMEs prioritise operations performance dimensions and the effect on these dimensions by the presence of supply management capabilities.

1.5 Research aim

The overall aim of the study is to establish the constitution of supply management capabilities, determine the extent to which UK manufacturing SMEs possess supply management capabilities and to find the link that may exist between these

capabilities and operations performance of manufacturing SMEs. Consequently, the research will address the research questions stated below.

1.6 Research questions

The fundamental question addressed by this study is:

- How do supply management capabilities influence operations performance of UK manufacturing SMEs?

This research question is broken down into the following specific research questions:

- 1) What constitutes supply management capabilities and how can they be measured?
- 2) To what extent do UK manufacturing SMEs possess supply management capabilities?
- 3) To what extent do firm age, size, ownership involvement, and dedicated supply function affect the level of supply management capabilities?
- 4) What constitutes the operations performance of SME manufacturers and how can this be measured?
- 5) To what extent is the effect of supply management capabilities on operations performance independent of firm age, size, and ownership involvement and dedicated supply function?

1.7 Implications of the study

The research is expected to make contributions to theory, practice and policy. The study contributes to theory by increasing the understanding of the connection between supply management capabilities and operations performance. It will develop the underlying dimensions and measurement scale of supply management capabilities which could facilitate other future research. In this regard, the study will contribute to the supply management literature particularly, the purchasing literature on small companies which Ellegaard (2006) found to be very limited.

To contribute to practice, the findings may enable owner-managers of SMEs to better appreciate the need for supply management capabilities and relationship between supply management capabilities and operations performance. The study is intended to provide senior managers of SMEs with the mechanism for developing

such capabilities. The research could affect policy by assisting policy agencies to decide on appropriate support strategies that could assist SMEs to develop their supply management capabilities towards effective operations performance.

1.8 Thesis structure

The thesis is organised on a chapter basis. The structure has been developed based on eight chapters: (1) Introduction, (2) Literature review, (3) Theoretical framework, (4) Research methodology, (5) Qualitative data analysis, (6) Quantitative data analysis, (7) Discussion of qualitative and quantitative results, and (8) Summary of research and conclusion.

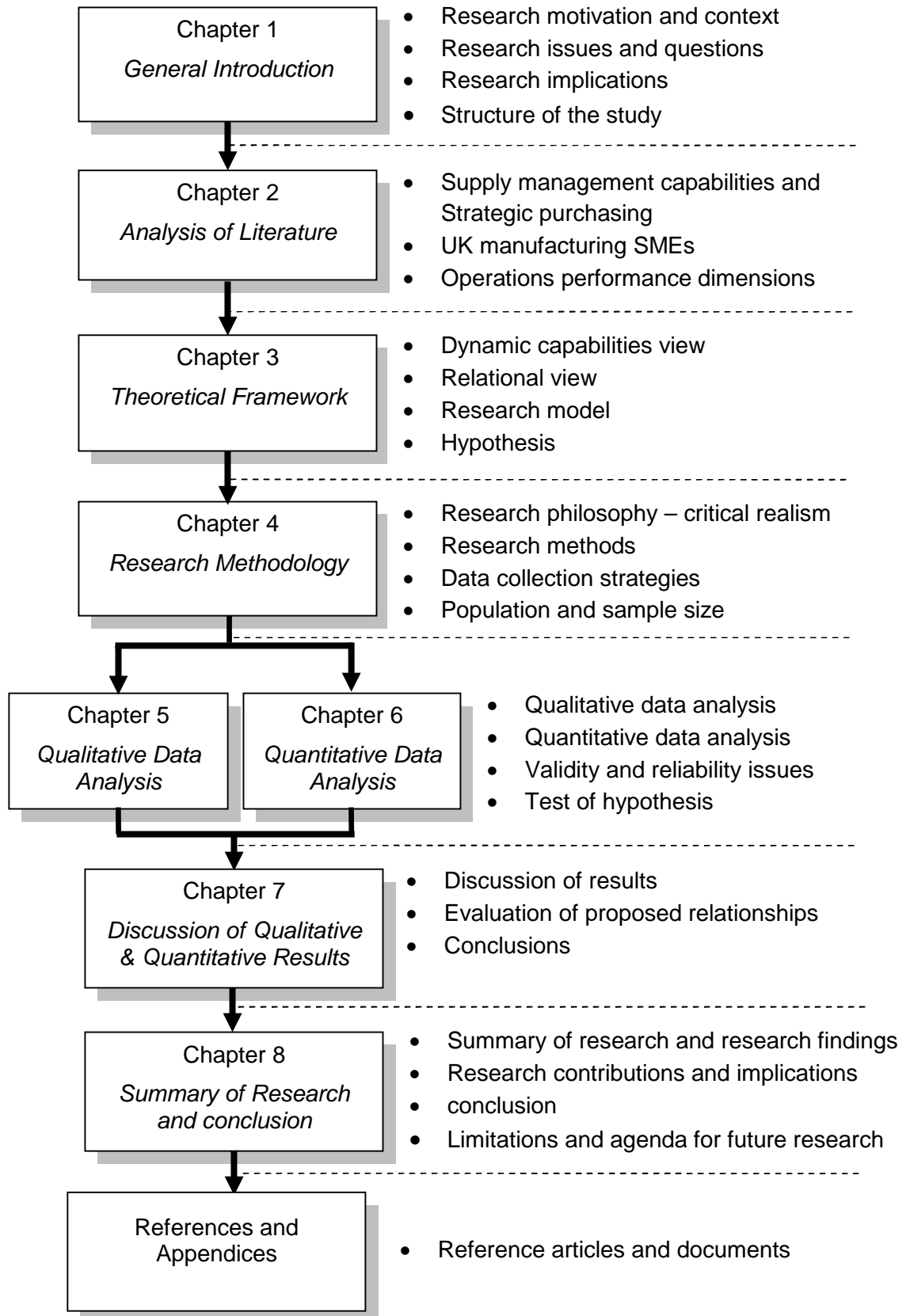
Chapter 1 provides the background to the research and discusses issues such as the motivation for the research interest and the context of the research, the research issues, research aim and questions, and implications of the study.

Chapter 2 analyses the literature on supply management and supply management capabilities, operations performance, SMEs and manufacturing in the UK. The objective in this exercise was to identify and confirm the research gap which supports the research questions raised. The literature analysis was also to enhance the researcher's knowledge of the research constructs, providing the direction and context for the study.

Chapter 3 is devoted to the development of the theoretical framework for the study. In this chapter, the argument is built to justify the use of the dynamic capability theory in combination with the relational view as the theoretical foundation for this. On the basis of the theoretical debate, a research model is developed and hypothesis are stated. **Chapter 4** contains the research methodology. It highlights the research design for the study discussing issues such as the philosophical orientation of the researcher, research methods employed, processes for data collection and the design of data collection instruments and the type of analysis applied. **Chapters 5** and **chapter 6** contains the analysis of the qualitative and analysis of quantitative data respectively.

Chapter 7 integrates and discusses the results from the two analysis chapters. Following on in chapter 7, the practical and managerial implications of the study are drawn. In **chapter 8** which is the final chapter, the research is summarised and a conclusion is made. An agenda for future research is set in chapter 8. The last element of the thesis is the bibliography and appendices which follows after chapter 8. Figure 1.2 represents the structure of this thesis.

Figure 1.2: Thesis structure



Chapter 2

Analysis of Literature

2.1 Chapter overview

This chapter critically analyses the literature on supply management capabilities (SMC) and supply management (SM) in general, operations performance dimensions (OPD) and extends the argument to cover supply management in SMEs and manufacturing operations in the UK. The objective of this analysis is to deepen theoretical understanding of the two constructs – SMC and OPD – and their interrelationships. Furthermore, the analysis is aimed at identifying the gap(s) in the literature within which the present study is positioned.

2.2 Call for studies into SME purchasing

The purchasing function has gradually gained visibility within the firm over the last couple of decades (Carr and Smeltzer, 1997). Carr and Smeltzer (1997) argue that the improved visibility for the purchasing function may have been propelled by Porter's (1980) emphasis on the importance of the buyer in his five forces model. In the Porter's (1980) five forces model, the buyer is identified as one of five key competitive factors affecting competition in an industry. The increased visibility for the purchasing function may also be attributed to the increasing competitiveness of the global market. As purchasers demonstrate they can add millions to the bottom-line, the purchasing function which used to be a corporate backwater is becoming a fast-track job (Trully, 1995). A number of studies have however argued that the ability of the purchasing function to affect the bottom-line is dependent on its capacity to assume a strategic nature (Bernardes and Zsidisin, 2008; Carter and Narasimhan 1996; Cooper and Ellram, 1993; Ellram and Carr, 1994). On this note, the purchasing function is said to be gradually shifting from a dominantly passive role towards acting strategically. Carter and Narasimhan, (1996) observe that purchasing's ability to impact the strategic planning process has increased in a number of firms across the globe.

Subsequently, a number of studies have examined the strategic importance of the purchasing function on corporate performance (Su and Garyega, 2012; Lawson *et al.*, 2009; Bernardes and Zsidisin, 2008; Day and Lichtenstein, 2006; Chen *et al.*,

2004). These studies show that strategic purchasing has a positive impact on firm performance and have contributed to rejuvenating an increase in the strategic importance of the purchasing function. Chen *et al.*, (2004:505) note that “purchasing has assumed an increasingly pivotal strategic role, evolving from an obscure buying function into a strategic business partner”. Assuming a strategic role, the purchasing function contributes to improving a firm’s performance by actively participating in the corporate strategic planning process, facilitates beneficial organisation-environment alignment, fosters cross-functional integration and enhances customer responsiveness among others (Chen *et al.*, 2004; Cavinato, 1999; Carter and Narasimhan, (1996). Arguably, firms stand a greater opportunity to improve their performance by developing a strategic supply function.

Many of the studies on the strategic importance of the purchasing function have however been dominantly large company-centred. Attesting to this observation, Ramsay (2008: 568) refers to a ‘shocking failure to try to understand purchasing phenomena from the SME perspective’. Whereas Christensen (2003) maintains purchasing issues appear to have received little attention in the small company literature, Quayle (2002b) also notes that small company issues have attracted insufficient attention in the purchasing literature. The insufficiency of research on small company purchasing is probably well echoed by Ellegaard (2006:273) who states that “purchasing deserves more attention in small company research”. Given the economic significance of the small company (Birley and Westhead, 1990) and the critical role purchasing plays in SMEs (Gadde and Hakansson, 2001; Presutti, 1988; Dollinger and Kolchin, 1986), Ellegaard’s (2006) the call for increased research into purchasing within the small company is timely and relevant.

2.3 Supply management capabilities

2.3.1 The growing importance of supply management

Traditionally, the purchasing function from which the concept of supply management emerged was considered a clerical role (Dobler and Burt, 1996:10; Farmer 1985:67). This clerical purchasing role has come to be known as the traditional purchasing model. This model emphasises the efficient flow of goods and services to support operations. In this sense, the purchasing function was limited primarily to the tasks of purchasing goods and services at the cheapest price from approved sources ensuring that such goods and services conform to acceptable quality levels and delivery schedules (Cousins and Spekman, 2003). Cousins and Spekman (2003) further argue that the traditional view of purchasing as

predominantly a clerical function is increasingly changing among practitioners and academics. Consequently, the last two decades have seen a paradigm shift in the role of purchasing from mere buying function to a strategic one where the concept of supply management emerges (Burt *et al.*, 2003; Carr and Pearson, 1999; Ellram and Carr, 1994). Recognizing the increasing importance of purchasing, Gadde and Håkansson (1994:33) wrote:

“.....purchasing strategy has become an issue for top management. Never before have so many companies discussed, analysed and formulated offensive strategies for purchasing. The analyses are directed towards finding efficient supplier structures, forming alliances with key suppliers, developing training programmes together with suppliers and activating suppliers in technical development projects. This is a considerable change from the earlier concentration on formulating procedures for efficient purchasing, such as the number of bids that had to be asked for. These changes reflect a new view of purchasing efficiency.”

The paradigm shift in the role of purchasing emphasises a function that is well-integrated with corporate objectives. This new view gives the purchasing function a strategic outlook as it aligns with the strategic direction of the firm. Here, purchasing and for that matter supply management focuses on strategic relationships and managing critical commodities (Giunipero *et al.*, 2006). Cusumano and Takeishi (1991) note that strategically managing supply relationships becomes important when bought-out components are critical to the quality of products sold to the consumer. Supply management therefore seems to be critical to the operations of SMEs as they tend to buy most of their components. Lao *et al.*, (2010) highlights the importance of supply management to SMEs when they observe that, SMEs are much more dependent on the capabilities or resources of their suppliers and business partners in order to enable them adapt to environmental changes. In a typical manufacturing firm, the supply function is responsible for utilising about 65% of sales on bought-outs (Cousin and Spekman, 2003). The considerable purchasing spend calls for an effective and efficient supply management. Firms need to effectively manage their inter-firm relationships to unlock the value that exists in the buyer-supplier exchange (Lawson *et al.*, 2009).

The growth in recognition for the supply management function is not surprising considering the increasing significance of strategic collaborations among firms (Dyer, 2000; Kanter, 1994). Strategic collaborations among firms yield relational

capabilities (Lorenzoni and Lipparini, 1999) engendering strategic benefits for partnering firms and enhances a firm's competitive position (Dyer, 2000; Eisenhardt and Martin, 2000). Lawson *et al.*, (2009) add that through inter-firm collaboration, partners can reap rents only achievable through joint pursuit. They further point out that the firm's ability to capture these relational rents is partly dependent on the effectiveness of the supply function in building and leveraging collaborative partnerships with suppliers. Choi and Hong (2002) also note that these relational benefits are long-term and have sustainable impact. Thus capabilities in supply management are part of wider organisational capabilities (Dyer 2000), that can empower firms to enact or seize opportunities or neutralize threats from turbulent environments (Chen *et al*, 2004).

Another dimension to the growth in importance of supply management could be argued from the viewpoint of the so-called 'Farmer's laws'. Farmer (1997) framed the key situations which occasion the strategic importance of the supply function in the following rules which have come to be known as the 'Farmer's Laws:

- Purchasing increases in perceived importance in direct relationship with the reduction in the length of the company's product life cycle.
- Purchasing is perceived as being important when the business concerned interfaces significantly with (a) volatile market (s).
- Purchasing is perceived as being important when the business interfaces with demanding customers.
- Purchasing is important whenever the organisation concerned spends a significant proportion of its income on purchasing goods and services to allow it to do business (Farmer, 1997:8).

The bottom-line of Farmer's laws is customer responsiveness. It underscores the need for a proactive supply function in an increasingly competitive global market. The factors which affect the significance of the purchasing function as enshrined within Farmer's laws could be listed as; reduction in product life cycle, firms' interface with volatile markets, firms' interface with demanding customers and firms facing increasing cost of production. These factors generally characterise the new era of competition in the 21st century and accentuate the significant uncertainty and ambiguity firms face as a result (Bernardes and Zsidisin, 2008; Hitt *et al.*, 1998). Consequently, Bernardes and Zsidisin, (2008) concluded in their study that:

Market changes during the last decades, combined with ever more-educated customers, have triggered increased interest in customer responsiveness and the need to tap into the latent knowledge available in a firm's supply network. The markets in which firms compete are increasingly influenced by intense foreign competition, rapid technological change, shorter product life cycles, and customers increasingly unwilling to settle for mass-produced items or services with limited value.under such a competitive landscape, purchasing firms must be abreast of developments, opportunities and threats steaming from or latent in their supply bases (Bernardes and Zsidisin, 2008:216).

The competitive nature of the business environment today requires that firms tap into every potential area of value creation to enhance their sustainability. Many studies (Lao *et al.*, 2010; Lawson *et al.*, 2009; Bernardes and Zsidisin, 2008; Cousins and Lawson, 2007; Day and Lichtenstein, 2006; Cousins, 2005; Chen *et al.*, 2004; Narasimhan and Das, 2001; Carr and Pearson, 1999) have confirmed the value-adding potential of the supply function but at a strategic level. Developing appropriate capabilities in supply management is essential if firms need to maximise supply base opportunities to enhance their competitiveness (Bernardes and Zsidisin, 2008). Supply management capabilities are part of a hierarchy of organisational capabilities on the basis of which a firm can develop its core competence. Subsequently, to perceive the import of SMC, a prior examination of the value of organisational capabilities is necessary.

2.3.2 Organisational Capabilities

The development of a sustainable competitive advantage has been closely linked to the creation of organisational capabilities (Barney 1991; Wernerfelt 1984). Capabilities are known to be distinct behavioural patterns, complex in nature that involve formal or informal processes, and developed over a time period (Schreyogg and Kliesch-Eberl, 2007). Winter (2003) argues that capabilities are deeply embedded in the routines and practices of the organisation and thus make them difficult to be traded or imitated.

Capabilities may be conceptualised as being a historical knowledge accumulation; a repository of historical experience and organisational learning. Capabilities and organisational processes are therefore closely related. Undertaking a particular organisational activity over time leads to learning and experience with the subsequent development of a capability in those set of activities. The accumulated

learning and experience builds a capability which enables business processes to be efficiently carried out. It could be perceived from this argument that capabilities and organisational processes are intertwined. Schreyögg and Kliesch-Eberl (2007) ascribe to this view by noting that organisational capabilities do not emerge from planned corporate conduct but instead build up incrementally from daily interactions in business processes. For capabilities to be useful and provide competitive leverage, they must be unique or distinct and therefore firm-specific. The distinctiveness of a capability lies in its capacity to make a significant contribution towards the delivery of superior customer value (Day, 1994). Organisational capabilities are seen as inimitable, tacit, socially complex and rare and embedded in organisational routines (Makadok, 2001; Teece *et al.*, 1997; Barney, 1991; Dierickx and Cool, 1989).

Organisational capabilities are perceived as high-value characteristics of the firm. As a result, organisations want to be associated with certain distinct capabilities that enable them to secure a defensible position in the competitive market place (Day, 1994; Schreyögg and Kliesch-Eberl, 2007). Schreyögg and Kliesch-Eberl (2007:914) for instance observe that, “these days nearly every organisation wants to be perceived as being capable of doing something in an outstanding manner”. A firm’s capacity to accommodate changing environmental conditions calls for the development of specific capabilities as a precondition.

In this regard, organisational capabilities represent the unique strengths of the firm to cope with a changing environment and deliver superior customer value. The fundamental objective of developing organisational capabilities which spans across functionalities is to enable the firm to better satisfy the customer than the competition. This proposition is affirmed by Schreyögg and Kliesch-Eberl (2007) with the claim that the very function of a capability is to enable an organisation to skilfully manage through complex challenges from a volatile environment and provide a platform to master the challenges better than competitors. Recognising the significance of capabilities, it is not surprising that firms are creating specific capabilities to be identified with. There are theories that associate core competencies with capabilities. According to the theory of competence-based competition, a core competence is derived from a set of organisational capabilities and advocates that business strategies must be built on the strengths of a firm’s core competencies (Hafeez *et al.*, 2002). A core competence can thus be construed as a network of capabilities rather than a separate activity-based process. Given the view in strategic management that organisational capabilities are critical

success factors (Schreyögg and Kliesch-Eberl, 2007) and the central role of capabilities in competence creation, the impetus for the development of capabilities by firms is understandable. The “competent and the capable organisation has become the new ideal” (Schreyögg and Kliesch-Eberl, 2007:916).

Organisational capabilities are usually a spectrum of capabilities cutting across functionalities. Day (1994) maintain that typical business processes such as order fulfilment, new product development and service delivery are areas where organisations can demonstrate capabilities. Increasing significance of supply management in today’s businesses (Bernardes and Zsidisin, 2008) identifies the supply management area as a potential source for capability development. Bernardes and Zsidisin, (2008) found the combined factors of changing market conditions and emerging sophisticated customers as having generated keen interest in customer responsiveness and necessitated the need to tap into the latent knowledge available in a firm’s supply network. Organisations can “pursue superior supply-related practices if they possess valuable, rare, inimitable and non-substitutable firm-specific resources/capabilities” (Paulraj, 2011:20). Capabilities in supply management have been conceptualised as a set of higher level capabilities within the hierarchy of organisational capabilities (Wu *et al.*, 2006; Grant, 1996).

2.3.2.1 Definition of supply management capabilities

Supply management capabilities have not been much explored in the literature. As a result, it is difficult to come by a concise definition of the construct. In their attempt at a definition, Bowen *et al.*, (2001:176) described supply management capabilities as the “bundles of skills and resources that are developed through a strategic supply approach”. Since this is the only known definition of supply management capabilities to the best of my knowledge, an attempt will be made in this analysis to add to the definition.

Supply management deals with the inflow of resources into the organisation and the related management of suppliers. It is an activity concerned with the flow of goods and services through the organisation aimed at creating competitive advantage for the firm and subsequent satisfaction of the end-user (Cousins and Spekman, 2003). Chen *et al.*, (2004) see supply management as the building and managing of buyer-supplier relationships in order to sustain competitive advantage. Other researchers have argued that increasingly, firms are leaning on their supply management function as a competitive tool to create and deliver value to external customers (Bernardes and Zsidisin, 2008; Novack and Simco, 1991). There seems to be a

consensus among researchers that supply management deals with managing the buyer-supplier interface. In line with this proposition, studies have acknowledged buyer-supplier relationship management as a key factor that can affect an organisation's success (Cousins, 2005; Cousins and Spekman, 2003; Mol, 2003; Lamming, 1993).

Capabilities are the "internal and external organisational skills, resources and functional competencies developed within firms to match the requirement of a changing environment" (Bowen *et al.*, 2001:176). Similarly, Hafeez *et al.*, (2002:40) defined capabilities as "the ability to make use of resources to perform some task or activity". The use of the word 'ability' suggests the need for skills to act on the resources. Contrasting capabilities to resources, Amit and Schoemaker (1993:35) wrote; "capabilities, in contrast, refer to a firm's capacity to deploy resources, usually in combination, using organisational processes to effect a desired end". Capabilities are rare and firm-specific; embedded in organisational routines, developed over a time period through interactions of resources; they cannot easily be transferred and engender sustainable competitive advantage (Chen *et al.*, 2004; Hafeez *et al.*, 2002; Bowen *et al.*, 2001; Makadok, 2001; Day, 1994; Amit and Schoemaker, 1993). They are information-based distinctive assets with the capacity to enhance the productivity of other corporate resources (Makadok, 2001; Teece *et al.*, 1997). Capabilities according to Day (1994) glue company resources together and enable them to be deployed advantageously.

It is commonly understood that a capability is made up of bundles of skills and resources that bears on the ability to perform a particular organisational task. This implies that even though the availability of resources is important, it is equally essential for the firm to possess the required skills to make use of the resources to achieve a corporate objective. Thus resources in themselves do not produce benefits unless there is a bundle of skills available to put them to use to achieve a desired end. Supply management has been extensively documented in the literature as having emerged as an important business function impacting significantly on the bottom-line (Bernardes and Zsidisin, 2008; Day and Lichtenstein, 2006; Carr and Pearson, 1999; Carter and Narasimhan, 1996). Even though many of these studies remain silent on the existence of specific capabilities in supply management, it is reasonable to attribute the impact of supply management to the inherent capabilities. Highlighting the significance of capabilities in the supply management, Bernardes and Zsidisin, (2008:209) observe that "with the requisite capabilities and opportunities, supply management can leverage and

align a firm's internal skill sets and strategic direction with that of the supply base to effectively and efficiently manage its supply chains”.

Based on the synthesis of the widely-explored meanings of 'supply management' and 'capabilities', the following is proposed as a definition for supply management capabilities.

The bundles of skills and resources, developed over time through purchasing expertise to manage buyer-supplier relationships with respect to the inflow of goods and services, culminating in satisfaction for the end-customer.

2.3.2.2 The capabilities in supply management

The attractive value-adding potential of the supply management function is not easy to come by. Lawson *et al.*, (2009) state that realising the gains from strategic supply management is a capability that requires years to develop through focused leadership and change management. A similar claim is made by Chen *et al.*, (2004) when they note that the accumulation of non-tradable resources and capabilities through strategic collaboration requires that firms adopt a different managerial mind-set for building strategic advantage. This implies that, changing the traditional mind-set on purchasing to a strategic orientation of the function is crucial. This will lead to the development of capabilities that leverage the supply management process and create value for the end-customer. However, this is a gradual process requiring time to happen. The question then arises, “what are the capabilities that could be developed within supply management?”

Generally the literature on capabilities in supply management or purchasing competence, as may be referred to in some quarters, (Gonzalez-Benito, 2007; Narasimhan and Das, 2001; Narasimhan *et al.*, 2001) is sparse. Many of the prior research on strategic supply management rarely examined what specific strategic capabilities exist or are required. These studies predominantly focussed on strategic purchasing and its involvement in the corporate planning process (Cavinato, 1999; Carr and Pearson, 1999; Carr and Smeltzer, 1997); its impact on business performance (Bernardes and Zsidisin, 2008; Chen *et al.*, 2004; Carter and Narasimhan 1996; Cooper and Ellram, 1993; Ellram and Carr, 1994); and its significance in creating collaborative relationships with suppliers (Chen *et al.*, 2004; Cousins and Spekman, 2003; Carr and Pearson, 2002; Carter and Narasimhan,

1996). Some attempts have been made to examine the supply management capabilities construct recently.

It is believed that the first empirical research on the supply management capability construct was carried out by Narasimhan *et al.*, (2001). In their study titled "An empirical examination of the underlying dimensions of purchasing competence", Narasimhan *et al.*, (2001) developed the purchasing competence construct by identifying its components, established measures and scale and used empirical data to test their validity. The study measured the five dimensions of purchasing competence as: empowerment, employee competence, interaction frequency-tactical, interaction effectiveness-NPD (New Product Development) and buyer-seller relationship management. Empowerment was interpreted to mean involvement in job-related and operational decisions, autonomy and job security which encourages risk-taking and trying out new ideas and practices to solve tactical and operational problems. Employee competence relates to the training for purchasing employees and suppliers in strategic initiatives such as quality improvement and customer satisfaction, and performance evaluation of purchasing employees that are tied to quality improvement goals. Interaction frequency-tactical captures how frequently purchasing interacts with production and quality control. Interaction effectiveness-NPD measures the interaction between purchasing and R&D and interaction between purchasing and engineering. Buyer-seller relationship management is defined in terms of four variables; purchasing's involvement in risk sharing for capital investment with suppliers, joint production planning with suppliers, purchasing's sharing of technical information with suppliers and sharing of cost savings with suppliers.

The findings of Narasimhan *et al.*, (2001) show that the five dimensions of purchasing which could be described as the five capability areas of purchasing have significant positive influence on customer satisfaction. They are key factors in delivering value to the customer (Narasimhan *et al.*, 2001; Novack and Simco, 1991). In a related study, Narasimhan and Das (2001) state that purchasing competence (set of capabilities) can be put into four categories; supply base leveraging, buyer-supplier relationship development, supplier performance evaluation and purchasing integration. The first three of these categories together focus on the external relationship with the supplier. Purchasing integration on the other hand emphasizes an internally-focused set of practices that involve the integration and alignment of strategic purchasing practices and goals with that of the firm (Day and Lichtenstein, 2006). Even though these capabilities are both

externally and internally based, Gonzalez-Benito (2007) argue that it is purchasing's alignment with business strategy that forms the basis for purchasing's contribution to business performance.

In a study that examined the role of supply management capabilities in green supply, Bowen *et al.*, (2001), identified supply management capabilities as constituting liaison between purchasing and other functions, a collaborative or partnering approach with suppliers, an understanding of environmental issues and how they affect supply, the technical skills of purchasing personnel and a detailed purchasing policies and procedures. The authors conclude that firms with these capabilities tend to demonstrate integration between corporate and supply strategy formulation; enhanced purchasing liaison with other functions; a stronger collaborative relationship with suppliers; skilful human resource in purchasing; and a better appreciation by purchasing of how they can contribute to the firm's corporate objectives. Chen *et al.*, (2004) attributed the source of supply management capabilities only to strategic purchasing whilst Bowen *et al.*, (2001) ascribed the development of supply management capabilities to a proactive corporate environmental stance and a highly strategic purchasing and supply process.

A more recent study by Chen *et al.*, (2004) detailed supply management capabilities as comprising: developing long-term strategic relationship orientation for mutual benefits; promoting close working relationships with a limited number of suppliers; and fostering open communication among supply-chain partners. Chen *et al.*, (2004) found that these capabilities contribute to enhancing customer responsiveness and financial performance for the buying firm. They posit that supply management capabilities are demonstrated through developing a long-term supplier orientation, maintaining open lines of communication between the firm and its suppliers, and building close relationships with fewer suppliers can engender transaction value creation.

A synthesis of the relevant supply management literature including those discussed here (e.g. Gonzalez-Benito, 2007; Chen *et al.*, 2004; Narasimhan *et al.*, 2001; Narasimhan and Das, 2001; Bowen *et al.*, 2001) highlights some concepts and practices influential in enhancing supply management performance. These concepts and practices constitute bundles of skills and resources that reflect the competences in supply management. Supply management capabilities in this study is therefore conceptualised as a multidimensional construct consisting of six first-

order constructs namely: long-term collaborative relationship with suppliers; close working relationship with limited number of suppliers; open communication between exchange partners; integration between supply strategy and corporate strategic objectives; application of information technology in supply management; and highly skilled and empowered purchasing staff. These first-order constructs are considered as the bundles of skills and resources representing the capabilities in supply management.

2.3.3 Development of the supply management capabilities constructs

The theoretical constructs conceptualised as constituting the underlying dimensions of supply management capabilities are further developed and discussed in the sections below.

2.3.3.1 Long-term collaborative relationship with suppliers

The selection, involvement and ability to develop a trusting relationship with relevant suppliers is a capability that has the potential to enhance firm competitiveness (Acharyulu and Shekbar, 2012; Monczka *et al.*, 2011). Building closer ties with suppliers has been commonly used by manufacturers as strategy to reduce cost, shorten lead-time, increase productivity, and enhance quality (Ou *et al.*, 2010). To maximise opportunities in the exchange relationship for the exchange parties, manufacturers often develop a long-term collaborative relationship with their key suppliers. Shipper *et al.*, (2013) state that Collaboration can be key where mutual win-win success is built into the entire system of doing business with suppliers. Nesheim (2001) asserts that this type of exchange relationship is built on a set of relational norms including reciprocity, solidarity and flexibility, which promote trust between the parties.

Studies have established the immense potential of long-term collaborative relationship with suppliers as a source of competitive advantage (Flynn *et al.*, 2010; Narasimhan and Talluri, 2006; Nesheim, 2001). Danese (2013) found buyer-supplier collaborations can lead to significant performance improvements in efficiency, schedule attainment and flexibility. In collaborative relationships, the buyer perceives the supplier to be a partner and an extension of the buyer's business. The effect is a commitment from both parties to the relationship. Within a collaborative relationship, the supplier will be more willing to adjust its operations to accommodate the buyer's requirements. The long-term nature of collaborative relationships builds higher levels of trust and cooperation which enhances customer

responsiveness and also encourage the supplier to adapt its own strategic objectives to match the buyer's strategic goals (Li *et al.*, 2012; Govindan *et al.*, 2010; Chen *et al.*, 2004). Li *et al.*, (2012) make the claim that long-term commitment from the parties encourages the signing of long-term contracts and also makes it possible for the buying firm to develop the capabilities of the supplier.

Long-term collaborative relationship with suppliers is perceived as capability because it can generate tacit knowledge and assets that are specific to the relationship and difficult to imitate by competition. Exchange partners may possess some tacit knowledge and other capabilities which will be shared only under conditions of trust, loyalty and commitment as engendered in long-term collaborative relationships (Zacharia *et al.*, 2011). Longer-term relationships with suppliers has become a source of competitiveness and a capability for achieving superior firm performance but Sivadasan *et al.*, (2010) advises managers to be cautious of collaborative relationships as it could degenerate into operational complexities. Long-term collaborative relationship with suppliers as a theoretical construct in this study is conceptualised to mean the initiatives taken by the buying firm to encourage collaboration with suppliers on a long-term relationships basis.

2.3.3.2 Close working relationship with limited number of supplier

Complexity and dynamism of the business environment are two of the major challenges that confront modern day manufacturers. Complexity issues include the varieties and volumes of inputs. Dynamism on the other hand relates to the increasing pace of changes taking place in the environment. Technological advances, greater product variety, international sourcing and sustainable manufacturing reflect the complex and dynamic nature of the business environment (Azadegan *et al.*, 2013; Zhang *et al.*, 2012; Mitchell *et al.*, 2011). Manufacturers have adopted close working relationship with their key suppliers as a strategy for managing the complexity and dynamism issues they face. Close supplier relationship is a capability in supply management because skills and resources are needed to be able to select appropriate suppliers and to work closely with them. This capability when properly and selectively used has been found to impact on customer responsiveness (Stanley and Wisner, 2001). The capability engenders strategic benefits that are unique to the relationship and therefore difficult for competitors to imitate.

Informal inter-organizational relationships may result when buyers and suppliers work closely together. Weck and Blomqvist (2008) found informal inter-

organizational relationships to be a great source of external knowledge which can contribute to new ideas and new product development. Closely working together with limited number of suppliers consolidates the supplier base and makes the relationship more attractive to the supplier as orders become consolidated and of higher value. This promotes longevity of the relationship, cooperation and builds supplier trust and commitment. The buyer benefits by the opportunity to improve cost as a result of the order consolidation and dedicated service from the supplier. (Hartmann *et al.*, 2012; Paulraj *et al.*, 2006; Narasimhan and Das, 2001). Operational issues relating to materials and other inputs can be resolved easily and quickly with a cooperative support from the supplier. Although Chen *et al.*, (2004) did not find close working relationship with limited number of suppliers to have any effect on customer responsiveness, companies have reported substantial cost-saving through developing this capability (Guimaraes *et al.*, 2002). The close working relationship with limited number of suppliers theoretical construct embraces the understanding of cooperative relationship with selected key suppliers.

2.3.3.3 Open communication between exchange partners

Open and frequent communication between exchange partners has value-enhancing characteristics impacting on several dimensions of a firm's operations performance. Both long-term collaborative relationship with suppliers and close working together with limited number of suppliers depends on the buyer's capability to create an open communication channel with suppliers. Open communication does not only build trust and information sharing between partners but also strengthens relationships (Goffin *et al.*, 2006). Yan and Dooley (2013) found high communication intensity to influence design quality or efficiency when uncertainty is high. Open communication between exchange partners is observed to increase inter-party knowledge and understanding of complex competitive issues through greater discovery and disclosure of information (Chen *et al.*, 2004). The ability to develop high-quality buyer-supplier relationships through open and frequent communication exchanges between buyers and suppliers lead to high quality relationships necessary for building and sustaining strategic advantage (Large,2005; Chen *et al.*, 2004; Takeishi, 2001).

Successful cooperation between buyers and suppliers is achieved through the sharing of both tactical and strategic information. Openness in communications should include the sharing of production planning and control data and product innovation information (Primo and Amundson, 2002). Chen *et al.*, (2004) assert that greater information disclosure through openness in communication enables the

relationship partners to build knowledge and understanding of complex competitive issues which in turn promote discovery and enhance competitiveness. Being open with suppliers is a capability that must be carefully developed as it exposes the buyer to the risk of supplier opportunism. Open communication between exchange partners is a relational competence which fosters inter-firm learning that is crucially important to competitive success (Paulraj *et al.*, 2008).

The importance of open communication with suppliers as a capability emerges from the relational rents that accrue from the knowledge sharing routines expressed through the openness of the relationship (Lavie, 2006; Dyer and Singh, 1998). Open communications promotes inter-organisational learning by sharing tacit, critical information and knowledge. This theoretical construct is conceptualised as the frequent two-way information sharing as well as free interactions in buyer-supplier relationships.

2.3.3.4 Integration between supply strategy and corporate strategic objectives

The supply strategy and corporate strategic objectives of a firm ought to be well-coordinated to ensure that a strategic fit is achieved between the two plans. A strategic fit will ensure that supply management contribute effectively to the attainment of corporate objectives. The selection, evaluation and motivation of suppliers as well as the subsequent relationship to be developed needs to be done in such a way that an integration is achieved with corporate philosophy and strategic intents. Narasimhan and Das (2001:594), argue that supply strategy integration with corporate level strategies constitutes “an internally focused initiative, aimed at aligning strategic purchasing practices with the firm’s competitive priorities”. Studies examining the impact of supply and corporate strategy integrations have reported positive results suggesting that firm performance is improved when this integration is achieved (Baier *et al.*, 2008; Cousins, 2005; Nollet *et al.*, 2005; Morgan and Monczka, 2003).

The capability to link the two strategies is important because corporate strategies must be the driver for strategies pursued at the supply end of the business. Given that different sourcing strategies contribute better to different competitive priorities (Narasimhan and Carter, 1998), the integration of these strategies is crucial for success. Typically, firms prioritising on quality as competitive priority will emphasise on total quality management and transactional cost management sourcing strategies, while firms focusing on customization and differentiation will stress on total quality management sourcing strategies (Rebolledo and Jobin, 2013). Supply

management and manufacturing functions constitute the key activities in operations. A consistency of strategies between these functional units and ultimately the corporate focus is essentially fundamental.

The choice of a particular manufacturing strategy must be reflected in the firm's supply management activities; the supply function should put in place practices allowing the firm to acquire products that meet the manufacturing requirements (Rebolledo and Jobin, 2013; Narasimhan and Das, 2001). The integration ensure that purchasing plans, policies and actions aligns with the cross-functional priorities and business goals (Day and Lichtenstein, 2006). The process involves creating strong internal ties through purchasing staff's participation in strategy development teams, information sharing, and joint decision-making activities intended to enhance organisational change (Narasimhan and Das, 2001). It is an internal relational competence that impacts directly and indirectly on the operations performance of the firm in several dimensions. A firm's capacity to develop this capability ensures that supply management opportunities are maximised to provide the required support for the competitive priorities of the firm. Theoretical construct of integration between supply strategy and corporate strategic objectives is conceived as involving the purposeful marriage between supply activities and practices, and the manufacturing competitive priorities of the firm.

2.3.3.5 Application of information technology in supply management

Information technology has had and continuous to have significant influence on the way supply chains relationships are managed. The significant beneficial impact of information technology on supply chains means that many companies are increasing exploiting and leveraging on its application to build their capacity to sense and respond to environmental changes. Intensified global competition has made agility and adaptability important characteristics of modern day supply chains. Agile and adaptable supply chains according to Collins *et al.*, (2010) depends on information technology to discover evolving trends in supplier markets and enable the firm to adopt appropriate actions such changing suppliers or materials, outsourcing operations, and adjust to market conditions.

The application of information technology in supply management enhances information sharing between the exchange partners, improves product lead-times and process integration all of which impacts on overall cycle time and customer responsiveness (Bertolini *et al.*, 2007; Wu and Angelis, 2007; Sanders, 2005). Supply management requires information technology for processing the increasing

amount of unstructured information and for linking with suppliers electronically. Through Information technology, a firm can sense environmental changes; analyse and interpret what is happening; assess the potential impact on the firm, and then respond appropriately. Sanders (2005) argues that information technology facilitates buyer-supplier communications, close working relationships and inter-firm collaborations. The use of information technology therefore complements the development of other supply management capabilities (Paulraj *et al.*, 2008, Sanders, 2005; Kale *et al.*, 2000) Real-time information on product availability, inventory level, shipment status, and production requirements which engenders efficiency in supply management are achieved through the application of information technology (Radstaak and Ketelaar, 1998).

The application of information technology in supply chains is thus a capability that can foster sustainable relational benefits impacting on several operations performance dimensions (Kim and Mahoney, 2006; Subramani, 2004; Kale *et al.*, 2000; Dyer and Singh, 1998). This theoretical construct symbolises the company-wide adoption of information communication technology in the buyer-supplier relationship management, including the day-to-day operational activities of the supply management function.

2.3.3.6 Highly skilled and empowered purchasing staff

Ogden *et al.*, (2007) observe that supply management skills, knowledge, and professionalism is an important success factor now and the future. Competency in supply management has been found to be influenced by the skills and experience of the personnel involved in the process (Tassabehji and Moorhouse, 2008; Giunipero *et al.*, 2005, 2006). The dynamic nature of the supply environment means that supply management practitioners need to have a skills set which can accommodate this business environmental dynamism. Carter *et al.*, (2000) argues the buyer-supplier dyad is continuously evolving with changes that impact on the capabilities of supply management practitioners. The supply function needs to evaluate, select, develop, manage, and monitor suppliers. These tasks focus on leveraging on cost, innovation and quality potentials as well as supply risk management (Feisel *et al.*, 2011; Monczka *et al.*, 2005; Giunipero *et al.*, 2005, 2006). Not only must supply management staff possess the relevant skills but they also need to be empowered to enable them take bold and timely decisions that exploits environmental opportunities and reduces supply risks when identified.

The skills include, team building skills, strategic planning skills, communication skills, technical skills (Prajogo and Sohal, 2013; Giunipero *et al.*, 2006). Proficiency in these skills sets ensure that supply operations are relevant and consistent with the long-term goals of the firm. The extent of supply management skills and empowerment contribute to the effective integration of supply activities with both suppliers and internal organisational customers (Cousins *et al.*, 2006). Das and Narasimhan (2000) suggest that that supply management competence engendered by skilled and empowered supply staff impacts positively on several competitive priorities including quality, cost, delivery and customer responsiveness. The presence of supply staff with the appropriate skills and knowledge will empower the supply function to develop strategic relationships, improve the total cost, and be able to collaborate and integrate the buyer's internal processes with those of the suppliers (Prajogo and Sohal, 2013; Feisel *et al.*, 2011).

The specialised nature of supply management knowledge and expertise and the process of staff empowerment may be seen as a valuable, rare, inimitable and non-substitutable resource (Ogden *et al.*, 2007; Dyer and Singh, 1998). High skills and empowerment enhances supply staff knowledge and enables them to develop valuable buyer-supplier relationships which is difficult to imitate. It is a dynamic capability which generate relational rent through increased buying power and maximising supply chain opportunities supply chains. This theoretical construct is characterised in this study as the skills, training and experience possessed by supply management staff and an accompanying authority that encourages supply staff to make some key supply-related decisions without top management involvement. Table 2.6 summarises the six theoretical constructs discussed.

It must be emphasised that capabilities are not the same as resources. Resources comprises a firm's capacity and every stock in its possession (Wang and Ahmed, 2007). Capabilities on the other hand, are the distinctive and superior ways of allocating, coordinating, and deploying resources (Schreyogg and Kliesch-Eberl, 2007) and are embedded in organisational processes. Capabilities consist of both explicit elements such as resources and tacit elements such as know-how and skills set (Flynn *et al.*, 2010). Flynn *et al.*, (2010) point out that the tendency exist for researchers to confuse operational capabilities and resources as these capabilities are closely linked to resources. Supply management capabilities are part of operational capabilities and therefore their interconnectedness with resources makes it difficult to identify separately. Hence, certain resources may be found in the identification of the six supply management capabilities in the present study.

Table 2.1: Supply management capabilities constructs

Capability	Definition	Literature sources	Key literature & empirical setting
Long-term collaborative relationship with suppliers	The initiatives taken by the buying firm to encourage collaboration with suppliers on a long-term relationships basis	Shipper <i>et al.</i> , (2013), Flynn <i>et al.</i> , (2010), Danese (2013), Narasimhan and Talluri (2006), Chen <i>et al.</i> , 2004).	Chen <i>et al.</i> , (2004): Medium to large firms
Close working relationship with limited number of supplier	The understanding of cooperative relationship with selected key suppliers	Hartmann <i>et al.</i> , (2012), Paulraj <i>et al.</i> , (2008), Chen <i>et al.</i> , (2004), Narasimhan and Das, (2001).	Paulraj <i>et al.</i> , (2008): Medium to large firms
Open communication between exchange partners	The frequent two-way information sharing as well as free interactions in buyer-supplier relationships	Yan and Dooley (2013), Paulraj <i>et al.</i> , (2008). Chen <i>et al.</i> , (2004).	Paulraj <i>et al.</i> , (2008): Medium to large firms
Integration between supply strategy and corporate strategic objectives	the purposeful marriage between supply activities and practices, and the manufacturing competitive priorities of the firm.	Baier <i>et al.</i> , (2008); Cousins (2005) Chen <i>et al.</i> , (2004), Narasimhan and Das, (2001).	Narasimhan and Das, (2001): SMEs and large firms
Application of information technology in supply management	The company-wide adoption of information communication technology in the buyer-supplier relationship management, including the day-to-day operational activities of the supply management function.	Paulraj <i>et al.</i> , (2008), Bertolini <i>et al.</i> , (2007), Wu and Angelis, (2007), Kim and Mahoney (2006) Sanders, (2005), Subramani (2004), Kale <i>et al.</i> , (2000)	Sanders (2005): Large firms.
Highly skilled and empowered purchasing staff	The skills, training and experience possessed by supply management staff and an accompanying authority that encourages supply staff to make some key supply-related decisions without top management involvement.	Prajogo and Sohal, (2013), Giunipero <i>et al.</i> , (2005), Giunipero <i>et al.</i> , (2006), Cousins <i>et al.</i> , (2006)	Prajogo and Sohal, (2013): SMEs and large firms.

2.4 Operation performance dimensions

In the sections which follow, the literature on operations performance is examined. The analysis focusses in particular on the key dimensions of manufacturing operations performance.

2.4.1 Performance measurement

The competitive nature of the global market implies that firms face a formidable challenge of improving their performance in order to survive. In view of the intensified global competition, Kodali and Anand (2010), argue that the success of the organisation in recent times depends much more on how quickly, efficiently and effectively it is adapting to business environmental changes. To gain competitive advantage, firms are under increasing pressure to continuously enhance their performance. Neely *et al.*, (1995) states that a firm's operating performance is dependent on efficiency and effectiveness of the activities it undertakes. They further explain that while the term effectiveness refers to the extent to which customer needs are met, the term efficiency means how economical the firm is in the utilisation of resources to deliver a given customer satisfaction. Effectiveness and efficiency are two key components underlying organisational performance. Effectiveness and efficiency are all fundamental to operations performance measure. Measuring the performance of the firm is necessary to ascertain the level of efficiency and effectiveness attained and helps identify any gaps for improvements needed to cope with business environmental changes.

There are a multiplicity of perspectives on how to measure the performance of a business resulting in different definitions for performance measurement (Franco-Santos *et al.*, 2007). Neely *et al.*, (1995:81), defined performance measurement as "the process of quantifying the efficiency and effectiveness of an action". Similarly, Bititci *et al.*, (1997:533) describe a performance measurement system as the "information system which is at the heart of the performance management process and it is of critical importance to the effective and efficient functioning of the performance management system". It has also been argued that "a business performance system enables an enterprise to plan, measure, and control its performance and helps ensure that sales and marketing initiatives, operating practices, information technology resources, business decision, and people's activities are aligned with business strategies to achieve desired business results and create shareholder value." (Maisel, 2001:12). Chen (2008) summarised the importance of a performance measurement system with the view that the essential

function of a performance measurement system is to assess how well the activities within a process, or the outputs of a process, meet intended operational objectives.

The various definitions presented here illustrates the multiplicity of perspectives on performance measurement systems. The existence of these diverse perspectives generates different metrics for measurement of operations performance. Effective performance measurement is necessary for identifying operational areas for improvement and can play an important role in focusing people and resources on particular aspects of a business (Jain *et al.*, 2011; Waggoner and Neely, 1999).

2.4.2 Manufacturing/operations performance dimensions

It appears from the extant literature that there are divergent views on the dimensions of manufacturing/operational performance and has been a subject of debate over the years. Early papers such as Wheelwright (1978) specified the dimensions as efficiency, dependability, quality and flexibility. Cost, design, delivery, flexibility (product and volume) were equally identified as the competitive dimensions of manufacturing by Krajewski and Ritzman (1987). In their Sand cone model, Ferdows and De Meryer (1990) constituted the dimensions as quality, dependability, speed and cost efficiency. Ward *et al.*, (1998) and Jayaram *et al.*, (1999) categorised manufacturing performance into four dimensions being cost, quality, flexibility and time. Neely *et al.*, (1995) concluded that there are numerous measures of manufacturing performance and subsequently highlighted the key measures as quality, time, cost, and flexibility. Innovation has also been mentioned as one of the dimensions in very few papers (e.g. Dangayach and Deshmukh, 2006; Leong *et al.*, 1990; Vickery *et al.*, 1996).

To date, the debate seems to be unresolved as recent authors still demonstrate the diversity in opinion. However, D'Souza and Williams (2000) note that there is a consensus among academicians and practitioners that with growing pressures of global competition in the twenty-first century, the major competitive arenas will be cost, quality, and responsiveness, where responsiveness refers to flexibility and speed of the manufacturing process. Despite this claim of consensus by D'Souza and Williams (2000), Amoako-Gyampah (2003) used flexibility, cost, quality and dependability as the basis for measuring operational performance. Flynn and Flynn (2004) defined the dimensions in terms of quality (process-based quality and market based quality), dependability (on-time delivery and fast delivery), time (cycle time and new product speed), and flexibility (product flexibility and volume flexibility). Dangayach and Deshmukh (2006) referred to manufacturing

performance as competitive priorities and measured them on the basis of quality, dependability, speed, innovation, flexibility and cost. In Devaraj *et al.*, (2007) cost, quality, delivery and flexibility were measured as the dimensions of operations performance. In two recent studies, Prajogo *et al.*, (2011) and Prajogo and Olhager (2012), the measure for operational performance comprised quality, delivery, flexibility, and cost. Table 2.1 summarises the various dimensions used to measure the manufacturing/operations performance of firms over the years.

Table 2.2: Measures of manufacturing/operations performance

Authors	Manufacturing/operations performance measured
Prajogo and Olhager (2012)	Quality, delivery, flexibility and cost
Furlan <i>et al.</i>, (2011)	Quality, dependability, flexibility and cost
Prajogo <i>et al.</i>, (2011)	Quality, delivery, flexibility and cost
Devaraj <i>et al.</i>, (2007)	Cost, quality, delivery and flexibility
Dangayach and Deshmukh (2006)	Quality, dependability, speed, innovation, flexibility and cost
Flynn and Flynn (2004)	Quality, dependability, time, and flexibility
Amoako-Gyampah (2003)	Flexibility, cost, quality and dependability
Jayaram <i>et al.</i>, (1999)	Cost, quality, flexibility and time
Ward <i>et al.</i>, (1998)	Cost, quality, flexibility and time
Vickery, <i>et al.</i>, (1996)	Delivery, value (quality and cost) flexibility, and innovation
Ferdows and De Meryer (1990)	Quality, dependability, speed and cost efficiency
Krajewski and Ritzman (1987)	Cost, design, delivery, flexibility (product and volume)
Wheelwright (1978)	Efficiency, dependability, quality and flexibility

It appears from the literature that quality (process and product), manufacturing cost, delivery dependability (speed and cycle time), and manufacturing flexibility (product and volume) have become the common priorities of the manufacturing task that are widely articulated (Beach *et al.*, 2000; Collins and Schemenner, 1993). Perhaps it is in this vein that Peng *et al.*, (2008) remark that operational strengths are commonly assessed with a multidimensional measure of operational performance, and this usually includes cost, quality, flexibility, and delivery (time) measures. Taking a cue

from the literature, the present study shall measure operations performance by quality, cost, dependability, speed and flexibility in line with the five traditional business performance objectives proposed by Slack *et al.*, (2007).

2.4.3 Quality as a dimension of operations performance

It is indisputable that quality is of major concern to most organisations as it is the only performance measure that firms usually create dedicated departments to manage (Slack *et al.*, 2010:495). Understanding the importance of quality is fundamental to successful competition in today's competitive market since it is cited as the single most important factor in determining market share (Calantone and Knight, 2000).

Ferdows and De Meryer (1990) demonstrated in their Sand Cone model that quality is a necessary fundamental precondition for achieving excellence in other operations performance objectives including cost, dependability and flexibility. Having developed quality that satisfies customers, firms can then focus attention on flexibility in order to satisfy variability in customer requirements. Therefore building on quality as a foundation reduces cost, increases dependability and enhances flexibility. Phan *et al.*, (2011) observe that excellent quality serves as a platform for the attainment of other competitive objectives including cost, delivery, cycle time and flexibility. The development of an infrastructure for designing, controlling and continuously improving processes and products is fundamental to the achievement of other competitive advantages (Nada *et al.*, 2006).

2.4.3.1 Quality defined

Garvin (1984) states that quality is a slippery concept, easy to visualise but exasperatingly difficult to define. Shetty (1987) shares this position with the view that quality is a complex concept with no single explicit defining set of characteristics. Subsequently the concept means different but related things to different people. Product quality can mean performance, features, reliability, conformance and serviceability (Shetty, 1987). These represent some of the defining characteristics which Garvin (1984) had earlier described as the dimensions of quality.

As a result of the diverse perceptions of the concept, quality has attracted multiplicity of definitions. Park *et al.*, (2001) note that these definitions appear to conceptualise quality along the notions of innate superiority, fitness for use, value

and customer preference. Notable among them are: ISO 8402 which defines quality as the totality of characteristics of an entity that bear on its ability to satisfy stated and implied need. Crosby (1979) defines quality as conformance to requirement. This definition is production-oriented, suggesting that a quality product must necessarily conform to the design specifications and satisfy the predetermined performance standards. Another commonly cited definition is fitness for use (Juran, 1998). Juran's definition appears to focus on the user. In other words, quality is what the user says it is. The implication is that once a product or a service is designed to satisfy the specified need of the user, quality is achieved. In this regard, excellence or luxury could be seen as far from quality. Covering this extended definition, Calantone and Knight (2000) define quality as the perceived fundamental characteristic of products which meet or exceed customer expectations regarding features and performance.

Garvin (1984) observes that although these definitions are helpful in some respects, they tend to be lacking in others. The author criticises these definitions on the basis that they appear to perceive quality as a single recognisable characteristic. He states, "quality is not a single recognisable characteristic; rather it is multifaceted and appears in many forms" (Gavin, 1984:41). Based on his multifaceted view, Gavin prescribed that the quality of a product should be assessed on the basis of eight dimensions; performance, features, reliability, conformance, durability, serviceability, aesthetics, and perceived quality.

These dimensions encapsulate many of the traditional definitions of quality. Quality can therefore be competed on in many respects with regards to its dimensions; a firm can choose to compete on selected dimensions rather all which is seldom possible. However, Shetty (1987) argues that the relevance of these quality dimensions will vary from industry to industry and perhaps even between firms. The manufacturer's perception of the customer's quality needs as well as the firm's own quality capability is a critical issue in the selection of dimensions to compete on. On this premise, it can be said that "a firm is likely to be more successful in pursuing a strategy of high product quality if it selects a small number of dimensions on which to compete, and then tailors them closely to the needs of its chosen market" (Garvin, 1984:42). The logic follows that a firm wanting to compete effectively on the quality of its products needs a deeper understanding of its consumers' perspective as a necessary precondition. The selection of the dimensions to compete on must however not be done in isolation from the resource capacity of the firm because each dimension of quality imposes specific demands on the firm.

In this respect, quality measures manufacturing performance and indicates the extent of distinction in producing and delivering products to the customer. Operations as result becomes a major stakeholder in the fulfilment of a firm's quality aspirations.

2.4.3.2 Quality in manufacturing

To ensure that manufactured products conform to expected quality levels, certain quality characteristics must be predetermined and fulfilled. Slack *et al.*, (2010) maintain that prescribing the quality of a product or service starts from the design stage. Fynes and De Búrca (2005) emphasised the importance of the design stage with the claim that design is not only a cost driver, but a recognised major determinant of quality because quality is designed into the product at least as much as it is built in during manufacture. Nada *et al.*, (2006) argue that high-quality products are influenced by two important factors, one being product design and the other, degree of conformance. Product design requires designing the product with all the quality features that satisfy and delight the customer. The degree of conformance on the other hand relates to the extent to which manufactured products satisfy the design specifications.

Quality is not only affected by the design of the product, but also the configuration of the systems and processes producing the product. For instance, it has been demonstrated in the automotive industry that the configuration and design of the manufacturing system significantly affect the resulting product quality (Inman *et al.*, 2003). In the same vein, Ahire and Dreyfus (2000) found in their study that the management of process quality and product design positively related to internal quality management. Karim *et al.*, (2008) further stress that as the importance of high-quality production in establishing and maintaining a global competitive position is realised, there has been an increasing interest in manufacturing practices that lead to improved quality performance.

Kaynak (2003) explained that process management involved taking a preventive approach to quality improvement. This may entail designing and introducing processes that are fool-proof and that provide stable production schedules and work distribution to reduce process variation by building quality into the product rather than inspecting it in. Process management has been identified as important because of its contribution to quality performance. Process management improves quality by standardising manufacturing processes to reduce process variances

(Yeung *et al.*, 2005; Matsui, 2002; Kaynak, 2003; Cua *et al.*, 2001; Ahire and Dreyfus, 2000).

Forza and Filippini, (1998) theorise that reduction in process variation will result in increased uniformity in output and a consequent reduction in rework and waste. Process management activities such as regular preventive equipment maintenance will enhance product quality by improving machine reliability and reducing interruptions in production resulting in less scrap and increasing process speed (Kaynak, 2003). Matsui (2002) observe that process control and housekeeping which are components of process management, when implemented, facilitate production flow and subsequently affect quality performance significantly. Ahire and Dreyfus (2000) and Forza and Filippini (1998) empirically established that process management impacts on product quality directly and positively. The objective of process management fundamentally is to improve production quality. High performance in production quality contributes to improved product quality. Making a case for quality, Shetty (1987) notes:

- Quality reduces scrap, rework and excess labour,
- Quality reduces work in progress, inventory, material handling and capital equipment,
- Quality improves the utilisation of tools and product equipment, and
- Quality reduces warranty and liability claims.

Excellence in manufacturing quality including effective quality planning and control, and process management leads to better product quality which according to Ferdows and De Meryer (1990), is the foundation to achieving cost efficiency, manufacturing flexibility, speed, and dependability. Ultimately product quality leads to improvements in competitive priorities such as cost reduction, fast delivery and increased profitability (Kaynak, 2003).

2.4.3.3 Quality and organisational performance

John A. Young, CEO of Hewlett-Packard comments that, "In today's competitive environment, ignoring the quality issue is tantamount to corporate suicide" (Shetty, 1987:46). This statement unambiguously associates quality with excellence in organisational performance. In support of this assertion, Calantone and Knight (2000) maintain that product quality is a key lever in the success of any firm.

Product quality is a powerful ingredient in a successful competitive strategy. It does not only enhance the reputation of the firm but can as well increase productivity and profitability by lowering costs and increasing sales (Calantone and Knight, 2000; Buzzell, and Gale, 1987; Shetty, 1987). De Toni and Tonchia (1995) observe that high quality performance is becoming crucially important particularly to manufacturing firms. Product quality is a major factor affecting the attainment of customer satisfaction. In a large scale empirical study, Fornell *et al.*, (1996) found quality as perhaps the most important determinant of customer satisfaction. Forza and Filippini (1998) also confirmed in their study that quality orientation is a lever to customer satisfaction although Hendricks and Singhal (1997) argue that attaining a high level of customer satisfaction usually requires more than providing a high-quality product.

The emergence of quality as an important competitive weapon in the West dates back to the early 1980s (Park *et al.*, 2001; Lemak *et al.*, 1997). Since its emergence, many studies have been undertaken to ascertain the link between quality management and overall business performance (Park *et al.*, 2001). Some of these studies have established a positive relationship between product quality and superior organisational performance (Zu *et al.*, 2008; Kannan and Tan, 2005; Mohr-Jackson, 1998; Lemak *et al.*, 1997), quality and improved competitiveness (Phan *et al.*, 2011; Krisztina, 2003), and quality and corporate reputation (Paulson gjerde and Slotnick, 2004). Kannan and Tan (2005) for instance found that a strategic commitment to quality has a significant impact on firm performance. Competing on product quality can have a strong, positive effect on the firm's return on investment through increased market share. Quality has a substantial and enduring impact on profitability (Calantone and Knight, 2000; Shetty, 1987).

Many researchers contend that improving performance in quality will bring about more satisfied customers with greater loyalty, increased sales and enhanced competitive position (Ahire and Dreyfus, 2000; Fornell *et al.*, 1996; Aaker *et al.*, 1994). The Profit Impact of Marketing Strategies (PIMS), was a large scale quantitative study that examined the relationship between quality and profitability. A thousand two hundred (1,200) firms were involved in the PIMS study (Buzzell and Gale, 1987). The findings of the study show that both return on investment and net profit as percentage of sales rose as quality increased. Businesses selling high-quality products or services were found to be generally more profitable than those whose products are of lower quality. However, in spite of some evidence in the literature suggesting that quality management improves performance, Park *et al.*,

(2001) argue that the results of empirical studies of quality practices and performance are mixed as many of the findings show no clear direction on which quality practices lead to improved performance and under what conditions.

2.4.4 Cost as a dimension of operations performance

Porter's competitive strategy (1980) and competitive advantage (1985) highlighted cost as one of three elements in the definition of competitive strategies. Cost relates to efficiencies not only in production but the entire manufacturing and distribution process. In Porter's discussions, cost leadership is one of the three generic competitive strategies he identified with the other two being differentiation and focus. Porter's generic strategies, Voss (1995) argues can be considered as business priorities directing manufacturing choice and management. Richards of the Institute for Manufacturing at the University of Cambridge observes that a focus strategy in itself has two variants; cost focus and differentiation focus. (<http://www.ifm.eng.cam.ac.uk/dstools/paradigm/genstrat.htm>).

A cost focus strategy seeks a cost advantage within a target market segment. Differentiation focus, on the other hand, is a strategy enabling firms to be unique along some selected dimensions that are widely valued by buyers in a target market segment. Pricing, a function of cost (Besanko *et al.*, 2001), is one of the common dimensions which are generally valued by buyers. Slack *et al.*, (2010:48) maintain that a firm competing on price will certainly have cost as its major operations performance objective. The implication is that even in a differentiation focus strategy, cost may be one of the dimensions that a firm may choose along others to be unique in. The import of the analysis here is that cost is a significant consideration in all competitive strategies to the manufacturer. Admitting the significance of cost as a performance objective, Slack *et al.*, (2010:48) state that low cost is a universally attractive objective. It is not surprising that most studies measuring operations performance (see Prajogo and Olhager, 2012; Furlan *et al.*, 2011; Devaraj *et al.*, 2007; Flynn and Flynn, 2004; Ward *et al.*, 1998) identified cost as one of the operations performance objectives. Cost as a performance objective appears to underlie other performance objectives; quality, speed, flexibility and dependability. This is because cost is affected by all other performance objectives and firms not competing on cost will still prefer to be low in cost as much as possible.

2.4.5 Cost and competitive strategy

Cost, whether chosen as a dimension to compete on or not, represents an important aspect of every operation. Even firms producing for customers who are less-sensitive to price would like to keep cost down as much as possible in order to maximise their profit. Firms that compete on cost as a strategy focus their priority on being efficient. Thus efficiency is the watchword in Porter's cost leadership strategy. Yamin *et al.*, (1999) note that low-cost strategy emphasises minimising cost wherever possible. When cost is focused on as the dominant competitive strategy, the firm assumes a cost leadership position as described by Porter (1985).

Porter (1985:12) defines cost leadership as meaning "when a firm sets out to be the low cost producer in its industry". Low cost (efficiency) remains the central theme for this strategic intent. Low cost is linked to strategy because achieving a low cost position in the industry may potentially result in above average returns for the firm (Porter, 1980:35; Jones and Butler, 1988). Firms pursuing a cost leadership strategy tend to lay emphasis on every aspect of the operation where cost is incurred. For instance, Yamin *et al.*, (1999) discovered that high cost leadership companies placed significantly more importance on all aspects of organisational performance. Besanko *et al.*, (2001) maintain that characteristic of the cost leadership strategy is the opportunity for cost leaders to exploit their advantage through lower prices in order to build volume. Theodorou and Florou (2008) argued for the cost strategy that its main purpose is to exploit advantages through elements such as price drops, rationalization and minimization of operational and maintenance expenses, labour cost, raw and intermediate materials, etc.

A firm pursuing a cost leadership strategy aims to be low-cost producer relative to competitors in the industry. A low-cost producer needs to find and exploit possible potential sources capable of delivering a cost advantage. According to Besanko *et al.*, (2001), a cost advantage is derived from the experience of favourable cost changes to the firm. There are varied sources of cost advantage depending on the structure of the industry. They may include the pursuit of economies of scale, proprietary technology, preferential access to raw materials and other factors. Cost strategy can further be supported with applications such as computer aided design, design for manufacturability, computer aided manufacturing and make-to-stock arrangements (Theodorou and Florou, 2008). Wagner (2006) discloses additional sources of cost advantage including more efficient manufacturing processes, fewer manufacturing downtimes, better utilization of capacity, or less scrap and rework, all

of which will result in lower costs for the product. The lower the cost of production, the lesser can be the price the customer pays. Besanko *et al.*, (2001) confirms this position with the claim that when a firm experiences a favourable cost change, the incremental advantage may be translated into lower prices for customers or 'bank' the advantage and profit from an increased price-cost margin.

Cost leadership requires the firm to be aggressive in its managerial controls and standardisation aimed at minimising cost (Jones and Butler, 1988). To successfully pursue cost as a competitive strategy, there needs to be industry/market-level preconditions. Murray (1988:396) summarises these conditions as follows:

"A cost leadership strategy will be viable only:

- If high transaction costs or differentials in the cost of producing inputs exist, and these can be overcome through vertical integration or some other means of achieving preferential access

and/or

- If the state of development of the process technologies employed in the value chain indicates that significant innovations can still be realized

and/or

- If the process technologies employed in the value chain are sufficiently complex to permit significant cost improvements to be realized from learning effects

and/or

- If the optimal scale for some significant part of the value chain exceeds one-half of the size of the market".

These conditions suggest that the success of cost leadership as a strategy predominantly depends on exogenous factors. Contrary to this position, Besanko *et al.*, (2001) opine that pursuing cost advantages can be evoked by both endogenous and exogenous factors. On the endogenous factors, Besanko *et al.*, (2001) note that improvements in product quality for instance, can be a significant source of cost reductions. This proposition ties in with the claim by Ferdows and De Meyer (1990) that improvement in quality leads to achieving cost efficiencies, flexibility and dependability in manufacturing. Fine (1983) confirmed this in an empirical study. In Fine's study, cost was observed to decrease more rapidly for firms that produce high quality products than for firms that produced low quality ones. Cost leadership manufacturers, Dahan and Srinivasan (2011) argue, are able to dissuade

competitors from entering the market, leading to significantly higher profits. Cost competency in effect drives away potential entrants.

2.4.6 Cost in manufacturing operations

Since the revolution in global competition from the early 1990s, cost has become a significant area of concern to many manufacturers. The reason is that as competition intensifies, efficiency in production has become a necessary precondition for business survival. Cost comes in many dimensions including; labour cost, material cost, transportation cost, telecommunications cost, health care cost, utilities and rental cost (Amoako-Gyampah, 2001). Cost appears to be fundamental to all strategic choices. Amoako-Gyampah and Boye (2001) found that the level of business costs may influence the emphasis firms place on operations strategic choices. Firms faced with rising business cost (material, labour, transportation, etc.) may be less willing to pursue strategies that lead to flexibility.

In many industries, cost of materials constitutes a significant percentage of the total cost of production, and in general, cost of materials assumes more than 50% of production cost. Dubois (2003) cited increasing reliance on outsourcing as one of the driving forces affecting material cost in today's operations. In this regard, an efficient supply management role becomes crucial to the financial performance of a firm (Dubois, 2003). Wagner (2006) observes that with the level of cost involved in materials management, the potential exist for cost reduction strategies to be successful through effective supply management.

2.4.6.1 Cost reduction in manufacturing operations

Wagner (2006) posits that a firm may achieve competitive advantage by offering superior value to the customer. This could be either through unique benefits that offset higher prices or by offering lower prices than competition for the same level of benefits. The latter option compels firms to innovate in their cost reduction strategies. For the purposes of cost reduction, many firms now tend to focus on quality as a strategic means. Voss (1995) emphasise that in cost competitive environments, quality programmes may be the most appropriate response rather than cost reduction programmes. Prior research (see for example, Barkan and Hinkley 1994; Mizuno, 1988; Taguchi, 1987) has demonstrated that cost reduction efforts aimed at reducing the number of parts and making assembly more efficient also reduce the number of failure modes of the product, thereby reducing defects.

Product design represents one of the several elements contributing to manufacturing cost. Past studies estimate the design phase to account for 6% of the overall product development cost whereas 70% of production cost is determined at the design stage (Shehab and Abdalla, 2001; Hundal, 1993). Shehab and Abdalla (2001) advise that to optimise product cost, greater effort must be devoted to the design phase of product development since it is more effective to reduce cost at this stage than at the manufacturing stage. Early supplier involvement is a supply management tool that contributes to cost reduction at the product design stage, hence emphasise the importance of supply management in overall cost reduction strategies.

Murray (1988) identifies three dimensions of cost-saving opportunities. These dimensions are the learning or experience curve, economies of scale and preferential access to distribution channels. The learning cost experience provides cost advantage to firms in industries with sufficiently steep learning cost curve. Lapre *et al.*, (2000) demonstrated that efforts to improve quality can have a positive effect on learning particularly where such efforts lead to acquiring both know-why and know-how. This probably explains why quality improvement has been associated with cost reduction in the literature. Preferential access to a distribution channel may also result in cost savings depending on the industry structure. Murray (1988) cites forward integration as capable of generating efficiencies by capturing the best locations for distribution to the detriment of competitors. Finally, economies of scale provide a viable option for cost minimisation. Willyard and McClees (1987) estimate that variable cost is bound to reduce by 22% whenever production volumes double in some high-tech applications. The sustainability of this strategy is however dependent on how many firms in an industry have attained the unique optimal scale of operation.

2.4.7 Speed as a dimension of operations performance

In the wake of growing global competition, product availability which is a function of time, constitutes an influential factor in attaining a competitive edge. Thomas *et al.*, (2011) point out that providing customers with time and place utility by delivering products at the right place at the right time is a key success factor on which supply chains depend. On-time delivery of product and services has become an important basis for competition (Urban, 2009). Kim and Tang (1997) state that low cost and high quality were the dominant operations performance dimensions which served as fundamental source of competitive advantage to manufacturers in the early

1980s. Kim and Tang (1997) further note that with the increasing significance of time as a competitive dimension, emphasis on low cost and high quality are no longer sufficient to deliver a sustainable competitive advantage to manufacturers. Subsequently time has emerged as the “next strategic frontier” (Stonich, 1990) and “the next battleground” (Blackburn, 1991) for the majority of manufacturers.

The focus on time in competition has been termed as time-based competition (Droge *et al.*, 2004; De Toni and Meneghetti, 2000; So and Song, 1998; Blackburn, 1991). De Toni and Meneghetti, (2000) traced the emergence of the term “time-based competition” to George Stalk and the Boston Consulting Group who coined the term to emphasise the importance of time in the renewed strategic movement. Manufacturing firms seem to have migrated from an era of industrial systems propelled by efficiency to a post-industrial systems era characterised by informed, demanding and sophisticated customers. The post-industrial systems era is predominantly driven by quick response to customer demands (Koufteros *et al.*, 1998). In this era, customers are generally informed about market conditions, hence delays in delivering products and services would not be countenanced as they know where to turn to for viable alternatives. In the words of Stalk and Hout (1990), “Customers can be a nuisance. First, they want what they want. Then, they want it when they want it”. In much recent times however, not only do customers demand what they want when they want it, but want what they want when and where they want it. Such customer characteristics require the business to be agile which has speed as a critical component.

Consequently, since the 1990s, time-based competition has been recognised as key success factor within a competitive environment (Urban, 2009; Davis *et al.*, 2002; So and Song, 1998; Blackburn, 1991; Stalk and Hout, 1990). So and Song (1998) and Urban (2009) observe that in recent times, service firms for example, are exploiting delivery time guarantees as a strategic marketing tool to compete in the marketplace although they admit that guaranteed superior service cost customers a price premium. The work of Miller and Roth (1988) and Blackburn (1991) found that the attention of most manufacturers have shifted from prioritising cost and quality from the early 1980s to speed in the 1990s. Fast response time has become a criterion that firms must meet in order to be considered as a potential supplier. Manufacturers are capitalising on time as the source of their differentiation strategy to enhance their competitiveness (Davis *et al.*, 2002; Bower and Hout, 1988). The evolving trend has resulted in time-based manufacturing, which is a direct response to time-based competition.

2.4.7.1 Time-based manufacturing

Time-based manufacturing has been defined by Koufteros *et al.*, (1998) as an externally-focused production system that emphasizes quick response to changing customer needs with a primary objective of reducing end-to-end time in manufacturing. This approach to manufacturing adopts practices that reduce customer response times to enhance firm competitiveness (Blackburn, 1991; Lindsley *et al.*, 1991). Time-based manufacturing is a strategy offering a comprehensive framework to build excellence in manufacturing to meet time-related dynamics in competition (Koufteros *et al.*, 1998). It is a strategy that advocates the use of time-based philosophies to enhance total firm responsiveness.

There appears to be multiple dimensions of time-based manufacturing. Droge *et al.*, (2004) observe that whereas some firms have sought to accelerate product development and launch speeds, others have concentrated on improving different facets of speed including manufacturing, delivery, and customer response times. This is understandable because the value of time is applicable to every facet of the entire value delivery system, from sourcing of materials to customer order fulfilment. Time-based manufacturing squeezes time out of all the facets of the value chain using a set of practices designed to reduce throughput time (Koufteros *et al.*, 1998).

2.4.7.2 Time-based manufacturing practices

The emergence of time as a source of competitive advantage has been associated with certain practices. Nahm *et al.*, (2006) refer to these practices as time-based manufacturing practices (TBMP). TBMP are meant to enhance firm responsiveness by contracting the total time for a value delivery system. Time-based manufacturers concentrate effort on the customer and offer a comprehensive framework to build excellence in manufacturing. TBMP congregate into a system that can quickly design, produce, and deliver a variety of products targeted to meet specific customer needs (Tu *et al.*, 2001; Rondeau *et al.*, 2000). Rondeau *et al.*, (2000:511) describe operations of time-based manufacturers as having the ability to “involve shop floor employees in problem solving, reengineer setup, implement cellular manufacturing, initiate preventive maintenance programmes, enhance quality improvement efforts, cultivate relationships with dependable suppliers, and achieve pull production”. This statement summarises the key practices of time-based manufacturers.

TBMP is thus characterised by the elements: (1) shop floor employee involvement, (2) set-up time reduction, (3) cellular manufacturing, (4) quality improvement efforts, (5) dependable suppliers, (6) preventive maintenance and (7) pull production (Nahm *et al.*, 2006; Tu *et al.*, 2001; Rondeau *et al.*, 2000; Koufteros *et al.*, 1998; Blackburn, 1991). Koufteros *et al.*, (1998) stress that these practices constitute essential elements of a manufacturing typology focusing on time as a competitive strategy.

Blackburn (1991) traces the beginning of the concept of time-based manufacturing to the emergence of just-in-time (JIT) manufacturing. JIT manufacturers were known to be the first implementers of time-based manufacturing having realised the potential of the philosophy to reduce response time and enhance flexibility (Tu *et al.*, 2001; Abegglen and Stalk, 1985). Tu *et al.*, (2001) maintain that JIT and time-based manufacturing address the same phenomena but with different emphasis; whereas time-based manufacturing focuses externally by reducing throughput time to achieve a quick response to customer demands, JIT is internally focussed, targeted at eliminating waste (non-value-adding activities) in the production system to achieve cost reductions.

2.4.7.3 The impact of speed on competitive performance

The literature is replete with studies showing evidence that compression of time, otherwise referred to as speed, can have significant positive impact on firm performance (see Nahm *et al.*, 2006; Davis *et al.*, 2002; De Toni and Meneghetti, 2000; Vickery *et al.*, 1997). Nevertheless, Narasimhan and Jayaram (1998) found that no relationship exist between reduction in customer response time and firm performance even though the samples included North American and European firms. In contrast to Narasimhan and Jayaram (1998) however, various industry-based research have supported the hypothesis that time-related practices reduce customer response time and enhance organisational competitiveness (Nahm *et al.*, 2006; Roth and Miller, 1992; Lindley *et al.*, 1991). Speed in manufacturing is thought to shorten cycle times to achieve faster response to customer requirement (Koufteros *et al.*, 1998).

Spanner *et al.*, (1993) note that to compete on time, it is imperative to rethink and redesign processes for time-sensitive operations. Empirical evidence from US and European plants have revealed that cutting end-to-end manufacturing time creates successive actions which enhance productivity and stimulate cost advantages (Schmenner, 1988). According to Moorman and Miner, (1998), focusing on cycle

times enable firms to minimise the time it takes from product design to market introduction through convergence of planning and improvisation in new product development. Similarly, Stalk and Hout, (1990) posit that emphasis on cycle time positively influences firm performance although Davis *et al.*, (2002) contend that successful cycle time strategy should not be undertaken in isolation of particular generic strategy adopted by the firm. Davis *et al.*, (2002) explain further that a firm risks not being able to meet customer expectations if the implementation of cycle time strategy is disconnected from the firm's competitive strategy.

Attention to speed can potentially generate improvements in quality. Spanner *et al.*, (1993) maintain that continuous efforts to reduce cycle times in all functions of the firm can serve as a tool to diagnose other problems, such as bottlenecks or deteriorating quality, to be managed appropriately. In such systems, emphasis is placed on designing and manufacturing quality into the product rather than inspecting quality in the finished goods. Spanner *et al.*, (1993) again observe that time-based manufacturers tend to create long-term strategic alliances with their suppliers which enables suppliers to better appreciate the manufacturer's product needs and build commitments to product quality for mutual success. Poor product quality leads to manufacturing delays as extra time is needed to effect corrections. Quality improvement efforts can therefore make available to customers products that meet their time, cost, and performance targets (Tu *et al.*, (2006). Preventive maintenance is a key practice in time-based systems. This ensures that frequent breakdown of machinery is avoided (Nahm *et al.*, 2006) resulting in improved quality that yields flow advantages. The combined effect of these efforts is significant improvement in a firm's quality level and a subsequent positive effect of firm performance (Anand, 2006).

Studies have shown that the focus on speed in manufacturing strategy is very much associated with increased productivity (Nahm *et al.*, 2006; Schmenner, 2001, 1991; Stalk and Hout, 1990). The theory of Swift, Even Flow, developed by Schmenner (2001) for example posit that firms emphasising flow would increase their productivity much more than firms focusing on productivity. Flow in this sense implies an attention to speed and variability reduction. De Treville *et al.*, (2004) note that increasing variability in demand calls for a faster access to demand, hence a decrease in lead-times. In this direction, Schmenner (1988) point out that a cut in throughput time leads to actions that enhance productivity.

Little's law (Little, 1961) stipulates that time and inventory are directly related; reducing manufacturing time leads to reduction in inventory levels. The law propounds that, time-in-process equals work-in-process multiplied by mean time between successive releases. This means that, given a level of capacity, contracting lead-time can reduce work-in-progress to engender high inventory turnover and a decrease in working capital. Little's law implies that improving speed through shortening manufacturing lead-times does not only enable firms to reduce work-in-progress inventory but also finished goods inventory. Koufteros *et al.*, (1998) supports this claim with the view that a faster manufacturing set-up time reduces the need for inventories. The direct benefit of reduced inventories is the minimisation of the risk of product obsolescence (Kim and Tang, 1997) and other costs associated with stockholding such as holding and ordering.

2.4.8 Flexibility as a dimension of operational performance

Flexibility denotes the quality of being able to respond or conform to changing situations or entirely new environments. Flexibility as a manufacturing strategy appears to be a complex, multi-dimensional concept and is defined on a meta-level as the ability to adapt to environmental change (Hallgren and Olhager, 2009; Gupta and Goyal, 1989). A more composite definition is provided by Upton (1994) who describe flexibility as the ability to change or react with little penalty in time, effort, cost or performance. Comparable to Upton's (1994) definition, Zhang *et al.*, (2003) define flexibility as the organisation's ability to meet an increasing variety of customer expectations without excessive costs, time, organizational disruptions, or performance losses. The definitions sampled here suggest that flexibility generally implies the ability of a system to quickly adjust to changes with minimal cost. Manufacturing flexibility can be conceptualised as representing a manufacturing system's ability to successfully adapt to environmental changes and process requirements.

Lloréns *et al.*, (2005) state that flexibility represents a fundamental property of a manufacturing system. Manufacturing flexibility remains a key strategic objective of many manufacturing firms particularly in the twenty-first century where firms are faced with a high level of uncertainty (Beach *et al.*, 2000). Thus there seems to be an increasing significance of flexibility as a manufacturing dimension among manufacturing firms as they are frequently faced with high-demand volatility in relation to total volume, product mix and customisation requirements; manufacturing firms face an increasingly uncertain external environment as the rate

of change in customer expectations, global competition, and technology accelerates (Lloréns *et al.*, 2005; Zhang *et al.*, 2003; Grubbström and Olhager, 1997). Zhang *et al.*, (2003) opine that flexibility of manufacturing has become a strategic imperative enabling organisations to cope with environmental uncertainty relating to customer requirement. To effectively manage environmental uncertainty, Lloréns *et al.*, (2005) posit that the firm would need to possess some degrees of flexibility in order to stay competitive and profitable.

Today's fast paced business environment is characterised by increased competition, global markets, shorter product life cycles, product variety and more demanding and unpredictable customers leading to a higher level of environmental uncertainty and variability (Chandra *et al.*, 2005; Vokurka and O'Leary-Kelly, 2000). Chandra *et al.*, (2005) argue that demand uncertainty is expected to increase in the future because of more intense pricing competition and less predictable behaviour of consumers. Manufacturing flexibility has emerged as a competitive weapon reflecting the firm's ability to respond to changes in customer needs as well as to unanticipated changes stemming from competitive pressures (Vokurka and O'Leary-Kelly, 2000).

2.4.8.1 Dimensions of flexibility

Researchers generally agree that manufacturing flexibility is a multidimensional concept (D'Souza and Williams, 2000; Sethi and Sethi, 1990). As a result of its multi-dimensional nature, researchers suggest that it could be measured in a multiple of ways (Chang *et al.*, 2006; Koste *et al.*, 2004; Sethi and Sethi, 1990). Vokurka and O'Leary-Kelly, (2000:486) confirm this position with the comment that "the term manufacturing flexibility does not refer to a single variable, rather manufacturing flexibility refers to a general class of variables". Consequently a broad range of dimensions of manufacturing flexibility can be identified in the literature. Gerwin (1987) explains that specific types of manufacturing flexibility match particular sources of environmental uncertainty. In other words, much as environmental uncertainties are varied, so must there be different flexibility types to manage them. The underlying premise is that the type of manufacturing flexibility a firm adopts is partly dependent on the source of environmental instability it faces or anticipates (Vokurka and O'Leary-Kelly, 2000). Beach *et al.*, (2000) state that, it is a popular view among many authors that the classification of flexibility dimensions by Browne *et al.*, (1984) represents the most comprehensive list of dimensions. The classification by Browne *et al.*, (1984) is presented in the Table 2.2.

Table 2.3: Browne's original taxonomy of flexibility types

Flexibility type	Definition
Machine	the ease of making the changes required to produce a given set of part types
Process	the ability to produce a given set of part types, each possibly using different materials, in several ways
Product	the ability to changeover to produce a new (set of) product(s) very economically and quickly
Routing	the ability to handle breakdowns and to continue producing the given set of part types
Volume	the ability to operate an FMS profitably at different production volumes
Expansion	the capability of building a system and expanding it as needed, easily and modularly
Operation	the ability to interchange the ordering of several operations for each part type
Production	the universe of part types that the FMS can produce

Source: Beach *et al.*, (2000)

A number of authors have reclassified Browne's original taxonomy of flexibility types. Among these are Gerwin (1993), D'Souza and William (2000) and Koste *et al.*, (2004). The flexibility types identified by these three authors are summarised in Table 2.3.

It is well established from the literature therefore that manufacturing flexibility can be viewed in many perspectives. Researchers generally agree on the importance of manufacturing flexibility but are somewhat divided on the dimensions of this important construct. However, the two most widely cited dimensions are volume flexibility and product-mix flexibility (Lloréns *et al.*, 2005; Bengtsson and Olhager, 2002).

Table 2.4: Flexibility classifications

Flexibility type	Authors
Machine	Koste <i>et al.</i> , (2004).

Process	D'Souza and William (2000)
Labour	Koste <i>et al.</i> , (2004).
Rerouting	Gerwin (1993),
Volume	Gerwin (1993), D'Souza and William (2000)
Variety	D'Souza and William (2000)
Changeover	Gerwin (1993),
Responsiveness	Gerwin (1993),
Mixed	Gerwin (1993), Koste <i>et al.</i> , (2004).
Materials	Gerwin (1993), D'Souza and William (2000), Koste <i>et al.</i> , (2004).
Modification	Gerwin (1993), Koste <i>et al.</i> , (2004).
New Product	Koste <i>et al.</i> , (2004).

2.4.9 Dependability as a dimension of operational performance

Relatively very few attempts have been made to define dependability in the literature. Often times, dependability is akin to reliability, which is viewed as an element of a quality strategy. Dependability may also refer to the ability to deliver on promises to customers, which is an element of a customer responsiveness or service strategy (Lillis, 2002). The attempts at defining dependability seem to view dependability of a manufacturing process from different perspectives. Some authors see dependability as relating to deliveries; full and timely deliveries to customers (on-time in full delivery-OTIF) while others associate dependability with the product and the operational process; that products conform to specification and will be available when needed. Dangayach and Deshmukh (2006) perceive dependability as relating to delivery and subsequently define it as the ability of the manufacturing process to meet required delivery schedules. To Amoako-Gyampah (2003), dependability refers to how fast and reliable a delivery system is. In other words, if a manufacturing system can quickly and reliably deliver customer requirements then it satisfies the dependability criterion. This view of dependability is shared by Das and Narasimhan (2001) and Davaraj *et al.*, (2001).

Flynn *et al.*, (1999) operationalised dependability using conformance to specification, on-time delivery and service. The conceptualisation of dependability by Flynn *et al.*, (1999) suggests that creating a dependable manufacturing system that customers can rely upon requires other interfaces of the manufacturing process to be dependable too. For instance, if a firm could deliver in full to meet customer

demand dates but products fall short of conformance to specification, dependability will be significantly affected. In the same way, dependability will be far-fetched if firms adequately meet delivery schedules with product specifications but are unable to respond effectively to customer concerns or queries (service). Dependability thus needs to be demonstrated not only in one facet of the manufacturing process but in a number of areas, including delivery, production and service. Sharing in this broader view, Ahmad and Dhafr (2002) discuss dependability as consisting of four key elements:

- 1) Low level of customer complaints; customer complaints could arise from any part of the business. The complaints could be related to product quality, shipment arrangements, packaging, shortages, and late deliveries among others. Excessive customer complaint is an indictment on the dependability of the manufacturing system implying that the less number of customer complaints, the more dependable the manufacturing system.
- 2) On-time-in-full delivery to customers (OTIFc); this relates to delivery of customer orders on time and in full without defects in the product, packaging, transport arrangement or supporting documentation. Thus the manufacturing system must be capable of adhering to the first agreed demand date for each order and to satisfy the order in full with no defects. OTIF therefore is a key factor in assessing the dependability of operations.
- 3) On-time-in-full delivery from suppliers (OTIFs); Ahmad and Dhafr (2002) argue that the supplier plays a crucial role in building up a dependable manufacturing system. This is because suppliers' activities can dramatically affect the dependability of a firm; the receipt of raw materials and other supplies on time and in full with no defects in the product, packaging, transport arrangement or supporting documentation will invariably affect the ability of the firm to meet customer orders.
- 4) Overall equipment effectiveness (OEE); OEE reflects the general dependability of the manufacturing system. It gives an indication of how reliable and capable the production resources are. Product rate, quality rate and availability are the main facets of OEE (Ahmad and Dhafr, 2002). The ability of the production resources to deliver the outstanding performance as expected enhances dependability.

Dependability is an order-winner dimension (Adamides and Voutsina, 2006; Kakati, 1997). In the Sand cone model developed by Ferdows and De Meryer (1990)

quality and dependability are seen as necessary preconditions for achieving improvements in flexibility, speed and cost efficiency. Although the Sand cone model has been widely cited in the literature, it has been criticised on the grounds that very little empirical evidence exist to support it (Flynn and Flynn, 2004).

In spite of the criticism, leading Japanese manufacturing companies have been found to follow the Sand cone model in the improvement of their manufacturing performance. They focus first on quality to nurture the seeds for other organisational abilities. While the effort to enhance quality is underway, attention partly shifts to making the manufacturing system more dependable. Guaranteeing a certain level of quality and dependability, manufacturing operations can qualify for becoming cost-efficient. High skills in quality, dependability and cost efficiency build competency and become the basis for flexible manufacturing (Ferdows and De Meryer, 1990; Olhager, 1993). In the United States and Japan for example, higher levels of dependability has been found to be associated with greater flexibility. That is, companies that made their production system more reliable could also run them more flexibly (Flynn and Flynn, 2004; Szejczewski *et al.*, 1997).

The manufacturing challenge is to create a cost-efficient and flexible system delivering reliable products that contribute to customer service and encourage customer dependence. Kakati (1997) observe that achieving dependability results in internal benefits to the firm and external benefits to the customer. Among the internal benefits are stability in operations, reduced inventory levels and fast throughput. On the external front, dependability enhances customers' experience as customers become more satisfied, helps customers maintain their own internal dependability, and reduces repeated enquiry and tension. Indirectly, dependability is a strategy for customer retention, premium price and more customer goodwill. To this end, Theodorou and Florou (2008) argue that the target of dependability is to create tighter relationships with customers through enhanced delivery speed, after sales service and products reliability. Excellence in these areas is likely to improve the competitiveness of the firm. In support of this notion, Albino and Garavelli (1998) concluded in their study that based on economic considerations, the effect of resource dependability on system performance can lead to optimal system configurations.

Amoako-Gyampah (2003) maintains that dependability is an important component of value to the customer stressing that in an environment of increasing competition, threats from imported goods and legislative changes, incorporating dependability as

a manufacturing strategy will enable firms to develop that customer loyalty needed to be successful. In today's business environment where manufacturers need to deliver customised and innovative products, a dependable production system is an essential success criterion. The programme relating to improving the dependability of the production process according to Ferdows and De Meyer (1990) include making deliveries more reliable, learning more about the process and generally making the production process more reliable and predictable.

2.5 Prioritisation of performance dimensions

The prioritisation of operations performance dimensions represents the firm's strategic focus in terms of attaining or maintaining competitive advantage (Rosenzweig and Easton, 2010). Operations performance dimensions are often conceived as competitive priorities constituting part of a wider operations strategy intended to satisfy market demands better than competition. These competitive priorities consist of a collection of policy decisions and goals relating to the dimensions of quality, cost, flexibility, speed and dependability, to be focused on by the operations function and consistent with the corporate business strategy. It has long been argued by Hayes and Wheelwright (1984) that firms differ on the level of emphasis given to each competitive priority. Firms generally differ in terms of the business environmental conditions they are confronted with. Studies have found that even competing within the same business environment, firms may differ in their strategic intent. Kathuria (2000) for example found that different groups of manufacturers emphasize different sets of priorities, even within the same industry. Thus unique business intent relative to competition may explain the diversity in the prioritisation of the operations performance dimensions among firms.

It is reasonable to expect differences among firms in the level of emphasis on the competitive priorities as manufacturers set priorities that are consistent with and supportive of their business or corporate strategy. Nair and Boulton (2008) assert that operations strategy which requires clear competitive priorities and strategic choices is driven by a corporate strategy. The prioritisation of operations performance dimensions enables the firm to configure and maximise resources to either satisfy customers or build a unique business identity. Nair and Boulton (2008) emphasise the need for firms to as a matter of importance, adapt their competitive priorities and operations strategies to the fundamental changes in the product-market requirement of differing industrial ecosystems. The emphasis need to be made that, the setting of competitive priorities exists within the context of operations

strategy. It is therefore important to understand operations strategy as being fundamental to making those strategic and tactical operational decision choices affecting consumer demand (Peng *et al.*, 2011; Rosenzweig and Easton, 2010). Lawson (2003b) argues that the types of judgements relating to operations decisions required to provide support for the operations strategy vary among firms and depends very much on the particular industry.

2.5.1 The nature of operations strategy

A number of competing business environmental conditions impacting on the firm requires firms to strategize their operations in order to survive. In recent times, global competition, product customisation, customer sophistication and market awareness, and technological advances are among the key environmental conditions compelling firms to develop operations strategy. Schroeder *et al.*, (2011) describe the operations function as the 'profit generating engine of any company' to emphasise its importance. Operations strategy ensures a deliberate matching of operations resources with market requirement in order to achieve business objectives (Senaji and Nyaboga, 2011). Operations strategy enables the firm to perform its activities differently by employing creativity and insights to differentiate itself from the competition. Operations strategy may be seen as the effective deployment of manufacturing strength as a competitive weapon for achieving business and corporate goals (Gupta and Maita, 2013; Swamidass and Newell, 1987). It is a strategy that seeks to make the firm, its products and services a preferred choice to the customer.

An informative definition of operations strategy given by Lawson (2003a:80) describes the concept as:

.....major decisions about and strategic management of: core competencies, capabilities and processes; technologies; resources; and key tactical activities necessary in any supply network, in order to create and deliver product or services and the value demanded by a customer. The strategic role involves blending these various building blocks into one or more unique organisational-specific, strategic architecture.

Lawson (2003b) explains that an operations strategy revolves around a pattern of choices or decisions dealing more with the firm's transformation systems. The choices incorporates competitive environmental changes which impacts on the business. Operation strategy is executed in the form of patterns of decisions which

shape the long-term capabilities and contribute to the overall corporate strategy, through the reconciliation of market requirements with operations resources (Senaji and Nyaboga, 2011). Martín-Peña and Díaz-Garrido (2008) identified competitive priorities and operations decisions or policies as the two fundamental components that shape the contents of an operations strategy. The authors described competitive priorities as the collection of goals pursued by the operations function which are consistent with the corporate business strategy. The priorities highlight the spotlights of operations that must be targeted by the firm to deliver organisational competitive advantage. It is the focus on these competitive priorities that guide the strategic decisions or choices.

Operations strategic decisions or policies thus comprise the set of actions that help achieve the competitive priorities and corporate goals. Such key policy decisions according to Martín-Peña and Díaz-Garrido (2008), may fall into two categories: structural and infrastructural decisions. Jentsch *et al.*, (2012) state that the structural category comprises process technology, capacity, facilities, and the vertical integration of the enterprise. The infrastructural category on the other hand, covers human resources, organization, quality, production planning and control, new product development, and performance measurement systems (Jentsch *et al.*, 2012; Rudberg and Olhager, 2003). Rosenzweig and Easton (2010) argues that it is through these structural and infrastructural as well as integration choice decisions that manufacturers acquire and maintain competitive capabilities. Within the organisational hierarchy, operations strategy can occur at either the corporate level or at the functional level. At the corporate level, operations strategy takes a broad perspective over a set of related or separate businesses while at the functional level, operations strategies represent one of the functional strategies at the business level (Gupta and Mui, 2013). Over the long term, the firm needs to make strategic choices among the five operations performance dimensions as already discussed.

An empirical study by Sweeney and Szwejczewski (2000), established that four generic operations strategies - variant producers, innovators, mass producers, and mass customisers - exist within the UK industry. The classification of the four generic strategies was informed on the basis of six competitive priorities. These priorities were, product cost reductions, changes in product design, quality, product performance, 'quick-as-possible' delivery, and just-in-time delivery. Zanon *et al.*, (2012) state that the key objective of an operations strategy is to balance the operations competitive priorities such that they are aligned with the firm's

overarching competitive strategy to ensure that they realistic and viable. Three models of operations competitive priority are generally discussed in the literature.

2.5.2 Models of competitive priorities

The question about whether manufacturers can focus on multiple competitive priorities simultaneously or achieve strength on multiple competitive priorities without sacrificing the performance of another has been a long-standing debate in the operations strategy literature (Rosenzweig and Easton, 2010). Three perspectives exist in the operations strategy literature regarding this debate. One perspective – the trade-off model – advocates for manufacturers to make choices with regards to the competitive priorities which should receive the greatest investment in terms of time and resources. A second perspective – the cumulative model – champions the notion that manufacturers should consider competitive priorities as complementary rather than mutually exclusive capabilities. The third perspective – the integrative model – attempts to reconcile the trade-off and integrative models. It is worth examining each perspective a little in detail.

2.5.2.1 The trade-off model

The trade-off model of manufacturing strategy was propagated by early operations strategy researchers such as Hayes and Wheelwright (1984), Fine and Hax (1985) and Skinner (1969). The trade-off model has commonly been interpreted to mean that companies cannot perform well on more than one dimension simultaneously; an improvement in one dimension would have to be traded off for poorer performance along another (Hallgren *et al.*, 2010). The model makes the fundamental claim that it is difficult for manufacturers to attain excellence in all priorities at the same time. Subsequently, operations functions need to prioritize their competitive strategic goals and develop certain manufacturing capabilities accordingly. Trade-offs among the competitive priorities will enable the manufacturer to focus resources on achieving a firm-specific capability relative to some priorities. The trade-off model is the oldest among the three perspectives on manufacturing strategy and could be sourced to the seminal work of Skinner (1969) titled *Some important trade-off decisions in manufacturing – or “you can’t have it both ways”*. Professor Wicham Skinner from the Harvard University argued that:

A production system inevitably involves trade-offs and compromises and so must be designed to perform a limited task well, with that task defined by corporate strategic objectives....Like a building, a vehicle or a boat, a

production system can be designed to do some things well, but always at the expense of other abilities (Skinner, 1969:138).

Skinner's (1969) idea of operations strategy trade-offs is seen as intuitively attractive. Slack and Lewis (2008:56) supports the trade-off model on the notion that any operation has resource-constraints which makes it impossible for it to "provide all things to all people". The implication is that, excellence in one competitive priority will reduce performance in one or some of the other priorities. Slack and Lewis (2008:56) emphasise that operations functions that make effort to excel in everything relating to quality, cost, flexibility speed and dependability dimensions finish up by being mediocre at everything. Essentially, the trade-off notion makes the claim that manufacturers cannot attain excellence in the competitive priorities of quality, cost, flexibility speed and dependability simultaneously, hence the need for choices to be made between competitive priorities. The choice decisions are informed by the relevance of the priorities, determined by competitive market characteristics relative to the firms anticipated market position; and that aspects of performance will to some extent trade-off against each other. The management of trade-offs is therefore essential to enable the firm develop an operations strategy adapted to its competitive environment (Zanon *et al.*, 2013).

Although Skinner (1996) raises concerns that the commonly understood interpretation of the trade-off model is a misrepresentation, the model has frequently received empirical support (Christiansen *et al.*, 2003; Boyer and Lewis, 2002; Pagell *et al.*, 2000). However, some studies (e.g. Avella *et al.*, 2011; Flynn and Flynn, 2004; Boyer and Lewis, 2002) have refuted the claim in the trade-off model. Mady (2008) for instance did not find sufficient evidence that support the trade-off model. Similarly, Größler and Grübner (2006) rather found evidence in support of the cumulative nature and supportive relationships among different manufacturing capabilities contrary to the central theorem espoused in the classical trade-off model. Thus some researchers hold the view that manufacturing capabilities can be developed simultaneously rather than being mutually exclusive.

2.5.2.2 The cumulative model

The cumulative model posits the view that the intensification of global competition exerts pressure on manufacturing firms to improve their operations performance on all frontiers of the performance dimensions. The cumulative model contrasts the classical trade-off model. Slack and Lewis (2008:56) maintain that cumulative view

has come from a “new breed of more evangelical academics and consultants inspired by the perceived success of some (mainly Japanese) companies in overcoming, at least some, trade-offs, most notably that between cost and quality”. The cumulative capability model can be traced to the early works of Nakane (1986), followed by Ferdows and DeMeyer (1990). The sand-cone model proposed by Ferdows and DeMeyer (1990) suggests that an accumulative structure underlays the relationship between competitive priorities. Ferdows and DeMeyer (1990) maintain that improvements in quality will lead to improvement in flexibility, dependability and cost performance. The model supports the notion that quality is the foundation for developing competences in other priorities.

Proponents of the cumulative view assert that firms can simultaneously do well on multiple competitive priorities. Underpinning the view is the claim that improvement in certain capabilities can lead to subsequent improvement in some other competitive priorities. The cumulative model rejects the trade-off view on the basis that it is neither desirable nor necessary (Boyer and Lewis, 2002). Boyer and Lewis (2002) cites the reason for this rejection as increased global competition and advanced manufacturing technology. Consequently, world-class manufacturers attempt to reinforce their market position by focusing on multiple capabilities. Manufacturers adopting the cumulative model are believed to follow a pre-specified order in which capabilities are developed. The cumulative model embraces the bottom-up approach in capability development. This viewpoint projects competitive priorities as being complementary contrary to the mutually exclusive position adopted in the trade-off model.

Größler and Grübner (2006) argue that modern manufacturing systems can enable improvements in multiple manufacturing capabilities concurrently and may explain why best performing manufacturing plants exhibit improvements in all strategically relevant capabilities. Studies have shown that indeed high performing firms tend to adopt the cumulative approach in their manufacturing strategy development. Such firms are able to compete successfully on multiple performance dimensions. Sum *et al.*, (2004) found that high performing firms in Singapore were able to compete successfully on multiple priorities. Following a review of the operations strategy literature, Martín-Peña and Díaz-Garrido (2008) established that the cumulative model is one of the three dominant strategies reported on. In this regard, firms attempt to obtain competitive advantage over a set of operations competitive priorities all at the same time. Empirical evidence have been found to support the cumulative model. Größler and Grübner (2006) confirmed all five hypothesis

concerning the accumulative effects between competitive priorities. Boyer and Lewis (2002) also empirically confirmed the cumulative prediction with the finding that manufacturing plants increasingly consider priorities of quality, delivery, flexibility and cost as all being vital for competitive success.

Studies on the cumulative assumption have frequently reported on quality as a primary priority that most manufacturers focus on to build other capabilities in succession. Hallgren *et al.*, (2010) was emphatic that quality is the foundation for developing other capabilities. Further capabilities are only developed when a sufficient level of the lower level priority is achieved (Jentsch *et al.*, 2012). The cumulative model has however been questioned on the basis that, empirical evidence indicates that the process of capability accumulation still reflects the trade-off relationships but the significance of the trade-off effect is marginalised by technological and organisational improvements (Hallgren *et al.*, 2010; Boyer and Lewis, 2002). Größler and Grübner (2006) argue that sand-cone model which is the bedrock of the cumulative model does not suggest the complete absence of trade-off effects neither does it suggests that each capability can exclusively be improved at the expense of others; rather, it suggests the existence of the trade-off relationships but only in certain directions. This notion suggests a middle ground between the trade-off and cumulative models as viable performance improvement path for developing competitive priorities.

2.5.2.3 The integrative model

Operations strategy is said to be the result of an iterative process that employs elements of both the trade-off and cumulative perspectives (Beckman and Rosenfield, 2008). This viewpoint summarises the position of the third perspective in operations strategy development, often times referred to as the hybrid or the integrative model. The integrative model appears to be a better reflection of what exists in practice relating to strategy development; operations may trade-off competitive priorities in order to position the business relative to market characteristics, but such strategic choices may equally have accumulative effects on other competitive capabilities.

Even though the trade-off and cumulative models have been empirically supported to some extent, some empirical studies have also established a combination of both models as viable option for competitive priority development (e.g. Hallgren *et al.*, 2010). In this regard, a middle ground between the trade-off and cumulative models is seen as an appealing position for operations to develop the relevant

competitive priorities that would allow operations to achieve a balance and overcome intrinsic trade-offs in the longer term. It has been suggested that while the operations function is required to clearly position its activities to achieve a balance between competitive priorities relevant for competition, there is also the longer-term imperative for operations to overcome the intrinsic trade-offs imposed by operations resource constraints (Slack and Lewis, 2008:57).

In a study of 62 Kuwaiti plants, Mady (2008) established a strong support for a significant positive correlation between several pairs of competitive priorities, including, quality improvement, flexibility, and innovativeness. In the same study however, Mady (2008) found “on-time delivery” as the most important priority emphasized by Kuwaiti manufacturers, while “flexibility” was identified as the least important competitive priority plants consider. Similarly, Hallgren *et al.*, (2010) in a study of 211 plants from seven countries, found empirical support for both the cumulative and the trade-off relationships between competitive priorities. The authors found that a high level of quality was a prerequisite for a high level of delivery performance. No cumulative pattern was however found between cost efficiency and flexibility. On the contrary, the study found that cost efficiency and flexibility are developed in parallel. Hallgren *et al.*, (2010) conclude that attaining a balance between cost efficiency and flexibility is subsequent to developing high levels of quality and delivery performance. Quality and delivery performance were also found by Chi (2010) to be the most important competitive capabilities considered by US high performing technical textile manufacturers though low cost and flexibility also do receive some level of attention.

Operations strategy development is therefore not a purely linear process as suggested by the trade-off and cumulative models (Shavarini *et al.*, 2012). The authors argue that manufacturers frequently adopt an integrative approach in their strategy development. Thus, firms may develop the relevant capabilities which allow them to maintain a predetermined market position by simultaneously leveraging their capabilities to identify new business or market opportunities. The process suggests that, while the choice of some competitive priorities over others may be necessary due to market positioning and some resource constraints, it is equally important that operations cumulatively builds capabilities allowing it to measure up with emerging market trends and changes. This is the bilateral integrative approach to operations strategy development.

2.5.3 Competitive priorities of SMEs

The operations strategy literature examining the competitive priorities pursued by firms largely focus on large firms (e.g. Zannon *et al.*, 2012; Nauhria *et al.*, 2011; Chi 2010; Rytter *et al.*, 2007). Danagyach and Deshmukh (2001) reviewed the literature and concluded that most empirical studies on manufacturing strategy were large company-centred and conducted in highly industrialized nations. Following this observation, Dangayach and Deshmukh (2001) called for more research in the competitive operations priorities of small firms. Thus, with limited literature knowledge, very little seems to be known about the competitive priorities pursued by SMEs.

The relative neglect of SMEs in the operations strategy literature may be attributed to the perception that the formulation of firm-specific competitive priorities is the preserve of world-class firms. More often than not, SMEs are perceived to follow informal strategies pioneered by their founders. SMEs are largely owner-centric. The business evolves on the owner's future intent. This future intent is found to be influenced by the owner's life style. Littunen (2000) maintain that the entrepreneur's personal life drives the business activities of the new firm. Thus, the personality characteristics of the owner are very influential in determining the strategic direction of the firm, including the competitive priorities that the firm chooses to focus on (Gupta and Muita, 2013).

A few studies have however investigated the operations strategy pursued by SMEs. Some of these studies include, Thürer *et al.*, (2013); Aranda (2002), and Kathuria (2000). Mady (2008) found evidence suggesting that to some extent, small firms do address the question of which competitive priority to focus on and what importance level should be assigned to each priority. Though the owner's personality traits are known to affect the choice of competitive priorities, market characteristics and imperatives are also taken into consideration by SMEs. For example, the company must at least ensure that its products meet certain minimum quality requirement as a prerequisite to compete in the global economy. Kethuria (2010) emphasise that although cost is an important performance dimension in all manufacturing environments, quality is more critical because irrespective of the cost, products with quality defects fail to sell. Consequently, all firms whether small or large, are expected to consider quality as a key competitive priority.

There is a divided opinion in the literature regarding the most appropriate competitive priority development model that SMEs by their nature of operations

ought to pursue. Some studies have argued that due to resource constraints, lack of managerial capacity and lack of capacities for economies of scale, SMEs are better off confining and dedicating themselves to a limited range of priorities (Wood Jr *et al.*, 2014; Rosenbusch *et al.*, 2011; Porter, 1980). On the contrary, Porter (1996) argue that firms which are distanced from their productivity frontiers can compete on multiple priorities without the need for trade-offs. Such firms need to ensure market acceptable level of performance in all competitive priorities in order to be successful. Given the knowledge that SMEs frequently demonstrate the need for productivity improvement characteristics (Taymaz, 2005), the need for them to focus on all competitive priorities seem reasonable. A finding from Lawrence (2008) indicates that owner/managers do not see a need for trade-off among individual competitive priorities.

The existing empirical evidence reflects the divided stance in the literature. Some SMEs have been found to follow the “everything at once” approach whilst others have been found to specialise in building capabilities in selected competitive priorities. Thürer *et al.*, (2013) studied small manufacturing companies in the South of Brazil and found out that these small companies are driven by the competitive priorities of cost, quality, flexibility and price and further established innovativeness as an emerging priority small firms focus on. Sum *et al.*, (2004) investigated the taxonomy of operations strategies of Singaporean SMEs operating in various sectors. The authors discovered an “all-rounders” category of SMEs consisting of firms that did not distinguish themselves in any competitive priorities (cost, quality, flexibility, and delivery). The authors however did find two other categories of SMEs. These were the “efficient innovators”, which showed superior performance in cost, delivery and flexibility; and “differentiators”, who demonstrated capabilities in quality, delivery, and flexibility. Lawrence (2008) found owner-managers to believe that small firms should compete on the basis of either “quality, delivery and cost” or “quality and flexibility” although owner-manager do not perceive the need for trade-offs.

In a study examining the use of competitive operations priorities in small manufacturing firms, Kathuria (2000) found the highest performing firms to be those that focused simultaneously on all competitive priorities. Kathuria (2000) therefore advocate for small manufacturers to focus on all competitive priorities of cost, flexibility, quality and delivery. This position is shared by Lawrence (2008) who like Sum *et al.*, (2004), posits that small firms should compete using multiple priorities. Ebben and Johnson (2005) in a study examining trade-offs in manufacturing

strategy of smaller firms, established that small firms with focus on efficiency or flexibility were superior in performance than those that focused on both efficiency and flexibility at the same time. Aranda (2002) investigated the impact of firm size on operations strategy and found that small firms tend to follow custom-oriented operations strategies, medium-sized firms tend to follow process-oriented operations strategies and larger firms tend to follow service-oriented operations strategies. Wood Jr *et al.*, (2014) make the argument in favour of SMEs excelling in a more limited range of priorities to out-compete larger rivals.

These mixed results implies that no clear direction exists in the literature regarding the strategic operations approach that provides the best results for SMEs. Porter (1996) for instance make a claim for trade-offs in competitive priorities with the view that “a sustainable strategic position requires trade-offs” (Porter, 1996:68). Porter (1996) however recognises that that it is possible for combination strategies to be successful. The mixed empirical evidence lends support the view that the choice of an operation strategy is influenced by industry and market characteristics as posited by Lawson (2003b). It is important that judgements relating to operations decisions are balanced with both industry and market characteristics to align with the firm’s overarching competitive strategy (Zanon *et al.*, 2012). This reasoning may explain the differences that exist among SMEs’ operations strategies. SMEs achieve competitive advantage by maintaining a balanced and complementary mix of activities which fit with their needs and the needs of the industry.

2.5.4 Emerging manufacturing trend in developed economies

A relatively new operations concept which is progressively becoming popular among manufacturers in developed economies is the concept of High Value Manufacturing (HVM). The need for manufacturers from advanced economies to reposition themselves on new operational dimensions has become imperative as it is increasingly becoming difficult for them to compete on the basis of cost with their counterparts from emerging economies such as China, India and Brazil. As it becomes obvious that manufacturers from emerging economies enjoy better cost advantages, manufacturers from advanced countries look for alternate source of competitive advantage that will empower them to outperform their cost-advantaged competitors. HVM is believed to deliver this superior competitive advantage (Martinez *et al.*, 2008; MacBryde *et al.*, 2008). The HVM philosophy drives manufacturers to move up the value chain by changing focus from low skill and low value products and practices to high skill and high value products. The firms

become less reliant on low cost operations and reduces its dependence on an efficient business environment (MacBryde *et al.*, 2008; Porter and Ketels, 2003). Moving up the value chain, manufacturers are expected to benefit from high-skilled, knowledge-intensive manufacturing operations (DTI, 2002).

HVM according to Martinez *et al.*, (2008:5) involves a change in focus of manufacturing where:

firms that do not compete primarily on cost. Instead they deliver value for one or more of their stakeholder groups by contracting for capability, delivering product/service innovation, establishing process excellence, achieving high brand recognition and/or contributing to a sustainable society.

HVM philosophy is changing the basis on which UK manufacturing compete as well as the nature of manufacturing itself (MacBryde *et al.*, 2013; Bennett, 2011). Melnyk *et al.*, (2010) supports the claim that there is a shift in competitive priorities of firms to include new dimensions such as innovativeness, sustainability and resilience. Wilkinson *et al.*, (2009) maintain that manufacturers are pursuing a transformation agenda regarding how they operate. Wilkinson *et al.*, (2009) however observe that the new approach to manufacturing operations is yet to be well-defined. Empirical studies providing this clarification are very much limited.

In an empirical study to understand high-value manufacturing in Scottish SMEs, MacBryde *et al.*, (2013) made the finding that majority of SMEs identified high quality, innovative products, and aspects of customer service such as flexibility and responsiveness as their focus in competition. Firms no longer see low cost as a sustainable basis for competition. Cost has become an order-qualifier rather than the order-winner it used to be. Under HVM, manufacturing operations have assumed a more complex operations dimensions encompassing broader, balanced and complementary portfolio of manufacturing activities, to deliver customer value as the basis for competitive advantage (MacBryde *et al.*, 2013; Zhang and Gregory, 2011; Martinez *et al.*, 2008). The shift in the manufacturing value proposition to a high value mode of operations activities focuses on integrating capabilities in design and service activities to complement production activities. HVM, the emerging trend in UK manufacturing is changing the basis on which UK manufacturers compete.

2.6 Supply management capabilities and operations performance

Studies have documented variety of dimensions by which supply management is significant in improving corporate performance (González-Benito, 2007; Li *et al*, 2006; Paulraj *et al.*, 2006; Tracey *et al*, 2005; Vickery *et al.*, 2003; Narasimhan and Das, 2001; Narasimhan *et al.*, 2001). For many large organisations, supply management is a strategic activity with significant impact on operations performance (Gadde and Snehota, 2001). Supply management strategies have moved beyond the traditional price focus to achieve cost efficiencies through total cost reductions. In addition, supply management represents a key strategic direction for improving cost, quality, flexibility in operations, and reducing customer lead-times, all of which enhances a firm's dependability and ultimately, performance. IfM ECS (2010) argue that SMEs are known to grow profitability, revenues and employment if they:

- have a coherent strategy, with a clear basis of competition,
- understand where and how to capture value,
- have effective capabilities with which to execute their strategy, and realise value.

The understanding can be deduced from the above conditions that with a defined strategic direction, effective capabilities are required to execute operations and manufacturing strategies. Supply management invariably affects all operations strategic options including quality, cost, flexibility, speed and dependability. Thus supply management capabilities are essential irrespective of the strategic intent a firm chooses to pursue in operations. For the purposes of this discourse, the supply management capabilities being evaluated are restated: 1) long term collaborative supplier orientation, 2) close working relationship with limited number of suppliers, 3) integration between supply strategy and corporate strategic objectives, 4) open communication between exchange partners, 5) application of information technology in supply management and 6) highly skilled and empowered purchasing staff.

2.6.1 Supply management capabilities and quality

To a large extent, the quality of a firm's finished products is dependent on the quality of its input supplies. Quality management extend beyond the boundaries of the firm to material and component sources. Yeung (2008) maintains that a culture of quality management drives organizations to improve their efficiency beyond

organizational boundaries and along the supply chain and subsequently calls for improvement in suppliers' capabilities and performance. This is why many suppliers are selected on the basis of their ISO and BSI quality certifications (Romano, 2002).

Quality has been described as having the single most important influence on customer satisfaction (Fynes *et al.*, 2005; Forza and Filippini, 1998; Fornell *et al.*, 1996). In view of this, firms tend to adopt a strategic approach in attaining quality. For instance, Kannan and Tan (2005) found that strategically committing to quality has a strong positive effect on performance. Strategic commitment to quality invariably includes long-term management of suppliers as the sources of quality. Cavinato, (1999) argues that supply management affects quality and ultimately organisational performance through its participation in the corporate planning process. Carr and Smeltzer (1997) elaborate further that at the strategic level, the immense contribution of supply management in the strategic planning process is encouraged to achieve an alignment between supply strategy and business strategy. By allowing supply management to partake actively in corporate planning, the firm's exposure to opportunistic behaviours from suppliers is minimised (Chen *et al.*, 2004; De Toni and Nassimbeni, 1999). Giunipero *et al.*, (2006) contend that strong buyer-supplier association engendered by supply management capabilities promote innovations which improves both quality and cost.

The participation of supply management in the business planning process ensures that satisfaction of the customer is adequately considered in the input acquisition stage of the production process. Active participation in the strategic planning process however requires the competency of highly skilled and empowered supply management staff (De Toni and Nassimbeni, 1999). Giunipero *et al.*, (2006) emphasise that the key to success in supply management lies in the skills and capabilities found in its people. The ability to investigate the supply base, effectively evaluate and select suppliers, and identifying the appropriate level of investment in suppliers' relationship specific assets, among others are important skills in supply management (Giunipero *et al.*, 2006). The skill set of supply management staff do not only contribute to the strategic planning process, but also enable the firm to satisfy the customer's quality requirement (Pearson and Gritzmacher, 1990).

Capabilities in supply management contribute significantly to enhancing the quality of a firm's products (Bernardes and Zsidisin, 2008; Burt *et al.*, 2003). Closer working relationship with a limited number of suppliers, monitoring of supplier quality control processes and joint product development with suppliers are practices

that emerge from a capable supply management function and underpins the nature of supplier involvement in quality practices and quality performance (Fynes *et al.*, 2005). Fynes *et al.*, (2005) argue that by developing capabilities to manage supply chain relationships, firms are able to improve their product quality. Fynes *et al.*, (2005) found that competences in supply management have a positive effect particularly on the design quality. Design quality which is simply the extent to which quality is engineered into the product, is fundamental to achieving total product quality. It can therefore be inferred that the supplier is a key component of quality management. Subsequently supply management capabilities such as long-term supplier orientation and open communication with exchange partners are indispensable in delivering quality to the customer.

2.6.2 Supply management capabilities and cost

Cost is a major component of any operations. In manufacturing operations, supply management can account for over 80% of cost activities. Dubois (2003) states that one reason why the upstream portion of supply chain has become so important to firms is that the cost of inputs constitutes the majority of total cost for most firms. Thus financial impact is one of the reasons why the supply side is important. Hartley *et al.*, (1997:58) for instance remark that “in many industries, 50% or more of direct product cost is attributed to purchased materials”. Carr and Pearson (1999) cite the example of Honda of America where over 80% of production materials are purchased from suppliers. The huge purchased material cost component entailed in a product cost particularly in manufacturing firms, makes it a target for cost saving and emphasises the need for capabilities in supply management.

Globalisation has revolutionised the manufacturing value chain and contributed to the rise in outsourcing activities among firms. A driving force for outsourcing which has become a predominant business practice over the last couple of decades is the need for efficiency. Advanced technologies resulting from globalisation now enable manufacturers to separate the different parts of the manufacturing value chain and to undertake these activities where they are economically viable (BIS, 2010). Externalisation of business functions means that the performance of the firm no longer depends solely on the effectiveness and efficiency of internal processes, but is also influenced to a large extent by inter-company processes and relationships (Cagliano *et al.*, 2004; Dubois 2003). Cagliano *et al.*, (2004) admit that indeed increased outsourcing resulting from globalisation has caused a dramatic evolution in the supply management role. For this reason, firms now require advanced supply

management capabilities in order to cope with business environmental dynamics of the upstream supply chain.

The nature of the prevailing business environmental conditions in recent times has exacerbated the need for firms to be increasingly competitive, flexible and efficient which many firms are doing by reshaping their supply chains. Organisations have begun realising that strategically managing supplies has a huge potential in cost-savings (Cousins and Spekman, 2003; Carr and Smeltzer, 2000) and enables firms to adjust to the competitive and dynamic business environments (Monczka *et al.*, 2000). Capabilities in supply management enable the effective implementation of supply strategies such as Just-in-time, make-or-buy decision, lean and other similar concepts which have widely acknowledged cost reduction implications. Supply management strategies based on both low and high involvement of suppliers are believed to impact on the efficiency of the buying firm in diverse ways (Dubois, 2003). This includes cost benefits in terms of reduced production and processes cost as well as improved material flow. A supply management capability such as long-term collaborative relationships with suppliers fosters greater commitment, loyalty and trust among alliance partners and can confer durable economic benefits (Chen *et al.*, 2004). Close working relationship with suppliers enable early supplier involvement, a strategy which reduces design cost and increases the speed for new product market entry (Dyer and Nobeoka, 2000; Dyer and Singh, 1998).

The nature of supply management activities makes it an important function in cost control, the fundamental basis of efficiency and this cannot be achieved without the development of the appropriate capabilities. Cousins and Spekman (2003:20) claim that “the realisation that with managing supply strategically firms can save huge amounts of money has led firms to begin to invest in this area of management”. Subsequently any organisation looking to achieve sustainable competitiveness in relation to cost efficiencies must not ignore developing capabilities in supply management.

2.6.3 Supply management capabilities and speed

Time has emerged as an important competitive tool. Many manufacturing operations are now time-conscious because on-time delivery has become an important criterion for winning orders. The drive for quick customer response time has resulted in what Nahm *et al.*, (2006) referred to as time-based manufacturing practices. Among the key elements of time-based manufacturing practices is sourcing for dependable suppliers.

Dependable suppliers are indispensable in all advanced supply management practices such as JIT, lean and agile supply systems. Agile supply is a supply management practice that speeds up the time to market and simultaneously improves the firm's quality performance (Christopher, 2000). Similarly, JIT is a key practice in supply management aimed at reducing inventory, improving quality and enhancing manufacturing speed. The supplier, without doubt, is a key stakeholder in any time-based operations. In this regard, supply management can be seen as having a close association with any customer-responsive approach to manufacturing. Studies have confirmed that capabilities in supply management improve the time-based operational efficiency of a firm, enhance customer satisfaction and improve business performance (Yeung, 2008; Chen *et al.*, 2004).

The supplier continues to assume a critical role in the post-industrial systems where customers appear to be more demanding, informed and sophisticated. Customers in the post-industrial era are least prepared to accommodate prolonged delivery periods. Being aware of market conditions in additions to competitive conditions created by globalisation, customers have uncountable number of options to reroute their purchase. As a result, the ability to swiftly fulfil a customer's order has become a necessary precondition for consideration as a potential supplier. Thus Koufteros *et al.*, (1998) state that characteristic of the post-industrial systems era is the drive for quick response to customer demands.

Cutting the end-to-end time requires appraisal and reconfiguration of all the activities in the manufacturing value chain of which supply management is a key component. Managing supplier uncertainty is crucial aspect in cycle time reduction. Davis (1993) identifies supplier uncertainty as a major concern affecting supply chains generally. Supplier uncertainty can assume various forms; poor quality, supplier failure, quantity shortage, late deliveries, emergency supplies, non-conformance to specification, etc. Uncertainties such as the ones mentioned here can have significant impact on the manufacturer's ability to meet customer demand. Their ultimate consequence is an extension in customer lead-times (Koufteros *et al.*, 1998). Although supplier uncertainties do affect manufacturing speed, they can however be managed with capabilities in supply management. Appropriate remedies such as enrolling suppliers into product designs, ensuring consistent supplier quality, improving supplier delivery times, ensuring supplier's alertness to emergencies are all capability-dependent. Open communication, long-term supplier orientation and the application of information technology in the supply management are strategic imperatives for enhancing manufacturing speed. González-Benito *et*

et al., (2010) contend that implementing advanced supply practices, such as supplier evaluation, development and involvement, are relevant in dealing with environmental hostility and low munificence. Advanced supply practices are fostered by capabilities in supply management (Chen *et al.*, 2004). It may therefore be conjectured that improving manufacturing speed starts from rationalising the role-play by the suppliers.

Supply management is therefore a key player in the attainment of customer responsiveness. Jayaram *et al.*, (1999) maintain that strategic supply management contributes to firm performance through enhancing customer responsiveness. Burt *et al.*, (2003) argue that capabilities in supply management contribute significantly to firm performance in terms of increased sales by reducing time to market and enhancing on-time performance. Similarly, Chen *et al.*, (2004) are of the view that collaborative relationships with suppliers reduces lead times due to the suppliers' dedicated capacity and work-in-process inventory.

Time-based manufacturers tend to create long-term strategic alliances with their suppliers which enable suppliers to better appreciate the manufacturer's product needs and build commitments to satisfying those needs in the interest of their mutual success (Pauraj *et al.*, 2006; Spanner *et al.*, 1993). Idiosyncratic inter-firm linkages created by supply management capabilities yield relational rents, a source of sustainable competitive advantage (Dyer and Singh, 1998) which includes dramatic improvement in manufacturing speed. Speed is synonymous to responsiveness. Lee (2004) captured five supply chain practices which are fundamental to creating customer responsiveness. They include outsourcing, strategic supplier partnerships, customer relationship, information sharing, and product modularity. Many of these practices are better implemented with capabilities supply management such as those evaluated in the present study.

2.6.4 Supply management capabilities and flexibility

The competitive landscape in recent times demonstrates much more uncertain characteristics that challenge the survival of businesses. Organisations particularly "feel threatened by uncertainty or unknown situations" (Hofstede, 1997:113). To cope with the high level of uncertainty, businesses have adopted the concept of flexibility to enable them adapt to the dynamics of an uncertain business landscape. Swamidass and Newell (1987) state that flexibility has resulted from business' response to environmental uncertainty. Manufacturing flexibility has become a

strategic imperative buffering firms against environmental uncertainties (Lloréns *et al.*, (2005; Zhang *et al.*, 2003).

The concept of flexibility enables firms to sustainably accommodate supply-related uncertainties without significant disruption to their operations. The significance of flexibility is emphasised by Zhang *et al.*, (2003) that, it is a concept which empowers organisations to fulfil an increasingly varying customer expectations without excessive costs, time, organisational disruptions, or performance losses.

In spite of the inconsistencies in the literature surrounding the number of operations performance dimensions, there is a general consensus among researchers that manufacturing flexibility stands out as a potent strategic weapon (Avittathur and Swamidass, 2007). The critical role of the supplier in the focal firm's manufacturing flexibility must be acknowledged. Irrespective of the type of flexibility, whether it is mixed, volume, material, delivery, production or any dimension of flexibility pursued by a firm, its suppliers will be central to the flexibility success envisaged. The implication here is that, the supply management strategies a firm implements can have profound effect on its flexibility.

Supply management capabilities are necessary to ensure that suppliers with the ability to deliver on the promised due date and adjust their capacity in response to the changes in demand are selected. It was found for example in Ndubisi *et al.*, (2005) that a manufacturer's supplier management strategies influence its ability to meet the flexibility requirement of its customers. Thus it has been recognised that a manufacturing firm's flexibility depends on its supply chain flexibility (Avittathur and Swamidass, 2007). Narasimhan and Das (1999) established that practices in supply management have positive effect on the development of several flexibility dimensions including delivery, modification and volume flexibilities. These practices are advanced methodologies emerging from the possession of diverse capabilities in supply management. Shin *et al.*, (2000) observe that strategic supply management has a great impact on the buying firm's delivery performance.

Avittathur and Swamidass (2007) expressed the view that it is a common knowledge nowadays that the flexibility of a manufacturing plant depends on its supply chain flexibility or agility. Supply flexibility is defined as "the ability of the purchasing function to respond in a timely and cost effective manner to the changing requirements of purchased components in terms of volume, mix and delivery date" (Tachizawa and Gimenez, 2010:215). The literature clearly points to the direction that there is a close association between supply management and

manufacturing flexibility. Empirical evidence exists to show that a strategic approach to supply management strongly influences a firm's manufacturing flexibility (Swafford et al., 2006). This view is shared by Narasimhan *et al.*, (2004) who argue that the manufacturer's flexibility competence might be influenced by its supply chain configuration and practices. Supply chain configuration and practices are a function of organisational capabilities and may therefore be concluded that capabilities in supply management are essential in creating and enhancing manufacturing flexibility.

2.6.5 Supply management capabilities and dependability

Dependability as a priority for operations strategy focuses on the manufacturing firm's ability to deliver quality, quantity, speed and cost promises to the customer. It lays emphasis on the reliability of operations in relation to customer order fulfilment. This is another facet where capabilities in supply management cannot be ignored. In order for the focal firm to deliver a dependable customer service, the reliability of its suppliers becomes inevitably crucial. The concept of supply chain management has made collaborative relationships a preferred type of relationship for businesses. This is partly due to the relational rent capability this type of relationship offers (Rudawska, 2010; Lavie, 2006). The need for buyers to foster a closer working relationship with suppliers means that suppliers ought to be dependable. This situation compels suppliers to in turn source for dependable suppliers.

Adamides and Voutsina, (2006) identified dependability as important for order-winning. The claim that dependability is an order-winning criterion finds support in the Sand Cone model developed by Ferdows and De Meryer (1990). Characteristic features of dependable manufacturing according to Ferdows and De Meryer (1990) is delivering on time, improving processes and creating a more reliable and predictable production system. These underlying characteristics emphasise the need for supply management capabilities. Supplier uncertainty is a major threat affecting the ability of the firm to be dependable (Davis, 1993).

Liker and Choi (2004) claim that capabilities in supply management reflected in strategic supply management have the potential to reduce the level of uncertainty to operations and subsequently improve dependability. Pauraj *et al.*, (2006) argue that effective inter-firm communication, a supply management capability, stimulates integration of information between exchange partners and allows for sharing of sensitive information. This enables a quick joint-problem-solving approach to resolving material problems and design issues among buyers and suppliers and

therefore enhances dependability of the buying firm. A viewpoint from the relational competency theory (Dyer and Singh, 1998) indicates that a close working relationship with a limited number of suppliers increases asset specificity investments which in turn engender dependability and trust among exchange partners (Chen *et al.*, 2004).

Supply management capabilities clearly have a positive effect on the focal firm. In today's business environment where manufacturers need to deliver customised and innovative products, a dependable production system is an essential success criterion. Suppliers are critical in operations that focus on customised and innovative products. Therefore capabilities in managing these suppliers are essential in ensuring dependability of operations. Many of the advanced supply models such as leanness, agility, network sourcing, JIT, vendor managed inventory (VMI) models which reflect capabilities in supply management are mainly found in large companies where the purchasing spend appear to be high (Cagliano *et al.*, 2004). The use of such advanced supply models in SMEs seems to be limited as purchasing formality is found to be low. The overwhelming evidence of the impact of supply management capabilities on operations performance dimensions makes it interesting to know the extent to which SMEs possess these capabilities.

2.7 Supply management in SMEs

SMEs generally have limited resources as compared to large firms (Mudambi *et al.*, 2004; Park and Krishnan, 2001). Persona *et al.*, (2004) confirm the resource-poverty status of SMEs, claiming that apart from being driven by short-term goals such as profit, SMEs generally have limited access to financial resources because of limited size and also lack some essential staff skills. For example, Tan (1990) discovered that SMEs appear to be weaker in planning, finance and technical skills. The highly skilled and experienced staff are usually not attracted to the SME environment as they see better opportunities with large firms instead. Consequently, SMEs tend to be heavily dependent on external resources. Considering SME's heavy dependence on external resources to complement their own limited internal resources, it is believed effective supply management would be beneficial to them (Pressey *et al.*, 2009).

Unfortunately, Supply management in SMEs to date still remains a low-level function in many organisations ".....despite the recognised dependence of small companies on external resources" (Ellegaard, 2006:272). Towers and Burnes, (2008) make the observation that although SMEs focus much attention on satisfying

their niche market, for financial reasons, their efforts are misdirected at maximising short-term sales opportunities instead of optimising performance of the supply chain in the long term. In line with this observation, Towers and Burnes, (2008) note that the individual SME's survival very much depends on the ability to create internal enterprise control systems aligned with the wider needs of their customers and the supply chain rather than being merely narrowly focussed on producing the next order. As the literature supports the view that SMEs are predominantly short-term goal-oriented, the need to develop a supply strategy which falls within a long-term goal-orientation is most frequently neglected. Supply strategy is a major component of the acquisition function, one of the three fundamental operations functions. Dollinger and Kolchin, (1986) observe that, of the three fundamental operations functions; acquisition, transformation and disposal, acquisition appears to be the most critical. This is because not only must materials for production be acquired but also information is required about suppliers, markets, competitors and other equally important environmental constituencies. In all these areas, the influences of supply management cannot be overemphasised.

2.7.1 The significance of supply management to SME operations

The influence of the environment on organisational operations is widely recognised in the strategy literature. Dollinger and Kolchin (1986) state that as open systems, firms obtain resources from their environment, process these resources into finished products and/or services, and dispose these back into the environment. The effective execution of these interrelated functions of acquisition, transformation and disposal according to Dollinger and Kolchin (1986) can make the difference between failure and success for the firm. Because the environment is a critical success factor, boundary spanning roles such as purchasing and supply management have to be effectively managed so that opportunities could be maximised and threats minimised. Besides, unlike large firms, SMEs have less specialisation, which means they have less buffering capacity and therefore a greater need for effective boundary role performance (Dollinger and Kolchin, 1986).

SMEs rely heavily on the external environment for the required resources. This means the cost of purchased materials is high, usually accounting for a significant proportion of their annual turnover. Crook and Combs (2007) state that purchased input can take up to 75% of a firm's cost of operations. Relative to sales, the proportion of cost of inputs is usually in the region of 50%-80% depending on the industry. The proportion is relatively higher within the pharmaceutical industry.

Cost-savings opportunities are noted to be higher where company spend is considerably high (Wagner, 2006). Consequently, supply management presents an opportunity for SMEs to take advantage of and maximise their scarce resources. Recent global developments such as the economic crisis have emphasised the need for cost control in firms thereby highlighting the value of supply management particularly in the interest of the small firm which has limited resources.

Park and Krishnan (2001) argue that for the purposes of competitive advantage, SMEs have a much greater need for cost control. Effective cost control provides a buffer for SMEs against economic shocks. Comparatively, SMEs are more susceptible to severe economic and financial crisis than large enterprises due to their lower financial and physical resource capacity (Koh *et al.*, 2007). The indispensable need for cost control elevates the value of supply management to SMEs as by their nature and size of operations, they may be limited by capacity to take advantage of economies of scale (Arend and Wisner, 2005). Supply management is estimated to reduce cost and increase value by up to 25% according to Hughes (2005).

The notion that competition has gradually drifted from between firms to between supply chains (Koh *et al.*, 2007; O'Marah, 2001) is another reason why supply management should be of key consideration to SMEs. Koh *et al.*, (2007) emphasise that supply chain management and its related strategies are crucially important to the success of a manufacturing firm. A supply chain consists of a number of interconnected organisations who collectively manage the flow and processing of raw materials into finished products (Hult *et al.*, 2002). By this interpretation, every organisation, be it large or small, belongs to a supply chain. In fact, "belonging to a supply chain is not a decision that must be made actively. If a company regardless of size is part of the flow of goods and services to a group of final consumers, it belongs to a supply chain" (Chapman *et al.*, 2000:31). The growing popularity of the supply chain concept heightens the level of firm interdependencies. Park and Krishnan (2001) state that firms need to recognise how important firm interdependencies have become in recent times and understand that effective management of these relationships is a critical survival factor. They add that a firm's relationship with its suppliers can be a source of sustainable competitive advantage.

For the majority of SMEs, a greater proportion of their output is consumed by large firms. These large firms who are usually the champions of supply chains frequently

subject the SMEs to stringent demand compliance relating to quality, price, innovation and speed of delivery. For example, in manufacturing, studies have found that smaller firms have been compelled by their buyers who are larger organisations to achieve ISO certification (Axelsson and Larsson, 2002; Bates and Slack, 1998). To meet these demands, SMEs equally require a reliable support from their supply base which has to be systematically developed. The claim by Koh *et al.*, (2007) that the cost and quality of goods and services sold is directly related to the cost and quality of goods and services purchased suggests an increasing dependence of firms on their suppliers. This according to Kannan and Tan (2002) calls for an effective supplier management. Subsequently, the presence of SMEs in supply chains makes it imperative for them to develop their supply management capabilities (Koh *et al.*, 2007).

2.7.2 The status of supply management in SMEs

Supply management is probably the function in the organisation that receives the least attention from SME owner-managers and accorded a very low status (Ogden *et al.*, 2007; Ellegaard, 2006; Quayle, 2002b). Gadde and Snehota (2000) state that since the last two decades of the 1900s, the supply side of firms has gained considerable strategic importance, resulting in purchasing assuming a more strategic role to become supply management. Advanced strategic supply approaches classified as industry 'best practices' and possessing competitive advantage capabilities have emerged to overshadow the functional purchasing practices that existed in the 1970s (Morrissey and Pittaway, 2006; Boodie, 2002).

Unfortunately, the view still pertains that in many SMEs the supplies function is either under-developed or entirely non-existent. Gadde and Hakansson (2001) maintain that for small firms, purchasing is an integral part of managing the business. For this reason, no specialised function is created to manage supplies as it is the norm in large companies. Within this context, the management of supply for some SMEs is not considered as a specialised set of responsibilities requiring specialised knowledge to manage it. Such firms frequently substitute supply management with a simple order-placing role which is often referred to as buying. The buying role usually forms part of a set of administrative functions carried out in the firm. It is not surprising that Quayle (2002b) found that the majority of small firms perceive purchasing as unimportant. SME owner-managers were reported to have ranked purchasing as 14th out of 19 managerial tasks (Quayle, 2000). Morrissey and Pittaway (2006) however observe that there is now a tendency

towards establishing a discrete purchasing function among maturing manufacturing SMEs. A discrete purchasing function exists when the purchasing role is accorded a departmental status. Morrissey and Pittaway (2006) describe maturing SMEs as firms which are over 10 years old, employ over 26 people and have a turnover of more than £1m. A further observation was that in firms where turnover was less than £1m and employed less than 26 people, purchasing was more likely to be done by either the owner-manager or another department.

Studies have shown that supply management is usually the preserve of owner-managers in small firms (Morrissey and Pittaway, 2004; Pittaway and Rose, 2006). Park and Krishnan (2001) share this view noting that executives in small firms significantly influence the firm's supply chain management practices. The personal traits of the executives such as age, educational level and work experience have been ascertained to play a critical role in supply management decisions of small firms (Park and Krishnan, 2001). Ellegaard (2006) further add that small company executives led by their personal characteristics, quite often do not have purchasing experience resulting in subjective supply-related decisions which may have been unprofessionally made even though they rely on various decision making models. In this regard, most SMEs do not appear to have an explicit purchasing strategy and key purchasing actors have limited education and primitive information systems (Ellegaard, 2009). Dollinger and Kolchin (1986) however state that for manufacturing SMEs, purchasing activities are executed by other persons rather than the owner-manager.

Purchasing activities are observed to be largely less-formalised in majority of SMEs. Pearson and Ellram (1995) found in their study that compared to the large firm, the small firm follows less-formalised procedures. The small firm is less hierarchical and has less reporting structures. This, added to the knowledge that all too frequently, purchasing is an ad hoc responsibility of the owner-manager, may explain why formalisation of purchasing is low among small firms. Pearson and Ellram, (1995) however caution that, the absence of formalised purchasing procedures may not be a necessary indication of lack of managerial sophistication in such firms. They note that a potential explanation could be that "small firms may have developed personalized informal relationships with suppliers, through friendships among firm owners, family relationships, and the ability of small firms to invest personal resources in the development of business relationships with suppliers" (Pearson and Ellram, 1995;63).

The low formality of purchasing in small firms has been confirmed by Pressey *et al.*, (2009) and Ellegaard (2009). Not only is purchasing informal in most SMEs but also reactive in nature and optimised for the smallest possible resource consumption (Ellegaard, 2009; Arend and Wisner, 2005). Generally, SMEs tend to have low priority towards formalised planning and control systems (Towers and Burnes, 2008; Vaaland and Heide, 2007). Interestingly, in spite of the widely-held view that SMEs lack purchasing planning and formalisation, Ellegaard (2006) claims that relative to how well their companies were doing, SME owner-managers perform well as purchasers. Similarly, Pearson and Ellram (1995) maintain that informal relationships may be as effective as formal ones and may be the reason behind the success of some SMEs.

Collaborative or partnering buyer-supplier relationships is a practice that SMEs appear not to be interested in. Mudambi and Schründer (1996) observe that partnership indicators in SMEs are still below expected levels even though there is a gradual progression in this direction. Morrissey and Pittaway (2004:261) conclude in their study that the “concept of partnership has not yet been embedded in SME relationships”. The authors partly attributed this development to SME owner-managers not solely focusing on profit maximisation, but equally important to them are issues of lifestyle and the idea of selling the business in future. All these characteristics influence the purchasing behaviour of SME owner-managers. The claim has also been made by Morrissey and Pittaway (2006) that there is less evidence to show that SMEs make conscious effort to establish long term relationships. SMEs are cash-focused, short-term-oriented and appear to be opportunistic in their buying behaviour (Arend and Wisner, 2005).

Strategic purchasing, which is a key component of supply management, seems not to be common to SME operations. For instance, Pressey *et al.*, (2009) did not find sufficient evidence to suggest that strategic purchasing is of any relevance to SMEs. Strategic purchasing assumes a more proactive role in the firm and aligns the function’s objectives with the wider corporate strategic objectives (Carr and Pearson, 1999). As purchasing appears to be non-strategic in SMEs, it gives credence to the claim by Arend and Wisner (2005) that SME purchasing is more reactive. Pearson and Ellram (1995) argue that the non-strategic nature of purchasing in SMEs means that purchasing is less active in the strategic planning process and this may partly account for why purchasing formalisation is low in small firms. Ellegaard (2006) also explains that SME’s lack of sufficient resources may underline their lack of attention for strategic purchasing. Some researchers contend

that due to size asymmetries, strategic purchasing may be inappropriate for SMEs (Ramsay 2001; Quayle, 2000; Pressey *et al.*, (2009). Contrary to these studies, Paulraj *et al.*, (2006) found a high level of strategic purchasing among some 26% of firms surveyed even though purchasing practice among 51% of firms could still be described as non-strategic.

2.7.3 Supply management practices of SMEs

Ellegaard (2009) states that the purchasing practices of firms evolve over time. The author argues that these practices progress through various stages with time, moving from simple to advanced practices. The evolution process of the practices according to Ellegaard (2009) is driven by the purchasing orientation of the key decision-makers in purchasing departments. The study by Morrissey and Pittaway (2006) provides empirical evidence to support this view as they found out that maturing and larger SMEs had better purchasing structures than younger and smaller ones. They state “in larger manufacturing SMEs, there is often a specific purchasing role; however the owner-managers tend to take the lead” (Morrissey and Pittaway, 2006:292). SMEs vary widely in terms of age, employment, turnover etc. It is not surprising that Morrissey and Pittaway (2004) describe them as heterogeneous entities. SME heterogeneity means there are bound to be differences in their purchasing practices which spans across the simple-to-advanced purchasing practices continuum.

For the majority of SMEs, sourcing efforts are thought to be concentrated on local markets with others extending to national markets, but showing little interest in international markets (Agndal, 2006). In an empirical study, Ellegaard (2006) observe that SMEs depend more on the local market as they have poor knowledge of regional, national and international sources. Ellegaard (2008) justified SME dependence on local markets on the grounds of minimising supply risk. Alternative justification for the use of local markets could be that the informal approach to supplier management by the owner-managers makes them regard their supplier network as part of their wider private social network (Ellegaard, 2006) which largely has a local orientation, hence the use of local markets.

A study by Koh *et al.*, (2007) revealed that a common practice among manufacturing SMEs, particularly those within the machinery and equipment industry, is the use of many suppliers. This finding according to the authors confirms an earlier finding by Ulusoy (2002) noting that the use of many suppliers is an attempt not only to ensure continuous supply but also to get lower prices. In a

related finding, Morrissey and Pittaway (2006) reveal that owner-managers are more price-focused in their supplier and customer relationships. This knowledge seems to suggest that SMEs tend to prioritise unit cost and perhaps not the overall total cost of acquisition which would have compelled them to take a proactive approach to supply management. In contrast to Koh *et al.*, (2007), Ellegaard (2009) states that small companies have a supply base small enough for one person to oversee. Consequently it is common to find the general lack of purchasing strategies, tools and written procedures for supplier evaluation and selection among SMEs as it is basically one person's responsibility.

Contrasting the finding by Koh *et al.*, (2007), Ellegaard (2009) shows that SMEs are more inclined towards single sourcing rather than multiple sourcing. In the view of Ellegaard (2009), resource needs for maintaining multiple relationships for a particular supply is high for SMEs and therefore they prefer to be committed to as few relationships as possible. Again because SMEs use social factors in their supply relationships (Morrissey and Pittaway, 2006) which enables them to nurture trust, they perhaps find it difficult to be involved with keeping extra relationships for the same supply. An implication of the use of single sourcing relationship developed on the basis of social capital is that advantages such as supplier loyalty may be earned, but the risk of opportunistic behaviours by suppliers could also increase (Villena *et al.*, 2011; Lawson *et al.*, 2008; Cousins *et al.*, 2006).

A number of studies have highlighted the limited use of e-commerce in supply relationships among SMEs (Vaaland and Heide, 2007; Quayle, 2002a; Quayle, 2003; Wagner *et al.*, 2003). Vaaland and Heide (2007:27) argue that "it is difficult to see how SMEs can survive if they continue to underestimate the importance of e-commerce". Morrissey and Pittaway (2004) for instance observed that e-commerce was mainly used at the customer interface and not the supplier interface. This implies that the interaction between SMEs and their suppliers appears to be predominantly manual with less use of the advanced supply chain technologies, hence reducing any technology advantage to the small firm buyer.

In conclusion, the assertion by Crichton *et al.*, (2003) that compared to large firms, SMEs are less positive about the impact of supply management on organisational performance may be upheld. Although the literature on the supply management activities of SMEs appear to be somewhat divided on the extent to which supply management has advanced in these firms, the majority of studies still share the view that it is a low status function even in advanced economies such as the UK.

On the basis of the papers reviewed, it is clear that SMEs do vary in the extent to which they develop and utilise supply management capabilities. To a large extent, the level of sophistication in SME supply management practices depends on the company's level of maturity and size of operations (Morrissey and Pittaway, 2006). To this end, supply management practices may be regarded as a trajectory that changes with time (Ellegaard, 2009). Mature and bigger SMEs are more likely to be advanced in their supply practices than the less mature and smaller SMEs.

2.8 UK manufacturing SMEs

A number of criteria have been used as the basis for defining a Small and Medium Sized Enterprise (SME). Even using the same criteria, the definition seems to differ among geographic regions. This situation may be attributed to the fact that SMEs tend to vary widely from very small firms to relatively large ones. Among the commonly-used criteria for defining SMEs are headcount, total net assets, turnover and capital structure (Ayyagari *et al.*, 2003). The European Commission (EC) for instance, defines SMEs on the basis of four criteria; number of employees, turnover, total balance sheet and independence. The most popular criterion among the known criteria for SME definition is employment or headcount (Markit, 2012; Arend and Wisner, 2005; Park and Krishnan, 2001; Freel, 2000; Mudambi and Schrunder, 1996). Definitions using the employment criterion however tend to vary in establishing the lower and upper size limits of an SME. Some definitions set the upper size limits at less than 500 employees (Markit, 2012; Arend and Wisner, 2005; Park and Krishnan, 2001). Others (IfM, 2010; Freel, 2000; EC, 2005; Pearson and Ellram, 1995) set the upper employment size limit at less than 250 employees. Upper size limits of 200 employees (e.g. Quayle, 2002; Berggren *et al.*, 2000; Robson and Bennett, 2000) and 100 employees (e.g. Becchetti and Trovato, 2002; Voulgaris *et al.*, 2000; Dollinger and Kolchin, 1986) have also been used.

The UK Department of Business and Innovation (BIS) defines SMEs using the turnover, employee and gross asset criteria. BIS describe SMEs as firms employing between 0-249 people. SMEs are thus legally defined as firms with less than 250 employees (Perry and Towers, 2009). For the purposes of accounting requirement however, sections 385 and 465 of the Companies Act 2006 set the details for a firm to qualify as a small or medium enterprise. According to the Companies Act, 2006, a firm is considered as 'small' if its turnover is up to £6.5m, and not more than £3.26m balance sheet total and has less than 50 employees. On the other hand, a firm with less than £25.9m turnover, and a balance sheet total less than £12.9m

and less than 250 employees is classified as a medium-sized enterprise. The Act requires that two out of the three criteria are met to qualify as a SME.

In an attempt to standardise the SME definition across member states and to enable appropriate support to be offered to such firms, the EC (2003) recommended a new definition which took effect on January 1, 2005. According to the EC (2003), the micro, small and medium-sized enterprises (SMEs) comprises firms employing less than 250 persons with an annual turnover of not more than €50million and/or an annual balance sheet total not exceeding €43 million. The EC has therefore set the threshold on the basis of staff headcount, annual turnover and annual balance sheet as depicted in the table.

Table 2.5: Thresholds for SME definition

Enterprise category	Headcount	Annual turnover	Annual balance sheet total
Medium-sized	<250	≤€50M	≤€43M
Small	<50	≤€10M	≤€10M
Micro	<10	≤€2M	≤€2M

Source: EC (2003)

2.8.1 SMEs and the UK economy

The UK economy's is dominated by the activities of SMEs. The BIS (2013) states that there were an estimated 4.9 million private sector businesses in the UK at the start of 2013, with SMEs accounting for 99.9% of all enterprises, 59.3% of private sector employment and 48.1% of private sector turnover. These private sector businesses, employ an estimated 24.3 million people, and had an estimated combined annual turnover of £3,300 billion. It is without doubt that the SME sector plays a critical role in the health of the UK economy and subsequently attracts increasing interest among policy-makers.

The sector continues to enjoy increasing attention from successive governments. Successive UK governments have recognised that economic success is inevitably linked to the vitality of the SME sector. Emphasising the importance of SMEs, the government states in its strategic document, "The paths to strong, sustainable and

balanced growth” that the UK’s almost 5 million SME base is vital to the economy as it provides about 60% of private sector jobs and accounts for half of all private sector turnover (BIS, 2010a). The increasing recognition of SMEs as an important component in economic development is justified on a number of grounds. The sector is seen as a driver of innovation, a source of competition and employment, and an avenue for flexibility in labour. SMEs contribute to innovation by originating new ideas and technologies. They promote technical advances in the supply chains and deliver customised products and services to big companies. Constituting 99.9% of all businesses, the UK economy is heavily dependent on the proficiency of its SME sector.

2.8.2 SMEs in the UK manufacturing industry

UK’s manufacturing sector cuts across a wide range of industries and technologies including food and drinks, aerospace, pharmaceuticals, electronics and automotive. There are relatively new industries emerging from new technologies such as low carbon, industrial biotechnology, nano-technology, digital and advanced materials. The 2007 Standard Industry Classification (SIC) code system for industry statistics defined the variety of industries constituting the manufacturing sector as:

- Food, beverage and tobacco products
- Textiles and textile products
- Wood and wood products
- Pulp, paper and paper products
- Publishing and printing
- Coke, petroleum products and nuclear fuel
- Chemicals, chemical products and man-made fibres
- Rubber and plastic products
- Other non-metallic mineral products
- Basic metals and fabricated metal products
- Other machinery and equipment
- Electrical and optical equipment
- Transport equipment
- Other manufacturing

At the start of 2013, SMEs accounted for 58.1% of employment and 33.3% of turnover in the manufacturing industry. IfM ECS (2010) observes that manufacturing plays a major role in the economy. This is on the basis of its potential to generate financial value with regards to its GDP impact, strategic value

in terms of sustainable employment, intellectual capital development, and employee capability development, and social value regarding the social impact of employment.

2.8.3 Manufacturing and the UK economy

A major impact that the acceleration in globalisation has had on manufacturing in general is the ability to separate the different parts of the manufacturing value chain for such activities to be undertaken in different geographic regions deemed to provide cost advantages. Many developed nations including the UK now outsource or offshore lower value activities to emerging economies such as China, India and Brazil (BIS, 2010c), keeping to themselves what has been described as “high value manufacturing”. Among the advanced nations, a peculiar characteristic that manufacturing has assumed in the face of increasing globalisation is what is referred to as servitization. Servitization is a relatively new business model used by advanced manufacturers to pursue a differentiation strategy by combining the sale of product and service. BIS (2010c) states that the manufacturing sector accounted for approximately 14% of services exports in 2005.

A paper published by the BIS in 2010 titled “Manufacturing in the UK: An economic analysis of the sector” states that in 2009, manufacturing was the third largest sector in the UK economy, after business services and the wholesale/retail sector in terms of share of UK Gross Domestic Product. In terms of employment, manufacturing is significant as it employs an estimated 2.6 million people, representing over 8% of total UK employment. In the same year, the sector was estimated to have generated some £140bn in gross value added, representing just over 11% of the UK economy.

Jayawarna *et al.*, (2003) allege that as the UK entrenches itself as a service-dominated economy, manufacturing has significantly declined over the last couple of decades in terms of output and its proportion of employment. Consequently manufacturing’s contribution to UK’s GDP has equally dropped drastically during the last two decades. A publication in *The Independent* (June 28, 2010) corroborates the claim that British manufacturing is sliding steeply backwards. The publication quoted the rankings from an index comparing global manufacturing competitiveness prepared by Deloitte and the US Council of Competitiveness. The index predicted that British manufacturing described as “high-end, high-skilled and high tech” was likely to slide from its 17th position in 2010 to the 20th position by 2015 if necessary actions were not taken to arrest the situation. China takes the 1st

position on the league, followed by India, South Korea, USA, Brazil, Japan, Mexico and Germany, in that order.

The manufacturing sector now contributes 14% of UK's GDP, a considerable drop from its 20% contribution some two decades ago when Britain began orientating towards professional services and the public sector (The Independent, 2010). Manufacturing competitiveness according to the publication is assessed mainly on the basis of labour costs and availability of talented engineers, scientists and researchers. The non-competitiveness of British manufacturing is therefore partly attributed to the high labour costs, coupled with restrictive energy policies and environmental regulations which make it difficult to retain a manufacturing base in the face of pressure from low-wage Far-East competitors. Besides, manufacturing in the UK now faces tough competition from emerging economies such as China, India, Russia and Brazil which are steadily moving up the value chain into higher value activities and industries (BIS, 2010b). Advanced manufacturers such as the United States, Germany, France and Italy also represent a formidable competitive force to contend with. Another major problem identified as affecting manufacturing in the UK is image, as manufacturing is thought to be low-paid, blue-collar work in the grubby factories of 20 years ago. Thus more skilled people need to be encouraged to go into the "manufacturing industries because it is the quality and availability of the country's brains that are putting on the brakes." (The Independent, June 2010).

However, in spite of the government's focus on manufacturing as part of the efforts to 'rebalance the UK economy', developing the appropriate skills base for manufacturing could be affected by its reduced spending on education and cuts to the UK's science budget. These political decisions minimise the likelihood of a change in trajectory and exacerbates the skills shortages already bedevilling manufacturing industry (The Independent, June 2010).

Even though The World Economic Forum's Global Competitiveness Index indicates that UK's ranking slipped from 7th to 13th place between 1997 and 2009-10, the 2011-2012 rankings show some improvement as the country moves up on the index to the 10th position. Despite this ranking, manufacturing still remains a major component of the British economy. The UK is currently at the 10th position in terms of world rankings of export manufacturing. In 2008, UK's exports totalled \$260bn out of which 55% was contributed by manufactured products (BIS, December

2010a). Harris and Li (2010) also found in their study that a greater number of manufacturing firms export their products compared to the services sector.

The UK is recognised as a leading manufacturer in the world relating to its pharmaceuticals, food, beverage and tobacco products, aerospace and defence sectors. Manufacturing is, however, weaker in the areas of electronics, fibre optics and nano-technology and information technology. Research is a major strength of UK manufacturing. A large percentage of the research and development carried out by firms in the UK are done by firms in the manufacturing sector. In 2008, UK businesses invested £16bn in R&D of which £12bn (75%) was spent by manufacturing firms (BIS, 2010c). R&D is a key factor in innovation and as such could explain why SMEs, including those in manufacturing, are considered as drivers of innovation.

2.9 Conclusion and literature gaps

In order to conclude the literature analysis, a summary of the literature reviewed is presented. This is followed by a description of the literature gaps as perceived.

2.9.1 Chapter summary

The chapter has critically examined the relevant literature that is conceived as the foundations of knowledge for this study. The key literature reviewed relates to: Supply management capabilities, operations performance dimensions, the relationship between supply management capabilities and operations performance, supply management in SMEs, and UK manufacturing SMEs. The literature review has identified six key constituents of supply management capabilities. These include: long-term collaborative supplier orientation; open communication between exchange partners; close working relationship with limited number of suppliers; integration between supply strategy and corporate strategic objectives; application of information technology in supply management; and, highly skilled and empowered purchasing staff. Operations performance has been measured in past studies using a multiplicity of dimensions. After synthesising the operations literature, the conclusion was reached that the set of dimensions commonly employed in studies were: quality, cost, speed, flexibility, and dependability. Evidence from the literature shows that the choice of operations strategic priority can induce competitive advantage and impact on overall corporate performance.

The critical analysis demonstrated that manufacturing SMEs play a crucial role in the development of the UK economy. Manufacturing SMEs in particular were noted to assume a pivotal role in UK's economic development. In spite of its enormous economic importance, the manufacturing sector faces a number of challenges which impede its contribution. The coalition government has observed that the manufacturing sector has the capacity to improve the resilience of the UK economy to enable it to withstand sector-specific shocks, hence the need for strategic efforts to revamp the sector.

The analysis of the supply management literature reveals that capabilities in supply management may have some relationship with operations performance dimensions of the firm. The review established that despite the increasing dependence of SMEs on external resources, supply management in such firms still remains a low-level function. The conclusion can be drawn that although the literature suggests that supply management capabilities possess economic values that can be tapped by the firm, manufacturing SMEs may be underutilising such capabilities due to the low-level nature of supply management activities in these firms.

2.9.2 Gaps in the literature

The literature analysis highlights both empirical and theoretical gaps. First, the purchasing literature on SMEs, and manufacturing SMEs in particular, is very much limited both theoretically and empirically. The relatively few empirical studies in this area have been carried out mainly by the same handful number of researchers. SMEs' capabilities in supply management also need more theoretical understanding from the literature. The supply management capabilities construct appears to be under-researched and measures of supply management capabilities are vaguely established. In particular, the researcher did not find any study relating to the supply management capabilities of SMEs. In this regard, the present study will make theoretical contribution by enhancing understanding and operationalising the supply management capabilities construct within a SME context.

Another gap in the literature relates to the association between supply management capabilities and operations performance dimensions. Empirical studies assessing relationships between supply management and firm performance have done so largely in terms of the overall firm performance using variables such as profits, market share and market responsiveness. Moreover, the operations strategy literature examining the competitive priorities have largely focused on large firms hence, little seems to be known about the competitive priorities pursued by SMEs.

The specific associations between the dimensions of supply management capabilities and the competitive priorities of SMEs have also not been rigorously investigated. The current study sets an agenda to empirically explore the concept of supply management capabilities, SMEs manufacturing competitive priorities and examine the relationship between the two concepts to fill the gap.

The study will equally contribute to the UK manufacturing literature where empirical research is needed to generate knowledge necessary for enhancing manufacturing performance. By addressing the above-mentioned gaps in the literature, this study will potentially enrich multiple streams of the literature namely supply management, operations strategy, and UK manufacturing SMEs. The study will provide valuable insights into the measurement of supply management capabilities and the association of these capabilities with the operations performance dimensions of manufacturing SMEs.

Chapter 3

Theoretical Framework

3.1 Chapter overview

The conceptual framework for the study is developed in this chapter. The conceptual framework is developed by complementing the dynamic capabilities theory with the relational view of the firm. The two theories have been integrated to provide a theoretical explanation of supply management capabilities as a source of sustainable competitive advantage to the firm. Following this, a research model is presented. The research model proposes the conceptual associations between the research constructs based on the theoretical explanations. On the basis of the research model, hypotheses are stated for testing at a later stage in the research.

3.2 Theoretical foundations for economic rent

The debate about the sources of economic rent has been on-going in the strategic management literature for the past two decades, leading to theories and extension of theories. These theories fundamentally seek to explain the causes of differential firm performance, hence sources of competitive advantage. Key theories which have emerged over the years include: theory of growth of the firm (Penrose, 1959); industry structure view (Porter, 1980); the transaction cost theory (Williamson, 1985); the resource-based view (Barney, 1991); the dynamic capabilities view (Teece *et al.*, 1997); the relational view (Dyer and Singh, 1998). These theoretical frameworks have all contributed meaningfully to the understanding and modelling of the relationship between firm resources and above normal profits and influenced the selection of the appropriate unit of analysis such as firm, dyad or network (Fynes *et al.*, 2005).

Whereas some of these rent-yielding theories have emphasised the industry structure as the source of competitive advantage (Porter, 1980), others such as the resource-based view (Barney, 1991; Wernerfelt, 1984) have attributed the source of differential firm performance to firm heterogeneity. Contemporary views on the rent-yielding theories such as the dynamic capabilities theory (Zahra *et al.*, 2006; Winter, 2003; Teece *et al.*, 1997) argue to the contrary, ascribing the source of competitive advantage to the appropriate fit between organisational competencies

and the changing environment. Teece (2007) for instance argue that with the increasing pace and complexity of business environments, firms have shifted from competing on processes to competing on the improvement of processes. The ability of the firm to continually reconfigure its internal and external competences and resources with changing business environments delivers superior benefits to firms that excel in this capability. The relational view of the firm (Rudawska, 2010; Lavie, 2006; Dyer and Singh, 1998) which extends the resource base view espouses that sustainable economic rent lies in inter-firm relationships. The theory addresses inter-firm relationships as a source of yielding above normal profits.

3.3 The choice of research theory

The dynamic capabilities view and the relational view appear to deliver a formidable theoretical foundation for this study. The two theories emphasise managerial competences and align directly with supply management as an organisational process where appropriate capabilities can be developed to enhance operations performance. The literature analysis has demonstrated that supply management is a boundary-spanning role. Strategic supply buffers environmental pressures on the organisation that emerge from the buyer-supplier dyad. Strategic supply management is a capability developed internally within the firm to buffer environmental uncertainty relating to supply; the supply structure enables the firm to react to competitive market pressure and demand (Cousins and Spekman, 2003). The supply structure can therefore be used as a market positioning tool to enhance competition. Rudawska (2010) attests to this view, contending that a means of achieving competitive advantage is the implementation of competitive strategies that empower the firm to assume a better position in the market.

Bernardes and Zsidisin (2008) argue that strategic supply management plays a critical role in generating rents (benefits) by its management of supplier relationships. Chen *et al.*, (2004) observe that studies focusing on resource acquisition, transformation and deployment tend to assume the dynamic capability perspective. Since the present study examines association between resource acquisition and transformation efficiency (operations performance), the choice of the dynamic capabilities view seems appropriate and justified by the precedents from the literature.

The dynamic capability view is particularly important to SMEs because “SMEs and new ventures need unique and dynamic capabilities that allow them to survive, achieve legitimacy, and reap the benefit of their innovation” (Zahra *et al.*,

2006:919). Teece *et al.*, (1997) explain that industry best performers are usually firms with the ability to show responsiveness, rapid and flexible product innovation, in addition to management capability to effectively coordinate and redeploy internal and external competences. Not only must SMEs possess unique skills and competences to differentiate themselves on the market place, but must continuously upgrade these skills and competences to create dynamic capabilities which will ensure successful adaptation for growth (Zahra, 2006). Teece *et al.*, (1997) maintain that a firm's competence and dynamic capabilities are resident in the organisational processes, which are shaped by the firm's assets and its evolutionary path.

The relational view explains the capability of the firm to extract value called 'relational rents' from resources which are not specific to any one organisation. In other words, relational rents result from assets not wholly owned and controlled by one organisation (Lavie, 2006). Peteraf (1993) describe relational rents as benefits or advantages resulting from relationships with other firms. The rent results from the interconnectivity among firms which lead on to the joint creation and ownership of resources which generate the rents. The emphasis seems to rest on shared resources, consequently even when a resource is specific to a firm but shared in a relationship, benefits in the form of rents might accrue. Thus the creation of relational rent may be linked to joint resource development as well as firm-owned but shared resources in a relationship. The relational processes involved in supply management provide an opportunity for capturing relational rents. Lawson *et al.*, (2009) maintain that supplier relationships have influential impact on the performance of a firm; supplier relations generate value through joint resource development and shared knowledge among exchange partners. On the account of the theoretical analysis presented above, the present study will be grounded in the dynamic capability view and the relational view of the firm.

3.3.1 The dynamic capabilities view

The dynamic capabilities view resulted from the limitations of the resource-based view. Peteraf (1993) posits that the resource-based view deals with the management of organisational resources to enhance a firm's competitive advantage and ultimately the firm's economic rent. The resource-based view proposes that it is the resources owned and controlled by the firm that generate competitive advantage. In other words, the more the resources available to the firm than competition, the better its performance will be.

Although the resource-based view calls for managerial strategies in new capabilities development (Wernerfelt, 1984), not much research attention has been paid to the managerial strategies in this respect. It is against this background that Teece *et al.*, (1997:514) argued that “indeed, if control over scarce resources is the source of economic profits, then it follows that such issues as skill acquisition, the management of knowledge and know-how and learning become fundamental strategic issues”. Teece *et al.*, (1997) developed the dynamic capabilities view from the perspective that the greatest potential for contributions to strategy lies in the skill acquisition, learning, and accumulation of organisational and intangible or 'invisible' assets with emphasis on managerial acts.

Dynamic capabilities according to Teece *et al.*, (1997:516) refer to “the firm’s ability to integrate, build, and reconfigure internal and external competences to address rapidly changing environment”. Zahra *et al.*, (2006:919) define dynamic capabilities as “the abilities to re-configure a firm’s resources and routines in the manner envisioned and deemed appropriate by its principal decision-maker(s)”. Teece *et al.*, (1997) conceptualised the term ‘dynamic’ as the capacity to develop competences to accommodate the changing business environment, adding that innovative actions are required when firms are faced with criticality of time-to-market, rapid technological change and an uncertain nature of future competitions and markets. ‘Capabilities’ according to Teece *et al.*, (1997) represent the significant role of management to strategically adapt, integrate and reconfigure skills, resources and competences which are internal and external to the firm for the purposes of meeting environmental change. Dynamic capabilities therefore create competitive advantage for the firm by enabling it to achieve congruence with a changing business environment. Dynamic capabilities in supply management may contribute to a firm’s operations performance by allowing the firm to achieve congruence with a dynamic supplier environment. Eisenhardt and Martin (2000) gave examples of dynamic capabilities as strategic decision-making, product development and management of alliances. These examples highlight the importance of dynamic capabilities in a strategically-managed supply system.

Dynamic capabilities typically reflect an organisation’s processes, market position and expansion paths (Hung *et al.*, 2010). It is a knowledge-based phenomenon systematically developed by an organisation through learning to modify operating routines to become more effective (Zollo and Winter, 2002). Cepeda and Vera (2007) further add that these capabilities are dedicated to modifying operational capabilities which may lead to improvement in the firm's products or production

processes. Studies have found positive association between the existence of dynamic capabilities and firm performance (Zott, 2003; Danneels, 2002; Luo, 2000). The implication is that the more dynamic capabilities a firm develops, the greater its chances of success. Chen *et al.*, (2004) observe that these capabilities enable the firm to enact or seize opportunities, or neutralise threats from the environment.

3.3.2 The relational view of the firm

Inter-firm collaborations have become a common practice in today's business dealings. This trend seems to justify the notion that competition has shifted from between firms to between supply chains (Hult *et al.*, 2007; Christopher and Towill, 2001). The increasing move towards supply chain collaborations is aimed at minimising the risks associated with business uncertainty. Barney (1999) argues that access to other firms' capabilities through inter-firm collaborations is necessary under conditions of high uncertainty. The current dynamic business environments confronting organisations demand an inter-firm connection of cost-based and distinctive attribute-based resource positions (Lavie, 2006; Thwaites *et al.*, 1998).

Dyer and Singh (1998) are the key proponents of the relational view. They argue that although the resource-based view has contributed significantly to the understanding of differential firm performance, the theory overlooks the fact that the weaknesses and strengths of a firm are associated with the weaknesses and strengths of the relationship network it is embedded in. The resource-based view associates competitive advantage with the inimitability of a firm's in-house resources and capabilities. Dyer and Singh (1998) however point out that the critical resources of a firm may extend beyond the firm's operating boundaries. The theory posits that firms earn relational rents created jointly by exchange partners through critical resources that may be external to the parties (Lavie, 2006). Corner (1991) shares in this view claiming that it is the simultaneous interaction among the environment, competitors' resources and a firm's own resources that results in firm performance.

The relational view offers an approach to understanding competitive advantage emerging from dyad/network routines and processes. Rudawska (2010) states that in recent times, the value of relationships has been widely understood as strong foundation for developing a sustainable competitive position. The theory subsequently posits that idiosyncratic relations with external parties including suppliers may be a source of superior firm performance. Such idiosyncratic relationships create relational rent which can only be captured through inter-firm

linkages (Dyer and Singh, 1998; Peteraf, 1993). Dyer and Singh (1998) specifically defined relational rent, the core of the relational view as:

Supernormal profits jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners (Dyer and Singh, 1998:662).

Inter-firm relationships thus generate unique and hard to imitate resources which benefit only the partners in a particular exchange process. Efficient organisational processes represent the foundation on which supernormal profits may be made. Relational rent from the supply side of business may not have a direct effect on profitability of the firm but through its impact on organisational processes. Thus relational rent from buyer-supplier relationships may act through operations performance of the firm to enhance overall firm performance. Barney (2000) asserts that the organisation's form and its ability to achieve stated objectives is influenced not only by its internal social structure but also social structures external to the firm. Buyer-supplier relationship is a typical social structure external to the firm where important capabilities can be obtained through intermediate governance (Barney, 1999). The current high level of market uncertainty requires collaborative efforts among firms in order to succeed. Buyer-supplier relationship management may thus produce relational rent that will enhance the operations performance dimensions which form the basis for generating supernormal profits.

Dyer and Singh (1998) express the value of inter-organisational relationships with the claim that:

Firms who combine resources in unique ways may realize an advantage over competing firms who are unable or unwilling to do so. Thus, idiosyncratic inter-firm linkage may be a source of relational rents and competitive advantage (Dyer and Singh, 1998:661).

Rudawska (2010) argue that relational rents can only be earned from resources which have been specifically committed to the alliance and jointly owned by network partners. Thus network resources which are shared resources of the focal firm and its partners are paramount to the creation of competitive advantage for exchange partners (Lavie, 2006; Gulati, 1999). Dyer and Singh (1998) put the resources for generating relational rents into four categories:

1. Relation-specific assets,

2. Substantial knowledge sharing routines,
3. Complementary resources endowments, and
4. Effective governance mechanisms.

Supply management capabilities are relevant to generating all four categories of rents. Exchange partners will capture relational rents only when they are prepared to exchange physical and intangible resources as well as joint investment in relation-specific resources (Rudawska, 2010). Thus, the relational view of the firm examines inter-firm relationship as a source of competitive advantage. The theory offers a good theoretical basis for analysing how dynamic capabilities in supply management could be used to generate relational rent for enhancing a firm's operations performance.

3.4 Dynamic capabilities/relational view and supply management capabilities

Many firms are realising the value of alliances as a means of minimising the risks posed by environmental uncertainty. The evidence is the increasing rate of inter-firm collaborations (Rudawska, 2010; Dyer, 2000). Superior market performance has become a stimulus for the firm to develop appropriate capabilities to counter environmental uncertainty and turbulence (Hakansson and Snehota, 2006; Christopher 2000). Superior market performance may be linked to how best internal evolutionary capabilities match up with changing business environment (Petroni, 1998).

The majority of collaborative relationships are mainly found in the upstream portions of supply chains, and therefore this emphasises the importance of the relationship between the focal firm and its suppliers. The importance of collaborations emphasises the need for the focal firm to develop dynamic capabilities in supply management in order to capture relational rents. Such dynamic capabilities may indirectly contribute to the output of the firm through their impact on operational capabilities (Helfat and Peteraf, 2003). Dynamic capabilities in supply management empower the firm to achieve relational rents through appropriate investments in strategic collaborations.

Zacharia *et al.*, (2011) argue that both parties to an exchange process may possess tacit knowledge which may be highly relevant to each other's success. Partners will only be prepared to share this knowledge when there is an active involvement of all

in the relations. Zacharia *et al.*, (2011) cite product development as a typical instance where tacit knowledge shared between buyer and supplier has significant impact. Petroni (1998) maintains that the importance of dynamic capabilities is the organisational processes and routines that are created to solve business problems. Supply management capabilities are dynamic; they do not only support problem-solving, but are also linked to the market, technological environment and the competences of the firm. Being dynamic, supply management capabilities enable the firm to align the changing business supply environment with operations requirement thereby facilitating supply base responsiveness (Lawson *et al.*, 2009). Chen *et al.*, (2004) stipulate three conditions under which organisational capabilities may lead to sustainable competitive advantage. The conditions occur when organisational capabilities:

1. Are not tradable in factor markets,
2. Take a long time to develop, and are historically based and path dependent,
3. Have socially complex relationships with other organisational resources.

Supply management capabilities fit the above criteria as they are information-based physical or intangible processes and resources endowed in a firm's human capital and developed over time through learning (Zacharia *et al.*, 2011). Cepeda and Vera (2007) comment that dynamic capabilities deal with how firms acquire new skills and create routines and processes that enable them to compete effectively. These routines and processes solidify into the firm's knowledge base.

Top management's role in defining and shaping routines is important as they need to identify the business environmental challenges confronting the firm and develop appropriate capabilities to combat them. In view of this, Chen *et al.*, (2004:507) argue that "the accumulation of non-tradable resources and capabilities through strategic collaboration requires that firms adopt a different managerial mind-set for building strategic advantage compared to that adopted by the firms competing alone". Such capabilities enable the organisation to swiftly seize opportunities or neutralise threats emerging from the supply chain.

Developing capabilities in supply management is thus essential not only in terms of relational advantages but can equally impact on the operational capabilities of the firm. The deployment of supply management capabilities may create long-term supplier orientation that will generate collaborative advantages for partnering firms (Chen *et al.*, 2004; Dyer, 2000). The ability of the focal firm to share valuable technical knowledge with suppliers can promote active supplier participation in new

product development. The benefits are improved product quality and reduced time-to-market. In addition, the firm's ability to develop a capability of working closely with a limited number of suppliers will result in better economies of scale for the suppliers and improved price for the buyer. It is therefore argued that dynamic capabilities in supply management are fundamental sources of relational rents that contribute towards efficient operations performance (Dyer and Singh, 1998).

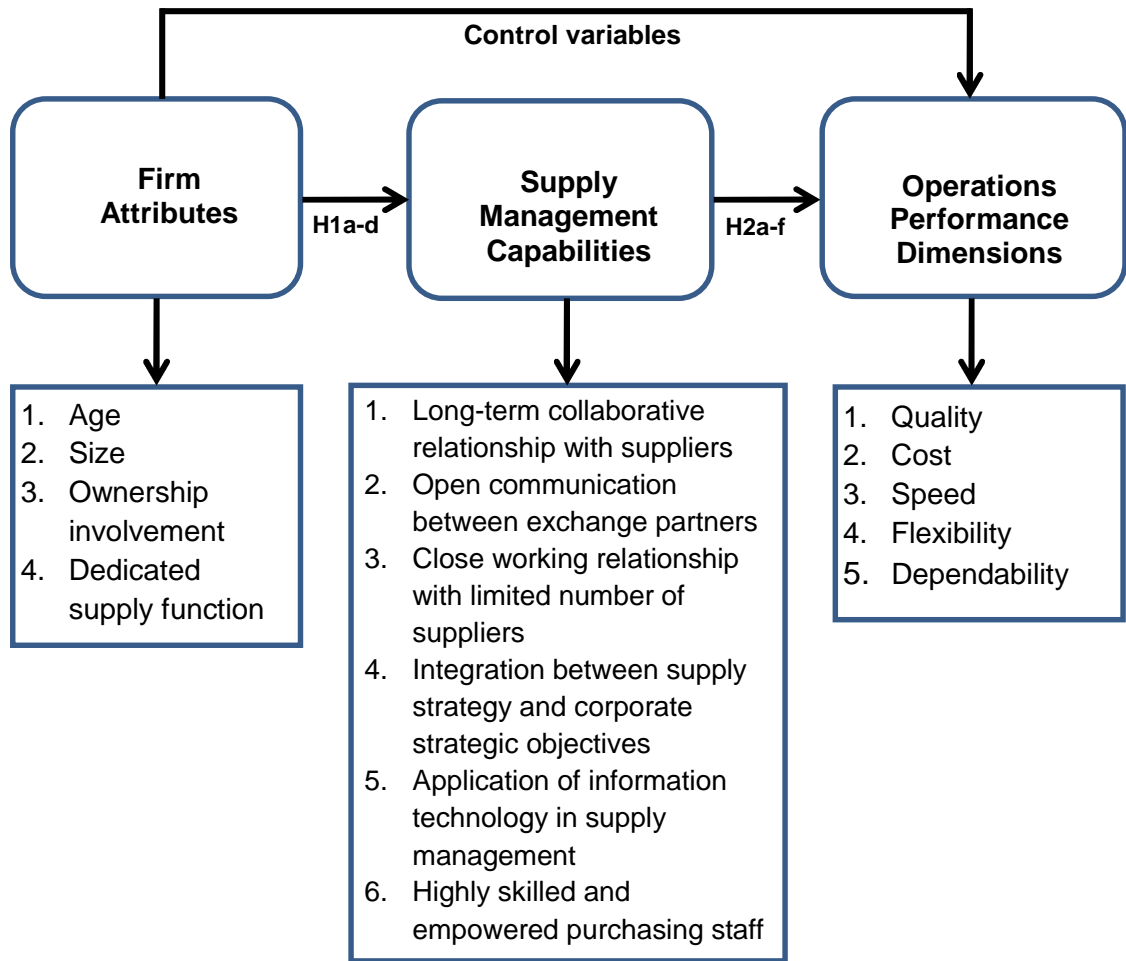
3.5 Research model

Figure 3.1 represents the research model for the study. The model depicts the relationships among the research variables. The supply management capabilities construct is operationalised as: 1) long-term collaborative supplier orientation, 2) open communication between exchange partners, 3) close working relationship with limited number of suppliers, 4) integration between supply strategy and corporate strategic objectives, 5) application of information technology in supply management, and 6) highly skilled and empowered purchasing staff. The operations performance dimensions construct on the other hand, is measured by: 1) quality, 2) cost, 3) speed, 4) flexibility and 5) dependability. Age, size, ownership involvement, and dedicated supply function are classified in this study as 'firm attributes'.

'Supply management capabilities' is the independent variable whilst 'operations performance dimensions' is the dependent variable. To assess the relationship between firm attributes and supply management capabilities, the former will be considered as the independent variable, and the latter, the dependent variable. As independent variables, it is conceptualised that age, size, ownership involvement, and the existence of a dedicated supply function (firm attributes) are key variables that affect the extent to which supply management capabilities are developed.

Firm attribute variables also constitute control variables in this study. In assessing the impact of supply management capabilities on operations performance dimensions, age, size, ownership involvement and dedicated supply function will be controlled for as these are already known to affect firm performance and may equally influence operations performance as well. Controlling for these variables will allow for the unique contribution of supply management capabilities to operations performance dimensions to be determined.

Figure 3.1: Research model with constructs and dimensions



3.5.1 Significance of the research model

From the theoretical premise, the model proposes that dynamic capabilities in supply management may generate relational rents which can impact on the operations performance dimensions of the firm (Zacharia *et al.*, 2011; Lavie, 2006; Chen *et al.*, 2004; Dyer, 2000; Dyer and Singh, 1998). Helfat and Peteraf (2003:999) state that “Dynamic capabilities do not directly affect output for the firm in which they reside, but indirectly contribute to the output of the firm through an impact on operational capabilities”. On this premise it is assumed that supply management capabilities will generate relational rent from the supply side of business to impact operations performance and ultimately firm performance. This thinking is captured in the research model by measuring the influences capabilities in supply management may have on the operations performance of the firm. It is recognised within the model that the development of capabilities in supply management is influenced by the factors, ownership involvement, age, size and a dedicated supply function. The research model is relevant to the study because it

captures all the key concerns raised in the research issues and research questions. The model is therefore significant for the following reasons:

1. It operationalises the supply management capabilities construct. This construct is relatively under researched and its operationalization in this study will enhance the understanding of the construct as part of the theoretical contribution.
2. It attempts the modelling of the influence of ownership involvement, age, size and dedicated supply function on the level of supply management capabilities. The determining of the influence can form the basis for support strategies for developing these capabilities in UK manufacturing SMEs.
3. It models the association between supply management capabilities and the operations performance dimensions. The model is intended to explore in detail the relationships among the measurements for supply management capabilities and the measurements for the operations performance dimensions.

3.6 Development of research hypotheses

3.6.1 Firm age and supply management capabilities

Building and managing an business relationship between the focal firm and its suppliers are believed to engender sustainable competitive advantage (Chen *et al.*, 2004; Kale *et al.*, 2002). The process of building these relationships leads to the development of capabilities which produces competitive advantage. For SMEs and new ventures, dynamic capabilities are required to enable them survive, legitimize and benefit from their innovativeness (Zahra *et al.*, 2006). Zahra and George (2002b) note that dynamic capabilities are valuable because they enhance the firm's agility and corporate responsiveness to changing market conditions which is the basis of its legitimacy and survival. Bowen *et al.*, (2001) define capabilities in supply management as the bundles of skills and resources for supply management which are developed through a strategic approach. A strategic approach implies long-term planning including the willingness on the part of purchasing to continuously take risks intended to seek long-term opportunities that lend support and expertise to corporate strategic intentions (Paulraj *et al.*, 2006). Helfat and Peteraf (2003) add that competitive advantage or disadvantage emerges over a period of time. Thus the evolution of capabilities is fundamental to the creation of competitive advantage, but time is required in order to develop these capabilities.

The age of the firm therefore seems to influence capability development as dynamic capabilities enable a firm's capabilities to change with the passing of time (Rindova and Kotha, 2001).

The evolutionary school of thought (Nelson and Winter, 1982) argues that the accumulation and development of capabilities and competences is a path-dependent process involving continuous learning (Petroni, 1998). Zollo and Winter (2002:340) add that "capability is a learned and stable pattern of collective activity through which the organisation systematically generates and modifies its operating routines in pursuit of improved effectiveness". Pre-existing endowments and experience has been identified by Helfat and Liberman, (2002) as sources from where capabilities may be learned. Similarly, Ambrosini *et al.*, (2009) account that dynamic capabilities emerge from organisational processes and routines which become embedded in the firm over time. Zahra and George (2002a) assert further that because learning is a path dependent process, what firms can learn is dependent on their past experience which is the basis of what they know. In other words, a firm's history and the developmental stage of its routines influence what and how they learn (Zahra *et al.*, 2006). It is widely acknowledged that learning is the basis for developing dynamic capabilities (Zollo and Winter, 2002; Eisenhardt and Martin, 2000). Organisational capability is the product of knowledge acquired by the firm over a period of time from practicing, failure, correction and mastery. The firm transits from basic levels of knowledge to some forms of 'technological mastery' targeted to product or process innovation resulting in performance differentials. Subsequently, it is argued that supply management capabilities are developed over time. The age of the firm could therefore be a major factor affecting its development. Hence it is hypothesized that:

H_{1a}: The age of a SME influences the extent to which they are able to develop supply management capabilities.

3.6.2 Firm size and supply management capabilities

The conception of capabilities as routines suggest that for the execution of an activity to become a capability, the activity must have reached some threshold level of continuous practice (Helfat and Peteraf, 2003). Eisenhardt and Martin (2000) maintain that repeated practice is a strong learning mechanism for developing dynamic capabilities. In addition, Zahra *et al.*, (2006) argue that the repetition of routines increases knowledge of cause-effect relationships and subsequently increases confidence in their use. The benefits from the repeated exercise of

routines according to Zahra *et al.*, (2006) is a reduction in variability in results, minimises costs of repeating these actions, and improves managers' confidence in their future use of these routines. Structured organisational processes are more formal in large firms, and therefore comparatively, larger firms have higher propensity to develop repetitive routines hence likely to have higher supply management capabilities than smaller firms.

Firm size is path-dependent. Many firms start small and develop into large ones in the course of time. From the premise that capability development is historical and path-dependent, the argument can be made that if firm size is also affected by time, then it is logical to conclude that the extent to which a firm develops capabilities in supply management may be a factor of the size of that firm. As the firm expands in size, the volume of purchases equally increases and complexities relating to managing various lead-times and formal supplier selection and approval among others begin to emerge. To take control of the increasing challenges in supply management, organisational processes and routines may be standardised and become repetitive resulting in gains of command and efficiency through learning. This comes with a cost requiring additional resources as a specialised function will have to be created and appropriate skills and experience recruited. Koh *et al.*, (2007) states that SMEs tend to have less financial and physical resource capacity, indicating that resource constraints emanating from SMEs' size may inhibit capability development in supply management since capability development is resource-dependent. The preceding argument supports the hypothesised that:

H_{1b}: The size of a SME (turnover) has a positive effect in fostering the development of supply management capabilities.

3.6.3 Ownership and supply management capabilities

Arosa *et al.*, (2010) point out that ownership structure is a major corporate governance mechanism influencing the scope of a firm's agency cost as well as its success. Ownership concentration for example has been found to impact positively on firm performance due to minimized conflict of interest between owners and managers (Arosa *et al.*, 2010; Maury, 2006). The type of ownership a firm has may influence how the firm might be managed as well as its ability to develop appropriate capabilities.

A firm may have different class of owners. This includes family owners, manager owners, equity investors, and debt holders. The source of ownership whether

family, equity, or debt has differing governance implications as the various types of owners have their own values, interests and motivations (Randøy and Goel, 2003). Firm ownership and controls are important factors deciding the strategic direction of the firm as well as its ability to seize opportunities. Zahra *et al.*, (2006) argue that the vision and integration skills of managers and entrepreneurs represent key factors in the development of dynamic capabilities. Where this vision and thinking is low so is the firm's ability to develop needed capabilities and vice versa. An ambitious owner or founder for example, who is actively involved in the operations of the firm, will exploit opportunities and seek to develop the required capability to manage them; the growth of the firm becomes paramount to them. Randøy and Goel (2003) argue that where a successful founder and directors own majority shares in the firm, it becomes an investor's best bet for success as there is minimal risk of reducing firm value through managerial entrenchment or significant divergence of interests.

For SMEs, the key interest of founder(s) or founding family is ensuring the longevity of the firm through the preservation and exploitation of the firm's limited resources (Randøy and Goel, 2003). This means that to ensure the success of the firm, resources and capabilities are utilized in the wider interest of the firm rather than managerial interests within founder-led SMEs. These "resources are valuable in spotting and exploiting entrepreneurial opportunities, using the founder's vision, experience, networks and risk-taking propensity" (Randøy and Goel, 2003:623). It is therefore not surprising that Villalonga and Amit (2004) found that the value of the firm is greater when the founder is the CEO or the chairman of the board. On the contrary the value of the firm decreases when the leadership of the firm is transferred to the descendants of the founder(s) (Maury, 2006; Morck *et al.*, 1998). The literature seems to suggest that the ability of the firm to react to change which requires dynamic capabilities varies between founder-controlled firms and non-founder-controlled firms whether traded or not.

Teece *et al.*, (1997) describe dynamic capabilities as a coordinative managerial process. From this premise, it can be argued that, in founder-controlled SMEs, the founders may have their motivation as the long-term survival of the firm and preservation of the company for generations to come. Such SMEs will be more receptive to change than their non-founder-led counterparts. Founder-led organisations will be more proactive in adapting and exploiting change leading to the creation of multiple capabilities including supply management capabilities. On the basis of this logic, it is hypothesized that:

H_{1c}: Ownership involvement (Founder-led/controlled) in SMEs' operations fosters the development of supply management capabilities.

3.6.4 Dedicated supply function and supply management capabilities

The extant literature on supply management suggests that the size of the firm may have some effect on the extent to which capabilities in supply management are developed. However, most studies which confirm the significant effect of supply management on firm performance were mainly carried out in medium to large companies (Bernardes and Zsidisin, 2008; Chen *et al.*, 2004). On the other hand, studies on supply management in SMEs (Ogden *et al.*, 2007; Ellegaard, 2006) have found supply management as a function frequently neglected. Large companies tend to have established structures and processes for managing supplies. These structures and processes lead to the creation of distinctive routines which become repeated practices. Repeated practices according to Eisenhardt and Martin (2000), constitute important learning mechanisms for developing dynamic capabilities.

The description of dynamic capabilities by Helfat *et al.*, (2007) as the capacity of the firm to purposefully create, extend and modify its resource base makes it size-dependent. This is because large firms have the capacity to adapt their resources in numerous ways (Arend and Bromiley, 2009). This implies that there is a higher chance for larger firms to develop dynamic capabilities in supply management by virtue of supply management being a specialised repeated practice. In contrast, SMEs tend to have fewer functional specialisations and often do not have defined routines and processes. For instance, Gadde and Hakansson (2001) observed that purchasing is one such function in SMEs that is often not specialised with defined routines. Purchasing usually constitutes an integral part of managing SMEs perhaps because many SMEs perceive purchasing as unimportant (Quayle, 2002b).

In particular, supply management structures and processes appear to be predominantly informal and unpredictable in SMEs making it difficult for routines to be repeated and learned from. Nelson and Winter (1982) defined routines as consisting of patterned and predictable behaviour. Since capabilities are organisational processes and routines rooted in knowledge and learning (Helfat and Peteraf, 2009; Cepeda and Vera, 2007; Eisenhardt and Martin, 2000), firms without well-defined processes and routines may encounter challenges with capability development. Dynamic capabilities according to Teece *et al.*, (1997) thrive on organisational skills, resources and functional competences. To this end, it may be

contended that, the minimal functional specialisation in SMEs which limits the repetitiveness of routines can limit the extent to which they develop capabilities in supply management. Larger firms which frequently specialise the supply management function appear better positioned to develop supply management capabilities. This argument leads to the hypothesis that:

H_{1d}: Dedicated supply functions in SMEs increases the development of supply management capabilities.

3.6.5 Relational view and dynamic capabilities in supply management

Supply management capabilities have been demonstrated in the preceding sections to be dynamic capabilities. Dynamism in supply management capabilities is needed to buffer the firm against environmental changes emerging from the upstream supply chain. In the sections that follow, the dynamic capabilities view and the relational view of the firm are combined to provide theoretical explanations for the relationship between supply management capabilities and operations performance dimensions.

Madhok and Tallman (1998) argue that inter-organisational relationships represent a unique and productive resource for value creation and realization. The importance of buyer-supplier relationships in business success has been heightened by the ability to separate and locate the various components of the manufacturing value chain in different geographic regions for cost advantages. This has given rise to strategic collaborations emphasizing the need for firms to develop dynamic capabilities in the management of supply chain partners (Chen *et al.*, 2004; Dyer and Nobeoka, 2000). Madhok and Tallman (1998) contend that collaboration among firms create mutual benefits for the exchange partners. Gadde and Snehota (2000) add that there exists an inescapable uncertainty and ambiguity in buyer-supplier relationships which require continuously changing solutions to manage successfully. These views reiterate the importance of dynamic capabilities in supply management. As dynamic capabilities, supply management capabilities enable the firm to seize opportunities, neutralize threats emanating from the supply side of business and enhance the resilience and survival capacity of the firm (Chen *et al.*, 2004; Eisenhardt and Martin, 2000).

A firm's capabilities in supply management will be unique to that firm. Hence such capabilities may become a resource which is valuable, rare, inimitable and non-substitutable (VRIN). Ainuddin *et al.*, (2007) found that, value, rarity and non-

substitutability of resources significantly drive the performance of firms. Supply management capabilities as a VRIN resource cannot easily be duplicated by competitors and therefore they can become a source of sustainable competitive advantage (Helfat and Peteraf, 2003; Eisenhardt and Martin, 2000; Barney, 1991). Such a resource offers strategic benefits because it is not tradable in strategic factor markets (Dierickx and Cool, 1989).

Another dimension to the source of competitive advantage delivered by supply management capabilities may be conceptualized from the relational view of the firm (Dyer and Singh, 1998). The relational view is also referred to as 'relational capital' (Kale *et al.*, 2000), 'relational capabilities' (Lorenzoni and Lipparini, 1999) and 'relational resources' (Sanchez, 1995). The relational view explicitly recognizes buyer-supplier relationships as a value-bearing asset (Madhok and Tallman, 1998) creating value for the relationship partners.

The effective redeployment of internal and external competences in the form of dynamic supply management capabilities lead to mutually beneficial buyer-supplier relationships. Dyer and Singh (1998) maintain that relational rents may arise in the form of lower total value chain cost, greater product differentiation, improved quality, and faster product development cycles. As contended by Lawson *et al.*, (2009), effective supplier relationship management influences firm performance through relational rents arising from joint resource creation and shared knowledge among supply chain partners. In the ensuing paragraphs, the relational benefits of supply management capabilities, (conceptualised as a six-dimensional construct), in relation to the operations performance objectives (five-dimensional construct) are discussed.

3.6.5.1 Long-term collaborative relationship with suppliers

It has been argued that the purpose of establishing supply chain relationships is to enable exchange partners to "gain access to or acquire unique and valuable resources that they lack, or to leverage "social" resources, such as reputation, status, and legitimacy" (Chen *et al.*, 2004:507). Thus the supply side of a business offers a good value creation opportunity. Chen *et al.*, (2004) maintain that where a collaborative relationship orientation is adopted, the economic benefits produced may be higher than a non-collaborative relationship approach. This view suggests that creation of a long-term collaborative relationship with suppliers is an essential capability in supply management.

Li *et al.*, (2006) describe a firm's long-term collaborative relationship with suppliers as important, intended to maximise the strategic and operational capabilities of the relationship partners for the purpose of achieving significant ongoing benefits. Such relationships usually span over a relatively long period of time focusing on mutual benefits for exchange partners and subsequently encourage sharing whether risk or rewards (Prajogo *et al.*, 2012; Li *et al.*, 2006; Paulraj and Chen, 2005). Long-term relationships create an enabling environment for the firm to respond to dynamic and unpredictable business environmental changes (Prajogo *et al.*, 2012). A firm's resilience to upstream supply chain turbulence fundamentally depends on its capabilities in supply management. However, Cox *et al.*, (2003) critiqued collaborative relationships citing power relations, uncertainty and asset specificity among others as being some of its drawbacks.

Long-term collaborative relationships with suppliers have been observed to have significant positive impact on the performance of Hewlett Packard and Silicon Valley firms (Saxenian, 1994). Relationship quality is improved when the relationship is based on a long-term collaborative approach. Long-term relationships with suppliers build supplier commitment and trust which are indispensable for the dependability and flexibility of the buying firm. Consequently, the capability in creating long-term collaborative relationships with suppliers generates numerous benefits which enhance the firm's operational efficiency. These benefits could include supplier's support in product development, major account holder benefits from the supplier, dedicated supplier staff, quick response to the buyer's queries and emergency request.

These benefits can be described as relational rents having the capacity to impact on the buyer's operations performance dimensions particularly quality, flexibility and speed. Kotabe *et al.*, (2003) for instance found that a long-term relationship orientation with suppliers improves supplier management with significant effect on the competitiveness of the partners in the chain. Similarly, De Toni *et al.*, (1994) posits that forging long-term relationships with key suppliers improves the firm's business performance by reducing cost, improving quality, and enhancing customer responsiveness or flexibility. But Sivadasan *et al.*, (2010) cautions managers to beware of operational complexity which could occur as a result of collaboration with suppliers. On the basis of this argument, it is hypothesised that:

H_{2a}: A long-term collaborative relationship with suppliers has a positive influence on the operations performance of a manufacturing SME.

3.6.5.2 Open communication between exchange partners

Open communication between exchange partners represents another dynamic capability in supply management. The importance of this capability cannot be overemphasized as relationships thrive on communication. Open communication in relationships may engender commitment and trust among partners and thereby “foster greater cooperation, reduce functional conflict, enhance decision making under conditions of uncertainty and ambiguity, and reduce the propensity of partners to exit the exchange relationship” (Chen *et al.*, 2004:509). Information sharing is recognised as a key component in effective supply chain management (Bechtel and Jayaram, 1997). Open and frequent communication has value-enhancing characteristics impacting on several dimensions of a firm’s operations performance.

Studies have traced defective supplier quality to poor buyer-supplier communication (Newman and Rhee, 1990). Thus effective communication improves the buying firm’s quality levels. Similarly, exchange of strategic information on materials may generate significant cost-savings for both partners and increase supply speed. Carr and Pearson (1999) note that a great deal of communication is required between buyers and suppliers in order for both parties to co-develop solutions to materials and design challenges. A dedicated supplier staff can work together with the buyer’s team to produce designs and materials or parts that minimise costs for both parties. Thus relational rents are extracted from the knowledge sharing routines expressed through open communication between the exchange partners (Lavie, 2006; Dyer and Singh, 1998).

Open and frequent communication in itself also contributes to the development of other supply management capabilities, such as the creation of long-term collaborative relationships. Sharing of classified information for example signifies trust among the partners which underlies long-term collaborative relationships (Large, 2005). Open and frequent communication according to Large (2005) is important for the relationship partners because it increases relationship quality which in turn strongly improves supply management performance. Dyer and Singh (1998) state that effective and efficient communication reduces communication errors, enhances quality and increases speed to market. Even though the importance of open communication has been highlighted in this discussion, getting suppliers to be open in a relationship is a capability that a focal firm must develop.

The supplier's readiness to engage in open communication with the buyer will be dependent on how they value the relationship by virtue of the benefits they envisage. Hence, the buyer's ability to promote a win-win relationship with the supplier is a fundamental step towards promoting openness in the relationship. This discussion suggests that the development of a supply management capability to openly communicate with suppliers may result in benefits to the parties including cost-savings, enhanced quality, improved speed and increased dependability. Chen *et al.*, (2004) add that open and frequent communication between the buyer and supplier enables parties to increase their knowledge and understanding of complex competitive issues through greater discovery and disclosure of information. This provides the buying firm with the advantage of added competitive value. Studies have associated better business performance with firms in network relationships where there is timely, accurate, relevant exchange and sharing of critical and sensitive information (Chen *et al.*, 2004; Mohr and Spekman, 1994). Thus, buyer-supplier relations require effective communication in order to succeed (Monczka *et al.*, 1995). Based on this premise, it is hypothesised that:

H_{2b}: Open communication with suppliers has a positive effect in enhancing the operations performance of a manufacturing SME.

3.6.5.3 Close working relationship with limited number of suppliers

Closely working with a limited number of suppliers has been identified from the literature as one of the dynamic capabilities in supply management (Chen *et al.*, 2004). Close supplier relationships with a limited number of suppliers lead to concentrated supply bases which in turn increases the buyer's bargaining power, produces economies of scale for both partners in the exchange, enhances the buyer's reputation with the supplier and promotes improved supplier quality. Hartmann *et al.*, (2012) make a case for a consolidated supply base that allows for the accumulation of buyer bargaining power to negotiate better prices, delivery conditions, and payment terms.

Supply base concentration enhances the effective use of the supply base (Cousins, 1999). Even though the situation may pose the risk of supplier opportunism which is manageable by appropriate governance mechanism (Lavie, 2006; Dyer and Singh, 1998), supplier base concentration generates several benefits including cost-savings by aggregating volumes; larger order volumes reduces the production cost for suppliers and the benefit is extended to the buyer by way of lower unit cost (Schotanus *et al.*, 2010). Supply base concentration enables volume consolidation

and parts-bundling providing leverages in the form of cost, quality, delivery, and supplier capacity and technology dedication advantages (Narasimhan and Das, 2001). Paulraj *et al.*, (2006) found that when a firm shares its requirement with a limited number of suppliers, they are better able to attract good discounts from suppliers who in turn are able to make more profit through added demand. Working closely with limited number of suppliers has again been found to engender higher levels of quality, reduced inventory cost and improved cycle times (Dyer, 1996). There is equally the advantage of increased business volumes which makes orders appealing to suppliers who are likely to do a great deal to maintain such relationships. However, closely working with a limited number of suppliers could reduce organisational resilience and make the firm more vulnerable to supplier disruptions.

Rudawski (2010) points out that network partners benefit from relational rents when there is an exchange of physical and intangible resources which may reduce transaction cost and add value. Dyer and Singh (1998) share in this view with the observation that network partners are able to increase the efficiency associated with inter-firm exchanges as they increase the volume and scope of their transactions. From the relational view perspective, developing a close working relationship with a limited number of suppliers increases investments in relationship-specific assets which facilitate greater trust, dependability and cooperation between the exchange partners (Rudawski, 2010; Dyer and Singh, 1998). A close working relationship facilitates trust and commitment building, enhances open communication and increases the problem-solving capability of the firm. These relational rents are fundamental to operations performance and influence the buying firm's customer responsiveness (speed/flexibility dimensions of operations performance). In the current business environment, interdependence among businesses is a necessity as competitive advantage is now much more of a synergistic effort among supply chain partners rather than individual company effort (Christopher, 2000). A close working relationship with a few suppliers enables the required synergy to be created. To summarise, a supply management capability in working closely with a limited number of suppliers improves operational efficiency and customer responsiveness of the focal firm (Paulraj *et al.*, 2006; Chen *et al.*, 2004). Thus,

H_{2c}: Close working relationship with a limited number of suppliers has a positive influence on the operations performance of a manufacturing SME.

3.6.5.4 Integration between supply strategy and corporate strategic objectives

Integration between supply strategy and the corporate strategy of the firm has received some attention in the literature (Cousins, 2005; Nollet *et al.*, 2005; Morgan and Monczka, 2003; Mills and Snow, 2003). Crafting a supply strategy which fits with the general firm strategy enables supply management to make a meaningful contribution to firm performance. Consequently, a supply management capability to integrate supply strategy with corporate strategic objectives (Carr and Pearson, 1999) may produce some benefits that could impact on the operations performance of the firm. The integration is meant to align “purchasing plans, policies and actions to cross-functional priorities and business goals of an enterprise” (Day and Lichtenstein, 2006:317). It involves establishing strong internal ties through purchasing staff’s participation in strategy development teams, information sharing, and joint decision-making activities intended to enhance organisational change (Narasimhan and Das, 2001). This configuration is very important because studies have established that firms which have a good alignment between functional practices and overall corporate strategy do perform better than firms where such alignment is poor or does not exist (Day and Lichtenstein, 2006; Nollet *et al.*, 2005; Frohlich and Westbrook, 2001). Bales and Fearon (1993) surveyed 134 firms and found detrimental effects of lack of integration between purchasing strategy and corporate strategy.

A fit between supply strategy and corporate strategy is the basis for the formation of a cross-functional team for the supply management process. Such cross-functional teams have been found to contribute significantly towards the performance of the firm. The impact of a cross-functional team in supply management could be felt through due diligence in supplier selection, active supplier involvement in product design, joint cost reduction and quality improvement initiatives with suppliers (Paulraj *et al.*, 2006; Sherman *et al.*, 2000). Furthermore the strategic fit is critical in determining what policies and actions will be required from supply management to enable the firm to achieve its corporate strategy. For instance, in Porter’s (1990) generic strategies, a firm that chooses to pursue a low cost strategy will require its supply management to pursue efficiencies in buying by focusing on cost reduction or improvement methodologies. In the same context, a firm that seeks to pursue a differentiation strategy is likely to prioritise quality orientation in its supply management activities.

Narasimhan and Das (2001) contend that supply management integration ensures that the firm's purchasing requirements are adequately matched with its manufacturing capability to satisfy the intended strategic direction. Supply management appears to contribute better to the corporate value system when supply-related activities are designed around the long-term requirements of the firm in general (Carr and Pearson, 1999; Freeman and Cavinato, 1990). Supply management's internal integration is necessary for the physical flows which enhance the firm's efficiency, flexibility and customer responsiveness and ultimately superior firm performance (Cagliano *et al.*, 2004; Frohlich and Westbrook, 2001; Narasimhan and Das, 2001). The extent of integration signifies the level of purchasing competence and recognition within the firm (Das and Narasimhan, 2000).

The relational view of competitive advantage focuses on the dyad/network routines and processes (Dyer and Singh, 1998). However, as stated by Narasimhan and Das (2001:594), supply management integration is predominantly "an internally focused initiative, aimed at aligning strategic purchasing practices with the firm's competitive priorities". It is an internal relational competence that impacts directly and indirectly on the operations performance of the firm in several dimensions. A capability to integrate supply strategy with corporate strategic objectives may lead to deciding on the best relationship strategies with suppliers to enable manufacturing to achieve its long-term objective. Hence it is hypothesised that;

H_{2d}: Integration between supply strategy and corporate strategic objectives has a positive influence on the operations performance of a manufacturing SME.

3.6.5.5 Application of information communication technology in supply management

The application of information communication technology (ICT) in supply management may be seen as an important capability in the current business environment where added value is achieved not simply by access to information but also access being virtual and in real time. Within the context of time-based competition, the importance of ICT in enhancing business prospects cannot be overemphasised. Since time emerged as a competitive factor, businesses have focused attention on lead-time reduction methodologies. Bertolini *et al.*, (2007) argue that one reason why lead-time compression is increasingly gaining awareness is the competitive advantage it delivers in the form of minimisation in inventory and cost, and improved customer response time. The application of ICT tools is one of the two main strategies proposed in the literature to achieve lead-

time reductions with the other being quick response strategy (Bertolini *et al.*, 2007). Wu and Angelis (2007) point out that process integration, information sharing, and customer responsiveness, all of which impact on cycle time reduction, are facilitated by the application of the appropriate ICT tools.

The application of ICT in supply chains is a dynamic capability that assists managers to “integrate, build, and reconfigure internal and external competencies to address rapidly changing environments” (Teece *et al.*, 1997: 516), hence a source of sustainable competitive advantage (Eisenhardt and Martin, 2000). ICT enhances information integration in the supply chain and subsequently improves its performance (Seggie *et al.*, 2006). The implementation of advanced ICT tools is widely recognised as an enabler for substantial improvement in supply chain integration and performance (Bertolini *et al.*, 2007). Chen and Pauraj (2004) make a claim for the use of ICT in a supply chain because it increases supply chain efficiency through providing real-time information regarding product availability, inventory level, shipment status, and production requirements. In addition it enables information to be shared among supply chain partners for the purpose of collaborative planning.

Gunasekaran and Ngai (2004) maintain that the use of ICT in supply chains improves the accurate flow of information and materials and in turn enhances decisions to support the business process in order to meet the changing market requirements. Giunipero and Percy (2000) point out that supplier base research must be done to identify best suppliers and what type of relationship might be appropriate to establish with these suppliers. The authors note that ICT is paramount in the effective execution of this important purchasing responsibility. Bertolini *et al.*, (2007) was emphatic that ICT tools enable the removal of several non-value-adding activities, whilst integrating most value-adding activities to engender more efficient and effective flows of products and information as well as substantial improvement in buyer-supplier integration. In agreement with these views, Giannakis and Louis (2011:30) conclude in their study that:

Inter-Organisational ICT tools offer opportunities to effectively support the management of supply chain activities, to communicate and share information in a speedy and reliable way, to reduce information asymmetries across the supply chain and to lead to the identification of events that have the potential to create disruptions in supply chain processes.

The basis of e-business is the application of ICT in supply chains. Kothari *et al.*, (2005) express the view that e-business or e-commerce delivers huge opportunities for minimising operating cost and increasing firm profitability. ICT applications in the supply chain may include the implementation of electronic data interchange (EDI), e-procurement systems, email systems, interactive websites, e-catalogues and auctions, internal information systems network, radio frequency identification system, barcoding and electronic inventory management systems (Harland *et al.*, 2007; Gunasekaran and Ngai, 2004). In spite of the claims being made for e-business as a firm performance enhancer, Harland *et al.*, (2007) found that the core motivation for SMEs to adopt e-business technologies is when they are pushed by key customers. Thus for many SMEs, the application of e-business technologies at the buyer-supplier interface (upstream supply chain) is scarce. The literature seems to suggest that SMEs have little awareness of the potential benefits of e-business adoption (Harland *et al.*, 2007; Salmeron and Bueno, 2006), hence their ability to develop this supply management capability may be limited.

Although some believe that the perceived benefits from the application of ICT in supply chains have been over-hyped (New *et al.*, 2003), its wide acceptance and usage in the supply chains of world-class firms is an indication of being a worthwhile investment. The relational benefits generated from applying ICT in supply chains seem to have implications on the operations performance of the firm, hence the hypothesis:

H_{2e}: The application of ICT in supply management has a positive influence on the operations performance of a manufacturing SME.

3.6.5.6 Highly skilled and empowered purchasing staff

Highly skilled and empowered purchasing staff represents an important capability in supply management. Elias and McKnight (2001:511) define skills as the “ability to carry out the tasks and duties of a job in a competent manner”. The opinion has been expressed that the most critical resource for a sustainable competitive advantage is people (Purvis *et al.*, (2001). Thurow (1994) emphasised that in the 21st century where organisations have virtually equal access to almost all resources, the skills to perform the job becomes a very important competitive factor. Thus it is the skills to effectively and efficiently execute job functions that mark the difference between successful and failing organisations. Skills and experience are necessary for developing competency in the supply management function. The

level of competency in the function indicates the extent to which it can contribute towards firm performance.

Das and Narasimhan (2000:18) described purchasing competence as “the capability to structure, develop and manage the supply base in alignment with manufacturing and business priorities of the firm.” This capability is very much dependent on the human resource expertise employed within the supply management unit as confirmed by Burke and Miller (1999) who found that good business decisions to a large extent depend on the skills and experience of the decision makers. It is widely believed that skills can positively influence not only a human’s but also a firm’s performance (Tassabehji and Moorhouse, 2008). Skills and experience are required to craft purchasing objectives that align with strategic business objectives and to implement same to deliver benefits to the firm. As noted by Giunipero *et al.*, (2006), the present business environment requires a skill set which demonstrates competence and excellence in supply management.

In their study, Das and Narasimhan (2000) found that purchasing competence impacts positively on several manufacturing priorities including quality, cost, delivery and customer responsiveness. Possessing appropriate skills and knowledge will empower supply managers to build strategic relationships, focus on total cost and strategic cost reduction, and be able to collaborate and integrate their processes with those of their suppliers (Giunipero *et al.*, 2006). As a dynamic capability, having highly skilled and empowered purchasing staff delivers several relational benefits that impact on the operations performance priorities of the firm, hence the hypothesis:

H_{2f}: Highly skilled and empowered purchasing staff has a positive impact on the operations performance of a manufacturing SME.

3.7 Conclusion

The study is conceptualised within the theories of the dynamic capabilities view and the relational view of the firm. From these two theories, a research model has been developed postulating the various relationships among the research constructs. The theories provided the explanations underlying the stated research hypotheses. To summarise, the working hypotheses for the present study are restated below.

H_{1a}: The age of a SME influences the extent to which they are able to develop supply management capabilities.

- H_{1b}: The size of a SME (turnover) has a positive effect in fostering the development of supply management capabilities.
- H_{1c}: Ownership involvement (Founder-led/controlled) in SMEs' operations fosters the development of supply management capabilities.
- H_{1d}: Dedicated supply functions in SMEs increases the development of supply management capabilities.
- H_{2a}: A long-term collaborative relationship with suppliers has a positive influence on the operations performance of a manufacturing SME.
- H_{2b}: Open communication with suppliers has a positive effect in enhancing the operations performance of a manufacturing SME.
- H_{2c}: Close working relationship with a limited number of suppliers has a positive influence on the operations performance of a manufacturing SME.
- H_{2d}: Integration between supply strategy and corporate strategic objectives has a positive influence on the operations performance of a manufacturing SME.
- H_{2e}: The application of ICT in supply management has a positive influence on the operations performance of a manufacturing SME.
- H_{2f}: Highly skilled and empowered purchasing staff has a positive impact on the operations performance of a manufacturing SME.

Chapter 4

Research Methodology

4.1 Chapter overview

The chapter discusses and explains the methodological approaches pursued in the present study in order to answer the research questions and achieve the aim of the study. The methodology employed sought to promote rigour in the investigations by viewing the phenomenon from diverse perspectives. The chapter describes and justifies the researcher's philosophical stance which in turn, informed the choice of research strategies including data collection and data analysis methods. The chapter explains the overall research process.

4.2 The ontological and epistemological debate

Approaches to social research are to a large extent based on the beliefs and the philosophical inclinations of the individual researcher. These beliefs and philosophical inclinations of a social researcher forms the basis of their ontology. Ontology refers to our worldview of 'being' or 'reality' which could be claims or assumptions relating to what we know. It describes the nature of being, existence or reality and addresses concerns about what exists or can be said to exist. Blaikie (1993:6) defines ontology as the science or study of being and covers claims about what exists, what reality looks like, what units make it up and how these units interact with each other. Saunders *et al.*, (2007:108) observe that ontology "raises questions of the assumptions researchers have about the way the world operates and the commitment held to particular views".

So the question is, how do we know what really exists? This ontological question brings into focus two major ontological positions; one viewpoint is that reality exists only through the experience of it whereas the alternate viewpoint holds that reality exists independently of those who live it (Hatch and Cunliffe, 2006:328). Saunders *et al.*, (2007:108) employed the terms 'subjectivism' and 'objectivism' to refer to these two poles of determining reality. Subjectivism maintains that 'social phenomena are created from the perceptions and consequent actions of those social actors concerned with their existence'. On the other hand, objectivism holds that 'social entities exist in reality external to social actors concerned with their

existence' (Saunders *et al.*, 2007:108). A researcher with an objectivist ontology would prefer working with an observable social reality to produce research results that can generate law-like generalizations. On the other hand, a subjectivist ontologist would rather prefer to study the 'details of the situation to understand the reality or perhaps a reality working behind them' (Remenyi *et al.*, 1998:35). It must however be pointed out that within and between these two extreme poles of knowing reality, a number of other ontological positions have developed. Some of these include idealism, nominalism, empiricism, rationalism etc all of which may be classified as either 'subjectivist' or 'objectivist' oriented. Consequently, social researchers have a number of deeply embedded ontological assumptions which affect their view on what is real and whether existence is attributable to one set of things over another.

Closely related to the question of what is reality, is the issue of how do we measure reality or knowledge. Considering that different views exist with regards to what constitutes reality, brings into focus how that reality can be measured, and what constitutes acceptable knowledge of that reality. This is the province of epistemology. Saunders *et al.*, (2007:102) explain epistemology as what constitutes acceptable knowledge in a field of study. This concept of epistemology presupposes that, what can constitute acceptable knowledge in a field of study depends on how it is measured. Perhaps Blaikie's (1993:6) description of epistemology as the theory or science of the method or grounds of knowledge, presents a better picture of the concept. Epistemology deals with views on the most appropriate ways of investigating into the nature of the world.

Research methods are therefore defined within the precepts of epistemological positions. The reason being that epistemology describes how and what is possible to know, a reflection on the methods and standards to generate reliable and verifiable knowledge, a criteria to distinguish good knowledge from bad knowledge, and what, and how reality is presented or described (Hatch and Cunliffe, 2006:13; Denzin and Lincoln, 2003; Chia, 2002). Researchers may assume one of varied philosophical positions including positivism, realism, critical realism, pragmatism, interpretivism, social constructionism, etc, all depending on their individual ontological and epistemological inclinations. Consequently, one's ontological and epistemological assumptions are bound to influence the methodological approach chosen in a particular research process.

4.3 Philosophical assumption of the study – critical realism

The ontology and epistemology dimensions discussed above provide the basis for assuming a philosophical foundation for this study. Appleton and King (2002) state that the philosophical intent of the researcher and the chosen methodology affect the rigour in a particular research. As a researcher, I am inclined towards the philosophy of reality that, knowledge exists independently of the researcher; that is whether we believe it or not, or whether we know it or not, there exists some measurable truths out there. However, in measuring that truth, the researcher's cognitive reasoning is influential in shaping that truth. The researcher's cognition is fundamental in discovering reality. The cognitive influence in the measurement of reality or truth may explain the post-modernism and pluralism views that absolute truth is unattainable. My perception of reality is practically in agreement with the beliefs of critical realists. In view of this, a critical realism philosophical position is adopted for the present study. It is anticipated that the assumed philosophical stance will allow for a methodology that will promote rigour in the research process.

The critical realist view of reality argues that "the world exists independently of our knowledge of it" (Sayer, 1992:5). Critical realists believe that there are objectively, knowable, mind-independent realities, but also accepts that human perception and cognition are influential in shaping that reality (Evely *et al.*, 2008). Easton (2010) describes critical realism as a philosophy that uses causal language with thinking. Critical realists share the view that there is meaning to every social phenomenon but meanings cannot simply be quantified; it also requires social construction of events to gain substance (Wilson and McCormack, 2006; Sayer 2000). In other words, critical realist view of reality suggests an interaction between objective measurement of observable entities and human perception to analyze non-observable entities in order to give reality a shape. This is because the social world is made up of complex interaction of processes; and objective measurement alone may not be sufficient to explain why certain events occur thereby requiring human cognition to unravel underlying causes (Wilson and McCormack, 2006).

Criticality is essential in order to know why things appear the way they do. To this end, Sayer (1992) argues that social science researchers ought to be critical in evaluating social phenomena in order to generate a credible explanation and understanding. The notion of criticality is embraced in the critical realism philosophy by its approach of measuring and socially constructing meanings. Based on the assumptions of the philosophy, Evely *et al.*, (2008) state that a critical realist's

approach to research is to identify and analyze psychological and societal systems that may cause unpredictable tendencies. The philosophy captures the validity and reliability values of positivism and simultaneously allows insight from human perception as pertains in social constructionism.

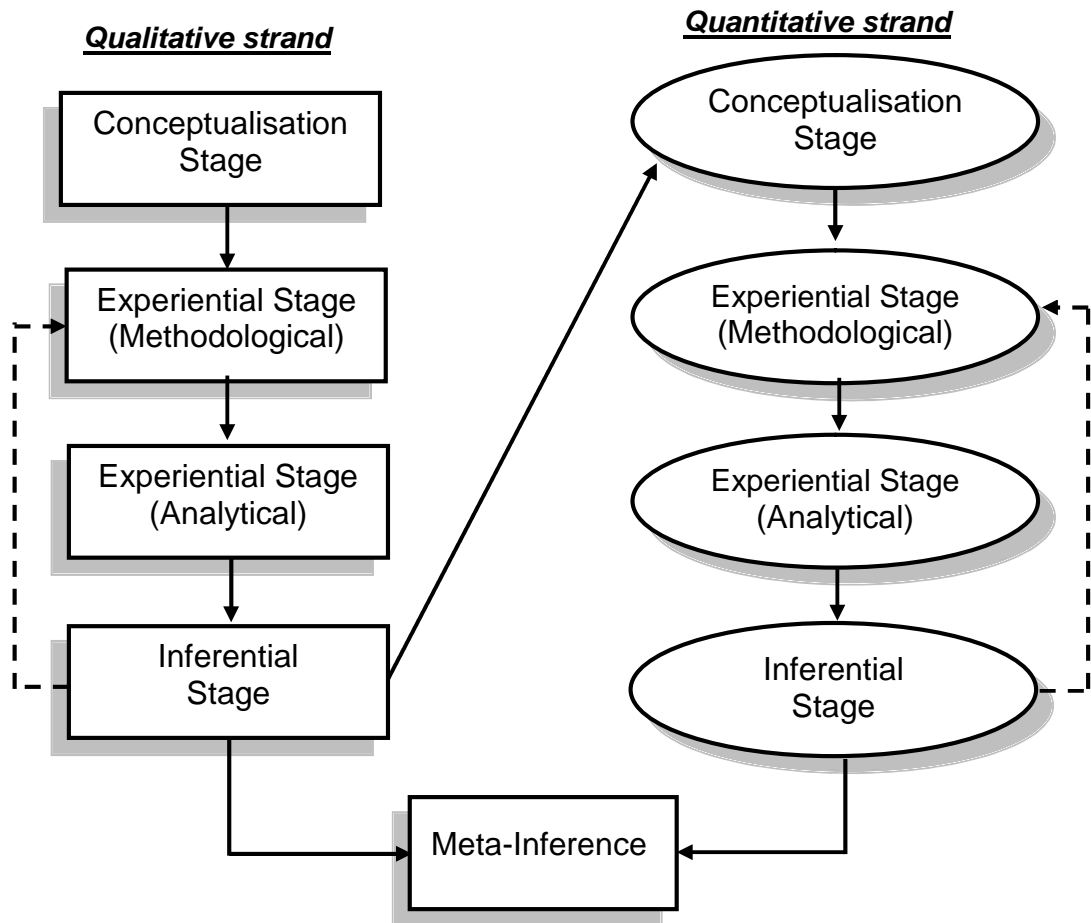
Critical realism provides a multi-research method for the phenomenon to be studied. This philosophical position offers the researcher a varied means to effectively answer the research questions posed using a complementary positivist and social constructionist approaches. The adoption of the mixed-methods approach enhances understanding of reality and provide answers to why a particular situation prevails (Remenyi *et al.*, 1998:35). Against this background, critical realism employs a methodological approach involving a combination of qualitative and quantitative research strategies as presented in the present study.

4.4 Mixed research methods

The mixed methods approach to research selected for the study conforms to the philosophical stance of the researcher. “Mixed methods research is defined as a research in which the investigator collects and analyzes data, integrates the findings and draws inferences using both qualitative and quantitative approaches or methods in a single study or programme of enquiry” (Teddlie and Tashakkori, 2003:15). This methodology provides complementary accounts of the research topic and considers the structures in social life with the underlying realities (Harrison, 2012; Bryman 2006). In this approach, multiple data are collected using both quantitative and qualitative tools which result in the benefits of complementary strengths and nonoverlapping weaknesses (Johnson and Onwuegbuzie, 2004). The adoption of mixed methods is not only for the maximisation and minimisation of the respective strengths and weaknesses of the component methods; it is also to enable the breadth and depth of explanation, corroboration and understanding of the phenomenon being investigated.

Supply management capabilities particularly in SMEs are relatively under-researched, hence the need to explore and discover their nature, a process which is better satisfied by qualitative methods. Quantitative methods facilitate the measurement of constructs and tests of relationships, but qualitative methods provide further support in explaining them. The sequential mixed design (Teddlie and Tashakkori, 2003) as depicted in figure 4.1 is adopted for the current study.

Figure 4.1: The sequential mixed method



Source: Adapted from Teddlie and Tashakkori (2003:22)

The sequential mixed design is one in which there are at least two strands that occur chronologically. The findings of the first strand informs the data collection and analysis of the next strand but the final inferences are based on the results of both strands of the study. Teddlie and Tashakkori (2003) did not prescribe the order of the strands. This is a choice for the researcher to make. Thus, the researcher may decide to start the process with either the quantitative or the qualitative strand depending on what the research is intended to achieve.

In the present study, the qualitative strand preceded the quantitative strand. This was due to the need for an insight into the research phenomenon from practitioners as they perceive it, using a dialogue approach. The idea was explore the concept of supply management capabilities for understanding and capturing insights which would subsequently inform a wider quantitative study. Thus, the initial qualitative insight was used to inform the quantitative strand of data collection. Some findings from the qualitative analysis was used to refine the draft survey items. This sequence of events is in agreement with the suggestion by Mason (2006:10) that “a

'qualitatively driven' approach to mixing methods offers enormous potential for generating new ways of understanding the complexities and contexts of social experience, and for enhancing our capacities for social explanation and generalization". By 'qualitative driven', Mason (2006) meant the use of qualitative methods as the starting point in a mixed method enquiry process as a useful way to reinforce the quantitative processes.

The assignment of quantitative and qualitative data in the same study will promote validity and reliability as well as enhancing the objectivity and generalizability of the research findings and make the findings useful to most manufacturing SMEs. The mixed method approach therefore seemed justified for the current study on the basis of philosophical perspective, the research questions to be addressed and the SME context of the study. It also satisfies the call for the use of mixed methods in business research as made by Woodside (2010).

4.5 Research population

The population for the study comprised all manufacturing SMEs based in the UK. However, the population for the qualitative component of the study was restricted to firms based in the Yorkshire region of the UK. The population for the quantitative component on the other hand, involved all manufacturing SMEs across the UK. There were firms which participated in both the interviews and the quantitative survey. Sections 4.5.1 and 4.5.2 expatiate on the population for the qualitative and quantitative components of the study respectively.

4.5.1 Population for qualitative data collection

The selection of firms for the qualitative component of the study was restricted to manufacturing SMEs in the Yorkshire region of the UK. The researcher is Yorkshire-based, therefore the restriction of the population for the qualitative study to firms in the Yorkshire region was primarily for easy access, convenience and cost reasons. In view of this restriction, all manufacturing SMEs based in the region qualified to be selected as part of the sample. A total of fifteen manufacturing SMEs based in the region subsequently agreed to participate in the study through company-based interviews. The number of participating firms was in line with studies (see Pressey *et al.*, 2009; Ellegaard, 2006; Bowen *et al.*, 2001) that have adopted similar methodology. Interviewees included firm owners and senior managers thought to have experience relating to the research issues.

4.5.2 Population for quantitative data collection

There were an estimated 274,000 private sector manufacturing firms in the UK at the start of 2013 according to UK's Department for Business Innovation and Skills. Out of this figure, it is estimated that there are about 270,712 small firms and 2,740 medium firms thereby giving the population of this study to be 273,452 (99.8% of 274,000). From a total of 273,452 firms, 2,002 were targeted as the sample for the current study. The targeted sample were SMEs spread across the whole of the UK. The sample consisting of 2,002 manufacturing SMEs were selected from the Financial Analysis Made Easy (FAME) database. The FAME database contains comprehensive information on over nine million companies in the UK and Ireland. FAME was used primarily because of access, the ease of usage, and the broad range of information it contains on firms including, key contact persons and contact details, registered company address, telephone numbers, number of employees, company turnover and other financial information. Table 4.1 shows the breakdown of the small firm and medium firm composition of the targeted sample frame.

Table 4.1: Targeted sample for questionnaire survey

Firm category	Frequency	Percentage (%)
Small firms	601	30
Medium firms	1,401	70
Total	2,002	100

4.6 Sampling strategy

For the qualitative data, the sampling strategy involved identifying firms in the Yorkshire region which were into manufacturing of any kind and fell within the SME definition of employing between 10-249 people. The restriction of the study largely to firms in the Yorkshire region was for the reasons of easy accessibility, convenience, reduced travelling cost and risk. This restriction however does not affect the findings in anyway as these firms are not known to operate under any peculiar or special conditions to the best of the researcher's knowledge. Yorkshire-based SMEs are typical of SMEs across the UK. As stated in section 4.5.1, fifteen companies participated in the interviews.

The selection of the interviewees was purely purposive as it was not based on any theory of the statistical probability of selection (Curtis *et al.*, 2000). Company

owners and senior managers as described in section 4.7.1.1 who were thought to have experience relating to the research issues were sampled. Even though the sample appears not to be 'objective' or 'representative' as may be required in a quantitative method, it is also not unusual. The sampling method was considered appropriate because "the aim of qualitative methods is to choose respondents who will help the researcher make sense of people's experiences" (Longhurst, 2009:581).

Although the companies which participated in the interviews were self-selected, the 'polar' rule was almost observed as there were nearly the same number of small-sized firms (46.7%) as there were of medium-sized firms (53.3%). By the 'polar' rule, there ought to be relatively equal representation of the two groups within the population, (i.e., small-sized firms and medium-sized firms) in the sample.

On the quantitative front, The FAME database was searched for manufacturing SMEs within the UK employing between 10-249 people. Only firms with key contact persons and telephone numbers were selected. This search criteria resulted in the identification of 2,002 SMEs from the database. Out of that number, there were 601 small firms and 1,401 medium firms (see table 4.2 above). The category of respondents for the survey were owners and senior executives similar to the interview participants.

4.6.1 Selection process for interviewed firms

A voluntary participation method was used to select fourteen of the firms that participated in the interviews. The researcher solicited support from the Keyworth Institute, Faculty of Engineering in The University of Leeds to seek access to firms on its database. The Keyworth Institute provides a liaison between businesses and major research and development capabilities of the University. The Keyworth Institute also offer a wide range of business support and links businesses to the research base of the university. Following an agreement with the head of the Institute, my interview request letter was emailed to the Institute. The Institute forwarded my letter to 2,500 businesses on its database on August 1, 2012. The businesses on the Institute's database included SMEs and large firms, manufacturing and non-manufacturing firms, and Yorkshire-based and non-Yorkshire-based firms.

Over a period of two weeks, fourteen companies had voluntarily contacted the researcher to express interest and accept participation. The fifteenth company was

a firm the researcher had earlier undertaken a postgraduate placement with. On receipt of each email accepting participation in the study, the researcher telephoned the responding individual to arrange an interview date. The interviews conducted in the fifteen companies were completed on October 1, 2012. Among the fifteen companies which participated in the interviews, eight were included in the 2,002 sample for the quantitative survey.

4.7 Data collection

The data collection framework consists of two phases. Phase I entailed collecting qualitative data using semi-structured interviews, whereas Phase II consisted of quantitative data collection using an online survey questionnaire. The details of the processes involved in both phases are explained below.

4.7.1 Phase I - The research interviews

A review of the relevant literature led to the identification of four interview themes relevant to the study. Interview questions were prepared on the four themes, namely, organisational attributes, supply management and processes, supply management capabilities, and operations performance dimensions. These questions constituted the interview guide [see Appendix A].

The face-to-face semi-structured interview approach was used for the qualitative data collection. This meant interviewees were not restricted to the questions on the interview guide. Interesting issues were explored further as and when they came up in the conversation. The face-to-face interview method enhances the development of rapport and a natural encounter which are necessary for generating rich qualitative data (Irvine *et al.*, 2012). Longhurst (2009) opines that the method is useful for delving into and attempting to understand complex behaviours, experiences, and opinions. The interviews followed a dialogue type enquiry allowing respondents to account for their supply management activities and how these relate to the attainment of their firm's operations performance objectives.

4.7.1.1 Interview participants and interview process

The interview participants were all senior executives in manufacturing SMEs. These included Chief Executive Officers, Managing Directors, General Managers, Supply Chain Managers, Business Development Managers, Commercial Directors, Technical Directors, Operations Managers and Purchasing Managers. The interviews took place at the premises of the participating firms. For three of the

interviews, there were more than one interviewee. In these three interviews, the interviewees included the owner of the firm or the Chief Executive Officer and a senior manager. With the permission of interviewees, all the interviews were voice recorded. The shortest interview lasted for 45 minutes whilst the longest lasted for 105 minutes. At the start of each interview, the researcher explained the purpose of the interview and assured interviewees of the confidentiality of all information provided. The transcription of the interviews was done following each interview. Table 4.2 gives some demographics of the SMEs which participated in the interviews.

Table 4.2: Participating firms

Firm code	Age of firm	No. of employees	Turnover
RES-1	16 years	27	£3m
RES-2	10 years	13	Not given
RES-3	31 years	55	£11m
RES-4	50 years	58	Not given
RES-5	27 years	200	£18m
RES-6	120 years	150	Not given
RES-7	94 years	60	£4.4m
RES-8	60 years	90	Not given
RES-9	20 years	10	£0.3m
RES-10	21 years	18	£1.5m
RES-11	50 years	66	Not given
RES-12	20 years	30	£4m
RES-13	25 years	14	£1.5m
RES-14	26 years	180	£17m
RES-15	10 years	35	Not given

The participating companies were spread across eight cities and towns in the UK. These were Leeds, Sheffield, Wakefield, Huddersfield, Chorley, Bradford, Scunthorpe, and Newport.

4.7.1.2 Interview data analysis

The analysis of the interviews began with the transcription of the interview data by the researcher. Though the exercise was tedious and time-consuming, it offered the opportunity for the researcher to explore and become familiar with the data. The interviews were transcribed using Nvivo 10. The same software was used for the coding process. Following the transcriptions, the researcher trawled through the transcriptions to understand them thoroughly before the open coding began. This pre-coding exercise helped in identifying important concepts and labels as well as themes beforehand and provided useful insights on the content of the text.

On completion of the coding process, the researcher applied the thematic analysis method to derive meaning from the data. Braun and Clarke (2006) describe thematic analysis as a “method for identifying, analysing, and reporting patterns (themes) within data. A theme, according to Braun and Clarke (2006) captures an important knowledge from the data relating to the research question. This important knowledge is represented in the data by some pattern of response or meaning expressed by the interviewees. In the current study, the codes that emerged converged into six major themes namely: organisational attributes; supply management structures and processes; supply management capabilities; operations performance objectives/dimensions; organisational attributes and supply management capabilities; and supply management capabilities and performance dimensions. By carefully scanning through the transcripts, patterns of responses were discovered in a manner that associates them with one of the six broad themes. For each of the six major themes, there were other sub-themes that emerged. Following completion of the qualitative analysis, some of the findings were used to inform and refine the quantitative survey questions.

4.7.2 Phase II – the quantitative survey

The quantitative data collection constituted Phase II of the data collection process for the current study. Phase II of the data collection followed after the analysis of the interview data. Quantitative data were collected using a survey instrument for statistical analysis. These data were collected to enable statistical tests of relationships among research variables.

4.7.2.1 Design of the questionnaire

The questionnaire was developed after an extensive review of the literature and contained questions on organisational attributes, company supply base, supply management challenges, supply management capabilities awareness, supply management capabilities, and operations performance dimensions. The key research variables are discussed below. Regarding organisational attributes, specific questions were asked on the age of the firm, the size of employment and annual turnover, the extent to which owners of the business were involved in the day-to-day operations of the firm, and whether the firm has a dedicated supply function.

Company supply base assessment consisted of ten questions bothering on management of activities relating to the supply base. These questions were developed on the basis of perceptual understandings of supply base management. Organisational attributes were measured by four content variables, age, size (employment levels), ownership involvement and dedicated supply function. Each of these content variables were measured using a single-item variate and consistent with previous literature.

“Supply management challenges”, “supply management capabilities awareness”, and “supply management practices” were all single-content variables which were measured by a five-point Likert scale set of questions. Supply management challenges measured the difficulties confronting the firms in their supply management efforts. Some of the challenges were culled from the literature whereas others emerged from the initial qualitative interviews. A total of fifteen items were used to capture the supply management challenges variable. Supply management capabilities awareness measured by the extent to which senior management of the firms are perceived to be aware of the six supply management capabilities examined in this study. The supply management practices variable measured the current practices engaged in by the firms in their supply management efforts, using fifteen items. On a five-point Likert-scale, respondents were asked to indicate their level of agreement or disagreement with each item measuring a variable. The scale ranged between 1 – 5, where “1” = “strongly disagree” and “5” = “strongly agree”.

Six dimensions were used to measure the supply management capabilities construct. Perceptual questions synthesised from the literature were used to measure each dimension separately. Each dimension was measured by a multi-

item Likert scale with a minimum of five items or variates on every dimension. The items were carefully selected following review of the supply management literature. Operations performance dimensions in this study were constituted by five content variables namely quality, cost, flexibility, speed and dependability. These variables were found in the literature review to be commonly and frequently used as the dimensions of manufacturing competitive priorities. Each content variable was measured using a multi-item Likert scale. Table 4.3 gives a summary of the questionnaire structure while Table 4.4 and 4.5 provide further details on the content variables and sources of measurement items used in the supply management capabilities (SMC) and operations performance dimensions (OPD) constructs respectively. The scales for the SMC and OPD variables were adapted from the literature. The reason for the use of the five-point Likert scale was to promote a reasonable statistical variability among the survey responses.

Table 4.3: Structure of questionnaire

Part	Heading	Likert Scale	No. of items	Sources of items
1	Company and respondent profile	No	21	Self-developed
2	Supply base information	No	10	Literature review and QA* findings
3	Supply management challenges	Yes	15	Literature review and QA* findings
4	Supply management capability awareness	Yes	15	QA* findings
5	Supply management practices	Yes	15	Literature review and QA* findings
6	<u>Supply management capabilities</u> 1. Long term collaborative supplier orientation 2. Open communication between exchange partners 3. Close working relationship with limited number of suppliers 4. Integration between supply strategy and corporate strategic objectives 5. Application of information technology in supply management 6. Highly skilled and empowered purchasing staff	Yes Yes Yes Yes Yes Yes	6 6 5 6 7 5	See table 4.4 See table 4.4 See table 4.4 See table 4.4 See table 4.4 See table 4.4
7	<u>Operations performance dimensions</u> 1. Quality 2. Cost 3. Speed 4. Flexibility 5. Dependability	Yes Yes Yes Yes Yes	5 5 5 5 5	See table 4.5 See table 4.5 See table 4.5 See table 4.5 See table 4.5
8	General	No	3	Self-developed

*QA: Qualitative analysis

Table 4.4: SMC content variables and sources of measurement items

Variables	Determinants (measurement items)	Literature sources of items
Long-term collaborative supplier orientation	Long-term supplier relationship, long-term improvement in quality, long-term alliance, suppliers as extension of the firm, joint problem solving with suppliers, mutually beneficial relationship	Dobrzykowski <i>et al.</i> , (2012), Lado <i>et al.</i> , (2011), Anbanandam <i>et al.</i> , (2011), Flynn <i>et al.</i> , (2010), Danese, (2013), Narasimhan and Talluri (2006), Chen <i>et al.</i> , (2004).
Open communication between exchange partners	Sharing of sensitive information, providing suppliers with relevant information, frequent and timely exchange of information, frequent face-to-face communication, annual appraisal of suppliers	Hartmann <i>et al.</i> , (2012), Lado <i>et al.</i> , (2011), Paulraj <i>et al.</i> , (2008), Chen <i>et al.</i> , (2004), Narasimhan and Das, (2001).
Close working relationship with limited number of suppliers	Use of few high quality suppliers, close relationship with selected suppliers, consolidation of orders, adoption of single sourcing	Dobrzykowski <i>et al.</i> , (2012), Yan and Dooley (2013), Lado <i>et al.</i> , (2011), Paulraj <i>et al.</i> , (2008), Chen <i>et al.</i> , (2004).
Integration between supply strategy and corporate strategic objectives	Purchasing knowledge of strategic goals, measurement of purchasing performance, development of purchasing professionals, the integral role of purchasing, purchasing participation in strategic decisions, source of supply strategy	Lado <i>et al.</i> , (2011), Baier <i>et al.</i> , (2008), Cousins (2005), Chen <i>et al.</i> , (2004), Narasimhan and Das, (2001).
Application of information technology in supply management	Direct computer-to-computer links, inter-organisational coordination, IT enabled transactions, electronic mailing capabilities, electronic tracking of transactions, e-sourcing	Dobrzykowski <i>et al.</i> , (2012), Fasanghari <i>et al.</i> , (2008) Bertolini <i>et al.</i> , (2007), Wu and Angelis, (2007), Kim and Mahoney (2006) Subramani (2004), Kale <i>et al.</i> , (2000) Paulraj <i>et al.</i> , (2008), Sanders (2005).
Highly skilled and empowered purchasing staff	Use of purchasing professionals, skills and expertise of purchasing professionals, capabilities to support suppliers, skills to improve total cost, innovativeness of purchasing staff	Prajogo and Sohal, (2013), Feisel <i>et al.</i> , (2011), Giunipero <i>et al.</i> , (2005), Giunipero <i>et al.</i> , (2006), Cousins <i>et al.</i> , (2006).

Table 4.5: OPD content variables and sources of measurement items

Variables	Determinants (measurement items)	Literature sources of items
Quality	High performance products, consistent quality products, highly reliable products, high quality products, minimal or no product returns.	Wong <i>et al.</i> , (2011), Phan <i>et al.</i> , (2011), Peng <i>et al.</i> , (2011), Flynn <i>et al.</i> , (2010), Oltra and Flor (2010), Mady (2008), Größler and Grübner (2006), Boyer and Lewis (2002)
Cost	Low cost products, low inventory cost, low overhead cost, competitive prices, competitive operations.	Wong <i>et al.</i> , (2011), Peng <i>et al.</i> , (2011), Oltra and Flor (2010), Mady (2008), Größler and Grübner (2006), Boyer and Lewis (2002).
Speed	New product speed, quick customer response, quick product delivery, shorter manufacturing lead-times, rapid order confirmation.	Peng <i>et al.</i> , (2011), Lao <i>et al.</i> , (2010), Oltra and Flor (2010), Mady (2008), Größler and Grübner (2006), Boyer and Lewis (2002)
Flexibility	Rapid change to production volume, customised product features, broad product specifications, quick product mix changes, react to change with minimal penalty.	Wong <i>et al.</i> , (2011), Peng <i>et al.</i> , (2011), Oltra and Flor (2010), Mady (2008), Größler and Grübner (2006), Boyer and Lewis (2002)
Dependability	Ability to deliver the correct quantity, ability to deliver the right products, on-time deliver to customers, repeat orders from customers, reliable delivery to customers, trusted by customers	Kafetzopoulos <i>et al.</i> , (2013), Wong <i>et al.</i> , (2011), Peng <i>et al.</i> , (2011), Oltra and Flor (2010), Flynn and Flynn (2004).

4.7.2.2 Questionnaire administration

The survey was conducted electronically using an online survey application called Qualtrics. Qualtrics was used to build the survey after which the same was used to email the survey link to the 2,002 target sample. The questionnaire administration lapsed over a period of three months. A copy of the questionnaire can be found at appendix B.

Prior to its administration, the researcher ensured that the questions were clear and unambiguous by subjecting them (the questions) to rounds of review with my research supervisors. Again, the questionnaire was pretested for content validity using experienced practitioners and academics. To improve response rate, Dillman's (2000) total design method was followed. The target sample of firms for the survey were selected from the Fame database using the criteria of size (10-250 employees) and having contact persons with details corresponding to those stated in section 4.7.1.1 above. The firms selected cut across the different sectors in manufacturing including manufacturers of chemicals, machinery and equipment, medical and optical instruments, etc.

4.7.2.3 Quantitative data analysis

The main software package used for the quantitative data analysis was the Statistical Package for Social Sciences (IBM SPSS statistics version 21). The software was used to execute all the statistical analysis. The scales measuring supply management capabilities and operations performance were subjected to reliability tests and principal component analysis (PCA) prior to running the regression models. In statistical analysis, it is important to ensure the reliability of scales when they are used (Pallant, 2005:90; Hair *et al.*, 2006). Reliability test ensures that a measurement scale is consistent in what it is intended to measure. A good measurement scale is required to meet an acceptable level of reliability, hence the need for this test. PCA on the other hand, is a means of factor analysis. It is used to examine the interrelationships among a set of variables and explains the variables in terms of their common underlying dimensions (Hair *et al.*, 2006). The objective of PCA according to Hair *et al.*, (2006:17) is "to find a way of condensing the information contained in a number of original variables into a smaller set of variates (factors) with a minimal loss of information". PCA provides an objective basis for creating summated scales used in the multiple regression analysis.

The statistical test of the strength of relationships between variables was done through multiple regression analysis. Multiple regression is a regression model with two or more independent variables (Hair *et al.*, 2010). It is a statistical analysis procedure used in evaluating relationships between a dependent variable and two or more independent variables. Hair *et al.*, (2006) state that multiple regression is useful when the researcher intends to predict the size of the dependent variable as a result of changes in the independent variable. The statistical analyses in the present study involves an evaluation of the contribution of 'firm attributes' to 'supply management capabilities' as well as the size of 'operations performance' contributed by 'supply management capabilities'. In this regard, the choice of multiple regression was deemed appropriate. The details of these analyses can be found in chapter six.

4.8 Conclusion

This chapter has highlighted the research process and the methodological choices for the present study. The researcher, assuming a critical realist philosophical position, adopted a mixed methods design for the study. The mixed design approach implied the collection of both qualitative and quantitative data. The qualitative data collection preceded the quantitative data collection. Qualitative data was collected using semi-structured interviews whilst the quantitative data was collected using an online data collection application. The semi-structured interviews were conducted in fifteen Yorkshire-based manufacturing SMEs. The online survey received a total of 184 responses out of which 132 were considered valid and used in the analysis. Thematic analysis was applied to the qualitative data whilst multiple regression analysis was used in the quantitative data analysis. The adoption of the mixed methods design has contributed immensely to the rigour in the research process; the multi-method data collection and analysis approach has enhanced our understanding of supply management capabilities relative to SME manufacturing operations performance.

Chapter 5

Qualitative Data Analysis

5.1 Chapter overview

This chapter is one of two empirical chapters of the thesis. The chapter deals with the qualitative analysis of data collected from the initial exploratory interviews with top managers of fifteen UK-based manufacturing SMEs. The analysis seeks to address issues relating to top managers perception of supply management capabilities and the importance of the capabilities relative to the firm's operations performance dimensions. It must be emphasized here that, the key purpose of the qualitative study was to inform better understanding of the construct "supply management capabilities" and to make sense of the stated hypotheses. Although the outcomes of the qualitative analysis lends support to the overall findings, the original contributions of the thesis are largely underpinned by the quantitative component of the study (Chapter 6).

5.2 Interview Participants

The semi-structured interviews were carried out in fifteen manufacturing SMEs based in the Yorkshire region of the United Kingdom. In all, nineteen top managers including owner-managers from fifteen companies participated in the interviews. Owner-managers constituted 37% of the research participants. In terms of gender, male and female participation stood at 79% and 21% respectively. In the majority of cases, there was just one respondent to an interview whereas in three cases there were multiple respondents to an interview. This situation of multiple respondents to an interview occurred in SMEs where the Managing Director felt that, the relevant functional executive could be involved in the interviews. With such companies, the Managing Director invited the key management staff responsible for supply management to assist in adequately responding to the interview questions.

Table 5.1 gives the description of the research participants. The nineteen participants have each been coded starting from RES-1 to RES-15 with RES interpreted as respondent. As shown in Table 5.1, in two cases, a management staff member was invited and in one case, two management staff members were invited to participate in the interviews.

Table 5.1: Description of Research Participants

Respondent code	Gender	Title	Status
RES-1	Male	Managing Director	Owner-manager
RES-1a	Male	Technical Director	Employee
RES-2	Male	Managing Director	Employee
RES-3	Female	Business Development Manager	Employee
RES-4	Female	Managing director	Owner-manager
RES-5	Male	Procurement Manager	Employee
RES-6	Male	Supply Chain Director	Employee
RES-7	Male	Operations Director	Owner-manager
RES-8	Female	Purchasing Manager	Employee
RES-9	Male	Chief Executive Officer	Owner-manager
RES-10	Male	Managing Director	Owner-manager
RES-11	Male	Chief Executive Officer	Employee
RES-11a	Male	Supply Chain Manager	Employee
RES-11b	Male	Logistics Manager	Employee
RES-12	Female	Managing Director	Employee
RES-12a	Male	Commercial Manager	Employee
RES-13	Male	Operations Manager	Owner-manager
RES-14	Male	General Manager	Employee
RES-15	Male	Managing Director	Owner-manager

5.3 Interview themes

The interviews generally traversed six major themes some of which contained categories and sub-categories. Four of the emerging themes followed a planned structure in the interview guide whereas the other two emerged from the interview discussions and analysis. The six themes were:

1. Organisational attributes.
2. Supply management structures and processes.
3. Supply management capabilities.
4. Operations performance objectives/dimensions.
5. Organisational attributes and supply management capabilities
6. Supply management capabilities and performance dimensions

5.4 Organisational attributes of SMEs

Relating to organisational attributes, five categories were aggregated to constitute this theme. These were, age of SMEs, size of the SMEs; ownership of the SMEs; formalisation in SMEs; and Innovation in SMEs. These conceptual categories conceived as organisational attributes were expected to associate with the extent to which supply management capabilities exist in manufacturing SMEs.

5.4.1 Age of the SMEs

The responses with regards to SMEs' age seems to suggest that SMEs are relatively younger entities compared to large firms as found in the literature. The youngest firm was 10 years old whereas the oldest firm was found to be over 120 years old. In-between the youngest and the oldest ages were majority of the firms. Below are extracts on how and when the firms were started.

This business has been running since late 1990s, no, early 1990s [RES-9].

The company was started off 20 years ago... [RES-12]

It started in 1988 by two gentlemen [RES-13].

The company as whole started in 1982 [RES-3].

Ok, well the business itself my grandfather started over 50 years ago [RES-4].

Table 5.2 shows some demographic characteristics of the participating firms. Table 5.2 shows that majority of the firms were indeed relatively young. The arithmetic mean age of the firms is calculated to be 39 years. On the basis of the mean age, these firms could be described as young firms. Some of the firms where ownership has been acquired by the present owners by means of a purchase appear to be older in age than the ages given. For example, in the case of RES-1, even though the company has been with the present owners for nearly 16 years, it has been running for the past 31 years.

5.4.2 Size of the SMEs

Employment and sales turnover were the criteria used in measuring the size of the SMEs. Whereas all participants gave data with respect to employment levels, not all were able and willing to disclose their sales turnover.

5.4.2.1 Employment

All the firms interviewed fit into the criteria which was set out at the onset of the study. Using the UK employment criteria definition, SMEs employ 0-249 members of staff. For the purposes of this study however, the employment range was adjusted to 10-249. Firms with less than 10 employees were excluded because they are considered as micro firms and are generally observed to have a low level of formalisation of supply management activities (Pressey *et al.*, 2009). The lowest number of employees was found to be 10 members of staff. The highest number of employees on the other hand, was found in a bespoke engineering manufacturing firm which employed a little over 200 members of staff. Thus the level of employment stood between 10 and 200 employees giving a calculated mean number of employees to be 67 persons as shown in Table 5.2.

The UK's Department for Business Innovation and Skills classifies firms with 0-49 employees as small firms and those with 50-249 employees as medium firms. By this classification, 46.7% and 53.3% of the firms in the study constitute small firms and medium firms respectively.

5.4.2.2 Sales turnover

Annual sales turnover is another criteria often used in measuring the size of the SMEs. This is one bit of information the interviewer observed some interviewees were hesitant in giving out. Even though the sales information was provided by majority of the interviewees, there were some firms which refused to divulge this information on the basis of confidentiality. Cases of this hesitation are demonstrated in the extracts below.

Our turnover you mean? (Interviewer: yes). I can't give that, no I can't give that. Unfortunately that information cannot be divulged [RES-11].

I'm sorry I can't provide that information. That is confidential. I can tell you all you want to know about our operations but certainly not that one, sorry [RES-15].

Unfortunately in all cases where the information on sales was refused, either the owner or the chief executive officer was involved thereby making it impossible to get the information from other sources within the firm.

The available sales data received shows the lowest annual sales turnover as £300,000 given by RES-9. This is a firm in the stainless steel fabrication industry with 10 employees, the lowest number of employees in the study. The highest sales turnover figure found was £18m, given by RES-5, a heavy engineering manufacturer employing about 200 people. The firm which is next in terms of highest employment numbers, engaging about 180 employees had an annual sales turnover of £17m (RES-14). It is important to note that for the majority of the SMEs which gave information on sales, their annual sales turnover was less than £10m. A relationship seems to emerge when one compares sales figures to employment figures as shown in Table 5.2.

Table 5.2: Size and Age of Firms in the Study

Firm code	Age of firm	No. of employees	Turnover
RES-1	16 years	27	£3m
RES-2	10 years	13	Not given
RES-3	31 years	55	£11m
RES-4	50 years	58	Not given
RES-5	27 years	200	£18m
RES-6	120 years	150	Not given
RES-7	94 years	60	£4.4m
RES-8	60 years	90	Not given
RES-9	20 years	10	£0.3m
RES-10	21 years	18	£1.5m
RES-11	50 years	66	Not given
RES-12	20 years	30	£4m
RES-13	25 years	14	£1.5m
RES-14	26 years	180	£17m
RES-15	10 years	35	Not given
Total	580 years	1006	
Mean	38.67	67.07	

Annual sales turnover appears to be associated with employment levels as SMEs with higher number of employees tend to have higher sales turnover and vice versa. The data however does not provide details to explain why this observation occurs. Perhaps an explanation can be adduced on the basis of logic; firms having

more resources will have a higher capacity to engage more employees to use the resources to enhance their turnover.

5.4.3 Ownership of the SMEs

Three concepts emerged as sub-categories under this organisational attribute. These were in reference to the SMEs' liability and financing thresholds and the extent to which owners were involved in the operations of the firm.

5.4.3.1 Privately owned (Limited liability companies)

Ownership of the firms in the study ranges from individuals, married couples to friends and partners as depicted in the quotes below.

The company was started off 20 years ago by xxx, it's a limited company, and solely owned by xxx at a stage [RES-12].

Private, one individual owns most of the shares; his wife owns the other one or two shares [RES-3].

Ownership is mostly me. My wife owns 20%, I own 70.1% and a friend owns 9.9% [RES-10].

I own the company with my wife....yes, it's owned by myself and my wife [RES-1].

I probably joined about nearly 14 years ago. And my dad pretty much handed over the reins to me now. My other uncle who worked here as a director, he kind of left a couple of years ago. So we are very much family-orientated business [RES-4].

All the SMEs in the study described themselves as private limited liability companies with financing provided by the owners and in some cases with the help of the banks. The maximum number of owners for a particular SME was found to be three. The predominant occurrence is the ownership by two people which in most cases tend to be married couples.

5.4.3.2 SME financing

The identification of all the firms involved in the study as private limited liability companies means that these firms do not issue shares to the general public.

Financing of the firms was found to be mainly through owner savings and debt financing by borrowing from the banks. Debt financing, which comes with its own challenges, appears to be the dominant source of financing for SMEs as expressed by RES-2.

.....you are dependent on money, money is controlled by banks and we needn't go very detail about how bad the banks have been..... if suddenly your bank says we've run out of money, you get no money and so you'll be put in a very tight corner [RES-2].

Although SMEs' dependence on bank credit for business financing provides owners with the benefit of exerting full control over the business as ownership is undiluted, these bank credit according to respondents, are sometimes difficult to access and make such firms cash-strapped. The financial challenge presented by the difficulties associated with accessing bank credit is further compounded when SMEs experience a declining sales revenue, a situation which may have contributed significantly to firms going out of business during the recent recession period. The extract from RES-1 typifies and summarises the challenging financial situation that SMEs are commonly confronted with.

It's tough at the moment but so far we've managed to survive in a very difficult climate.we have had some growth but it's very turbulent times that we really don't have any control over the government spending policy which ultimately we're quite dependent on and we have been hit terribly hard by the reduction in social services spending and how much with the councils.that affects the sales definitely, yeah. So it doesn't matter how good your organisation is, if your core demand drops, you can just stand on nothing or go out of business which obviously is what we're fighting up to but the big danger at the moment is that we are set up and the bigger you get even though we are only three million, is not really big but, 27 people but the wage bill gets bigger and bigger and you get very unstable when you reach certain size of the company because you haven't the critical mass perhaps to ride out of the storm. You're sort of very bumpy. You've got quite a large overhead and very susceptible/sensitive to changes in demand and the payment terms. So it's very uncomfortable at the moment, extremely uncomfortable.we are struggling at the moment with cash [RES-1].

5.4.3.3 Owner(s) involvement

In some cases, the owner(s) were found to be actively involved in the operations of the firm and were actually the respondents in the interviews. In other instances owner(s) were found to be distanced from the firm's operations. In cases where the owner or owners were found to be actively involved in the operations of the firm, they usually tended to assume one of two main positions: Managing director or Operations director. The quote below is an example of this observation.

So, I (the operations director) own the company 50% with xxx who is the managing director also 50% [RES-7].

Similarly, RES-13, the owner of a stainless steel products manufacturing firm gave his position as the Operations director. Instances of the owner(s) assuming the position of a managing director were however found to be dominant in the interviews. In a limited number of cases, the owners have taken a back stage role and were not actively involved in the firm's operations. RES-8 responded "no" when asked whether the owner of the company is involved in the company's operations. The extract below is an illustration of the passive involvement of some owners of the SMEs involved in the study.

Not really. The owner of the business set the business up in 1984, he's 67 now, he lives in Portugal but he comes over at least once a month. If there is anything going on, he'll come over a little bit more frequently. But he is still in touch on almost daily basis on Skype or emails or whatever. He likes to know what's going on [RES-3].

Owner(s) active involvement in the operations of the firm was observed to be particularly dominant in small firms than medium firms. Employment levels and owners' active involvement seems to be closely related. It was observed from the data that owner's active involvement in the operations of the firm dwindles as the firm grows in size with respect to the number of employees. The interviews showed that in the medium-sized enterprises, active ownership involvement in the day-to-day running of the business seem to be absent.

5.4.4 Formalisation in SMEs

An important observation in the SMEs interviewed is the level of departmentalisation or formalisation in them. Whereas some of the firms have well defined and unique departments, others operated as a single unit with virtually no

departments. In firms where departmentalisation is absent, operations would generally be under two implied units: administration and production. In such operating environments the owners of the business were found to assume all administrative responsibilities including supply management with support sometimes provided by one or two members of staff. This practice was found to be recurring in small-sized enterprises (10-49 employees) with vaguely defined departments as one interviewee stated.

Departments, no. I think because of the size we are at, even though that's 18 people, there are vague departments, sort of erm, I have production, cover production side, administration, we've got design which we started only 6 months ago. So, four loose departments [RES-10].

Generally, in the small-sized enterprises, the responses indicate that departments may vaguely exist as described in the above quote or may be completely non-existent as one interviewee put it:

I mean you are talking of a small business of 13 people. Why invent bureaucracy?now it does get to a point when it actually gets to 20, 25, when you have to start to break it down a bit more....[RES-2].

The non-existence of departments as found in some of the SMEs was understood as owner's approach to keeping the business simple and easy to manage. Contrary to the finding of non-existence of departments in some of the SMEs, there were SMEs which had the full complement of functionalization or formalisation. These were mainly the medium-sized enterprises. Respondents from these firms point out a well-defined management structure as well as clearly defined job roles. In view of the level of formalisation found among the participating firms, the evidence appears to suggest that medium-sized firms are more-formalised than small-sized firms. Table 5.3 shows some attributes of the participating SMEs relating to size, ownership involvement, existence of a dedicated supply function and whether or not a formalised structure existed.

Table 5.3: Attributes of SMEs

Firm code	Firm size category	Number of employees	Ownership involvement	Dedicated supply function	Type of structure
RES-1	Small	27	Yes	No	Less-formalised
RES-2	Small	13	Yes	No	Less-formalised
RES-3	Medium	55	No	Yes	More-formalised
RES-4	Medium	58	Yes	No	More-formalised
RES-5	Medium	200	No	Yes	More-formalised
RES-6	Medium	150	No	Yes	More-formalised
RES-7	Medium	60	Yes	No	More-formalised
RES-8	Medium	90	No	Yes	More-formalised
RES-9	Small	10	Yes	No	Less-formalised
RES-10	Small	18	Yes	No	Less-formalised
RES-11	Medium	66	No	Yes	More-formalised
RES-12	Small	30	Yes	Yes	More-formalised
RES-13	Small	14	Yes	Yes	More-formalised
RES-14	Medium	180	No	Yes	More-formalised
RES-15	Small	35	Yes	No	Less-formalised

5.4.4.1 More-formalised vs less-formalised SMEs

More-formalised SMEs are firms which have distinct functional demarcations and job roles in operation whereas less-formalised SMEs operate without or have vaguely defined departments perhaps due to the fewer number of employees. It was found that less-formalised SMEs were mainly constituted by 'Small-sized enterprises' whilst more-formalised SMEs were constituted predominantly by 'Medium-sized enterprises'. Active ownership involvement in the day-to-day running of the firm is more pronounced and visible in most less-formalised SMEs. Another distinction between the two classifications is the number of years in operation. less-formalised SMEs appear to be much younger than the more-formalised SMEs.

Perhaps this reason explains why active ownership involvement was found to be predominant in smaller SMEs. As young firms without codification of any practices, strategic intents and direction, ownership involvement in the day to day operations is necessary to provide a guide and a strategic focus for the firm.

5.4.5 Innovation in SMEs

It emerged from the responses that a concept which SMEs frequently associate themselves with is innovation. The majority of the respondents described themselves as innovators.

We are innovators and market leaders. There are about three English range manufacturers, serious companies who we would kind of class as competition and we are the market leaders and the market innovators. There are a couple of Dutch companies who also manufacture the fish and chips ranges and export them. I would say we are at par, possibly little bit lower than them. They are a lot more expensive than we are. But for the British competition we definitely are higher than the other two [RES-4].

Without any shred of doubt, RES-4 was confident about the innovative capabilities of the fifty-year old company she inherited from her father, adding that innovation is their source of survival. Other respondents also described themselves as innovators whereas some respondents were of the view that innovation is a large company preserve. RES-12 states:

We do like to be innovative, but obviously coming out with new ideas tends to be that of the lot larger companies that knows. We can be innovative though on a smaller scale. So, apart from the quality and the service which we base our sales on, we can be innovative whereby we can go into a client and improve their own packing process by recommending a certain design box and we can create new designs apart from the standard designs so we can be innovative for the customers by cutting down on their packing time, by suggesting ways and uses for boxes that will assist them. So that's how we have been innovative. We have the CAD table so, we can actually design something new to suit the requirement of that customer. So, the innovative side is very much on a small scale [RES-12].

5.5 Supply management structures

The extent to which supply management structures are defined and developed within SMEs appears to depend on the size of the firm and the extent of formalisation. The evidence available from the data suggests that the majority of the Medium-sized enterprises which generally seem more formalised, have well-developed structures for supply management whereas such structures seem to be absent from the smaller SMEs. However, size may not be a good predictor of supply management structures as there were firms such as RES-4 and RES-7 with 58 and 60 employees respectively but did not have a dedicated supply function (see Table 5.3). In describing the current structures and processes for managing supplies, respondents RES-1 and RES-4 had the following to say:

Right, it's very bad. I can tell you that because when you go from being entrepreneurial to being managerial, there's a big difference and I'd say if we are innovative we are also entrepreneurial and not so particularly managerial in what we do. It is serious because in what we manufacture, the supply of the materials and the products that make up our finished product represent a huge proportion of the finished good..... So looking at the supply side of things, it's ever so important, but not something we've done very well [RES-1].

Ok, at the moment, it's a mess. it's the only word that we can say. In fact we've recently, literally last week, we did my end of year stock take and we have identified some really serious anomalies in the way that our supply chain is working or not working maybe, to which end I interviewed on Friday night a purchasing manager, getting a new purchasing manager to sort it out because our stock levels are wrong, what they say is on the accounting system is not what we actually have and is down quite a lot. I think that the gentleman currently in charge of the department doesn't have the experience or the character necessary to run the supply chain management. Things like procurement, we are not tightened on procurement; we don't negotiate well enough, we buy too much stock and don't buy enough of the right stock and it just needs a complete and total overhaul, it's a mess at the minute [RES-4].

The respondents for the above extracts were the Managing Directors of firms which both fall within the classification for small firms. The views from other respondents representing similar small firms were not different from the immediate quotes

above. In contrast to this finding however, there were SMEs in the study, particularly those within the medium-sized classification, which described their structures for supply management as excellent.

What we do in the supply chain, we try to link our whole supply chain as best as possible, end to end, from the customer right the way through to our main vendors. Main vendors for us accounts for about 75% of our purchases.....and what we try to do is to link our whole process right the way through from the customer all the way back to our vendors. We use the term for that at the moment, which is a xxx (company name) term, called 'Connected flap'. What that is, is trying to ensure that the signal from a customer is passed as quickly as possible right the way through the whole supply chain process to our vendors. We link very closely with a number of our key vendors, regular workshops around process improvements and management and passing off demand information, market trends so that they're also aware of what our plans are [RES-6].

Similarly, in describing the supply management structure for his company, RES-5 had this to say:

We have something called master control schedule. The way that it happens here is, once something is been designed, it is put through to our project management team. Our project management team allocate a project manager or project engineer to oversee the project. They have more than one project to manage so that's the ethos of the business really, it's project management. They in turn will then pass on all the information necessary for build to our manufacturing people. Once they get hold of it they will then do our make-buy decisions so the general bought-out components are already identified but then the manufactured components have to go through a make-buy process. So we'll decide based on our current capacity and our capability what we can manufacture in-house, in the company itself and what we'd like to subcontract outside the company. From then on, then we have a supplier data base which we use with a number of approved suppliers on there that we tend to use and we'll make an enquiry to those suppliers. We'll receive the enquiries back, we'll analyse the enquiries and then pick the best supplier to do the job. So, that's basically how it really works [RES-5].

Both RES-5 and RES-6 represent medium-sized firms with more-formalised organisational structures. The vivid descriptions of supply management structures as contained in these extracts clearly symbolize an enhanced structure being in existence in some SMEs. A notable observation was that well-developed supply management structures tend to be found mainly in the medium-sized firms whereas less-developed structures were commonly associated with the small-sized firms. A possible reason for the occurrence of this observation is the adoption of 'supply management thinking' by the firms. The adoption and development of 'supply management thinking' seem to underlie the expertise and the extent to which supply management structures were developed. In cases where firms have embraced supply management thinking, expertise in supply management exist and better supply management structure was found. On the reverse, in firms where there was general lack of supply management thinking as evidenced by the non-specialisation of the function, respondents admitted to a low supply management expertise and structure.

The interviews further revealed that a formalised supply management structure has a good resource support. Respondents pointed out that a formalised structure will consist of a codified procedure for supply management from the need identification through to the final fulfilment of the order. The structure is usually supported by a team of dedicated staff, operational guidelines, operating budget, supplier database, and an electronic platform for supplier data management. These could be described as the support resources for a good supply management structure. A detailed probing into this area during the interviews shows that small-sized firms do not have such support resources which respondents readily admitted to. The support resource requirement for a supply management structure places a financial demand on the firm and may perhaps explain to a great extent why small firms which are usually cash-strapped may lack a formalised supply management structure. However, fundamental to the establishment of a formalised supply management structure is the conception of supply management thinking by top management.

5.5.1 Supply management thinking

The interviews seem to indicate that the adoption of supply management thinking is a precursor to developing a formalised structure for supply management. Supply management thinking may be defined as the orientation of the firm's senior managers to the competitive value embedded in the supply side of the business.

The extent of awareness of this competitive value among senior managers influence their readiness to exploit it, hence the establishment of a formal structure for its management. The adoption of supply management thinking means that the firm's senior managers have come to accept the knowledge that potential exists in the supply side of the business and when exploited, could add significant value to the firm. Having this supply management mentality would mean adopting defined approaches and practices in managing supplies intended to enhance value creation. Without this mentality there is a higher likelihood of supply management not being considered as important value contributor in the firm which subsequently may affect any arrangement for its management.

The adoption of supply management thinking, in this study was measured in terms of a firm's approach to supply management underpinned by the creation of a formal structure. As the thinking precedes the creation of a formal supply structure, SMEs which have embraced supply management thinking would normally have a defined formal structure for managing supplies. Firms embracing the concept of supply management demonstrated this by having in place, a dedicated division and a team of trained supply management staff assigned with the responsibilities for supply management activities. In such organisations, the head of the supply management team was found to be a top management staff member involved in the strategic decision-making process. In contrast, the absence of supply management thinking was evidenced by the general lack of a formalised administrative procedure for materials acquisition, supply management responsibilities being assigned as an adhoc responsibility to other staff in the firm with substantive job roles, or sometimes such responsibility being the preserve of the owner-manager. There were SMEs which expressed awareness of supply management thinking but pointed out that their inability to implement a formalised structure was due to financial constraints.

It was discovered from the interviews that supply management thinking appears to stem from the realisation of the need to be efficient or to address mounting supply management challenges. Unlike other functions in the firm whose establishment are usually pre-planned, the case for establishing a supply management function in the firm often emerges from a spontaneous action. A spontaneous action may be paramount in order to address pressing concerns identified in the supply side of business as often times the supply side of business is not a priority area for SMEs. Such spontaneous responses serve as the genesis for supply management thinking, leading to the formalisation of a supply structure for the firm. In essence,

the creation of a supply function is induced by the adoption of supply management thinking. A comment from RES-4 is repeated below to show how a spontaneous reaction could lead to formalisation in supply management.

Ok, at the moment, it's a mess. it's the only word that we can say, in fact we've recently, literally last week we did my end of year stock take and we have identified some really serious anomalies in the way that our supply chain is working or not working maybe.our stock levels are wrong, what they say is on the accounting system is not what we actually have and is down quite a lot. I think that the gentleman currently in charge of the department doesn't have the experience or the character necessary to run the supply chain management. Things like procurement, we are not tightened on procurement; we don't negotiate well enough, we buy too much stock and don't buy enough of the right stock and it just needs a complete and total overhaul, it's a mess at the minute [RES-4].

RES-4 has expressed the supply management challenges confronting the firm which has awakened the interviewee's consciousness to supply management thinking. The extract gives the impression that the experience and character of people in supply management may be important performance factors. Experience and character are highly influenced by education and training and therefore underpins the need for trained supply management staff to manage the supply process. The extract may lend support to the identification of the supply management challenges as being an influencing condition for generating a spontaneous reaction leading to formalisation in supply management.

..... to which end I interviewed on Friday night a purchasing manager, getting a new purchasing manager to sort it out.....[RES-4].

The realisation of the operational problems posed by inefficient supply management coupled with the spontaneous reaction of employing a trained supply manager which the interviewee believes "will improve the process dramatically" is an indication of management having embraced the supply management thinking. The 'anybody can buy' mentality which appears to be pervasive in SMEs is therefore questionable in the face of this reality. Allowing the process to be managed by the 'wrong' people can have detrimental effect on operations as the extract below reveals. Not 'anybody can buy' after all as RES-4 admits:

Like I said we are employing the wrong people to do the job, I think that's the main thing. Secondary we are paying too much; we are not negotiating hard enough with our suppliers. I think that the actual internal process of the supply chain management is not being done correctly and therefore we are overstating what stock we've got. There is very little planning ahead kind of with the manufacturing department saying we have these orders in to the purchasing department and then the purchasing department obviously kind of preparing for that. It doesn't appear to be any of that going on at the minute which is having a huge detrimental effect because we're having to wait for parts to come in, we've got lads on the shop floor sat down doing nothing because the stocks are not there [RES-4].

A similar story was told by RES-1 relating to the development of supply management thinking. RES-1 represents a firm which depends mainly on UK city councils as its customer base. At the time of interview, the firm was faced with a difficult sales period due to the ongoing public spending cut policy by the UK coalition government led by David Cameron.

It's very turbulent times that we really don't have any control over the government spending policy which ultimately we are quite dependent on and we have been hit terribly hard by the reduction in social services spending and how much with the councils [RES-1].

The public spending cut policy meant that the city councils were cutting down on their expenditure hence the amount of purchases they made from this firm. In the face of dwindling sales, the firm has realised the need to be more efficient and has focused attention of the cost saving effort on the supply side of business. In fact, it is this drive for efficiency that compelled RES-1 to participate in the interviews. Following the interview, RES-1 agreed to host a 13 weeks work placement in his firm for an evaluation of his firm's supply management by this researcher and make recommendations for improvement. The work placement was sponsored by Leeds University Business School. A company report on the work placement was submitted to RES-1 at the end of March 2013.

The cases of RES-1 and RES-4 as described above underpins the conception that firms embracing supply management thinking are likely to develop a formal supply management structure which ultimately enhances the firm's supply management capabilities. Embracing supply management thinking emerges as a prerequisite in the creation of the supplies function. The thinking as adduced from the data, is

usually brought to the fore by a cause which may be the need for efficiency or arresting challenging situations in supply management.

Interestingly many of the respondents including those with informal supply management structure alluded to the existence of a good structure as a necessary condition with significant influence on operations performance. The following extracts were in response to the relevance of a supply management structure to the operations of the firm:

..... It's highly relevantabsolutely [RES-11].

Erm, very significant (supply management structure) I mean because, if we look at it from the point of view, what's supply chain responsible for? A supply chain is responsible for getting products to the customer on time, right all the way through the whole organisation. At the same time we then also looking to have zero inventory, have 100% OTIF and all of what we do leads us to moving towards those directional goals. The supply chain also I think has an interface with each of the individual operations so for example, you know we don't do single piece manufacturing every single day. But we then understand what manufacturing want to do around that so we are trying to develop the whole production cycle campaigns to optimise manufacturing whilst not sub-optimising what's needed for inventory and sales [RES-6].

Yes (it is relevant), well, the service we offer our customers which is why we win quite a lot of our work, we promise turn around products within a period of time and if we are not supported with the material on the date required, we would let our customers down. So, what we say we going to do we do. And if we get let down by our suppliers, we still do it because we manufacture it at our cost from our stock boards, or whatever or we deliver it out of our cost, because it's a no fault to the customer [RES-12b].

Thus the usefulness of the supply management structure seem to lie in its ability to support material availability and operations in general in such a timely and cost-effective manner.

5.5.2 Importance of formal supply management structure

The majority of respondents were of the view that a good supply management structure can enhance several operational metrics such as quality and speed. The value of purchasing spend and the complexity of needs were found to be closely

related to the extent to which supply management structures were developed in SMEs. It was evident that SMEs with high purchasing spend and those with complexity of needs have developed a formal structure for supply management as compared to firms with basic routine needs and relatively low purchasing spend. The foundation for developing supply management capabilities is a good supply management structure. Where such structures are less developed, it is expected that the extent to which capabilities in supply management are developed will be impacted. For small-sized enterprises, developing the structure for supply management appear to be a major hurdle as one respondent puts it:

Well it's not very good like I say in purchasing. The purchasing side is the weakest. Sales and marketing are quite strong, technical is quite strong, our innovative strength is quite strong but the sort of administration/purchasing side of the company is particularly weak and that's a big danger. It is a very weak area of the company and we also have no proper purchasing system [RES-9].

The effect of the non-existence of proper purchasing system as admitted by some of the respondents on their firms traverses across the whole operations processes. It also limits the extent to which supply management tools can be exploited to enhance operational efficiency. There was however a consensus among the respondents to the effect that a good supply management structure is an enabler to operational excellence. Some respondents share the view that a good structure is equally as important as supply management expertise.

Because if you've not got that structure, I mean expertise does help but like any job a lot of it is common sense, and everyone is got to learn. You know, expertise does help but if you've got that structure, that system in place, and you know it has to be done that way, it's obviously approved and you know it works, so if you stick to that, you know [RES-8].

5.6 SME buyer-supplier relationship orientation

The relationship orientation created by SMEs and their suppliers is may be seen as an important facet of the whole supply management process. The interviews reveal that SMEs tend to lean towards a close and personal relationship approach with their suppliers which to a large extent contributes towards the informal nature of the SME buyer-supplier relationships. This attitude is particularly found to be a common practice among the small firms where formalisation of a supply management

structure is largely non-existent. With regards to interviewees' relationship orientation towards suppliers, they contended that they tend to focus more on service level from suppliers and to achieve this, getting personal with suppliers facilitates and enhances suppliers' responsiveness to their needs.

I must have a good level of service if I'm going to succeed in business; I've got to be better than my competitors. A major issue in being better than my competitors is the levels of service I can deliver and therefore if I am to deliver service to my customers, people must deliver to me.... The service levels are vital, much more important in many ways than the money. So your guys that supply have to be reliable, you must have good levels of service and you must be able to trust them. You must know, you must be confident that when you do pick up the phone and swear at them something will happen but if it doesn't, you must change them [RES-2].

It seems logical to deduce that the personal approach to the relationship helps SMEs to secure higher service levels from their suppliers as the relationship is more of a 'friendship' approach. On the basis of the friendship, suppliers would not want to fail their friends (buyer) at least for a legitimate and reasonable demand by the buyer. 'Picking up the phone and swearing at them' emphasises the informal and personal nature of the relationships with their suppliers. This buyer-supplier orientation was particularly observed to be dominant in the small firms. The relationships appear to be managed at a more personal level which often times leads to creating long-standing relationships with suppliers. This then sometimes make it difficult for the SMEs to switch suppliers perhaps for the fear of losing their personal connections with suppliers as well as some favours they enjoy. Switching a supplier is like 'letting go a friend'.

Well, I have a lot of long-standing relationships with a lot of suppliers, though there are exceptions to that. I think the working relationship with the suppliers is very important. We buy card boxes from a local company as well. I've people coming in offering slightly better prices, not a lot, but I won't change for toppings because I know when I need something in a hurry, I don't always demand it in that way, but say once or twice a year something goes wrong, they will sort it out for me. And I think that's far more important than saving £0.02 (two pence). And that's true for all my suppliers apart from couriers. Courier is a different thing altogether. That's a very cut-throat

market. I spend about £80,000-£90,000 on couriers so we are constantly keeping an eye on them [RES-10].

The above transcript and similar others give the impression that, this approach to relationship management secures some favours for the buyers. The interviewees seem to adopt this type of relationship to cushion themselves against future emergencies which may require some sort of preferential treatment from the supplier, emphasising the importance of suppliers' support in an emergency material requirement situation. Consequently, creating that personal touch to the relationship enables their needs to be prioritised by the suppliers when needed as observed in the extract below.

You have to have a good relationship with them because I know we can get bunched up on their list and get our stuff out first if we need to. And the more they know about what we expect to happen, the more they can help us out and it helps [RES-3].

The same respondent comment that "no matter the size of the company, you're still dealing with individuals in that company and building up those personal relationships is quite important" [RES-3]. Perhaps it is the personal element of SME buyer-supplier relationships that has led to the widely held perception that buyer-supplier relationships are largely informal in SMEs. Indeed some interviewees described their relationship with suppliers as informal describing formality as a farce. In responding to a question of the importance of professionalism and formality in his relationship with suppliers, a respondent had this to say:

That's just an American 'Bullshit', isn't it? What does being professional or formal with a supplier mean? Well, it means telling the truth, it means being honest with them and it means trusting them. So rather than use the 'bullshit' term professional, we don't have to sit down in an elegant office, in a suit and tie and say I want the best price and draw up a contract, right and put it in ...erm... you say, this is my business, what you do for my business is moderately important or very little important or 'bloody' important. I expect the following reactions to my request. I will give you a couple of attempts to meet those standards and if you fail, then we will not have a relationship and if you succeed we will have a very long-term relationship [RES-2].

Similarly, the informal nature of buyer-supplier relationships was confirmed by RES-10, who commented that:

Everything is informal. On this building, it's all handshakes. They are old-fashioned possibly; I have one or two formal arrangements. Obviously you can't lease a machine without formal arrangements, so on the machines I've got lease on my machines and I've got bank agreement but beyond that I've got no contracts other than you get a contract for your couriers for 12 months [RES-10].

5.6.1 Formal and informal relationships

The majority of interviewees opined that for any particular supplier, the relationship can be described as both formal and informal. They argue that both informal and formal relationships complement each other and very rare to find a purely informal or formal buyer-supplier relationships existing on its own. Respondents add that buyer-supplier relationships are created by people representing the two contracting firms; once the relationship is created and the representatives of the contracting firms are connected, it is the bond of friendship initiated by the two parties that gives substance to the business to business relationship as well as the strength of that relationship. Subsequently interviewees contend that it is the personal friendship component of the relationship that forms the basis for the informality hence informality in buyer-supplier relationship cannot be avoided. Informality in the relationship building process is crucial to the very existence of the formal relationship. The following extract illustrates.

I think also the ability to use the phone rather than email to have that interaction on a regular basis with them is very important. So interaction and communication is key with vendors. I think email is a useful tool but I also think when you start talking about working with vendors, I'm a big believer in vendor relationships and you don't get that from emails. You get that from picking the phone up and understanding you know, at least what erm, one thing that I do is I mean I have a file in here with all our vendors. And I also have in there at least some reference points to that vendor, children, ages, interests, so you've got at least some aspects around that, birthdays and all those sort of things so you know they are all in there. But I think talking with them on a regular basis, having a two-way thing dictates more being a partnership rather than supplier and customer [RES-6].

RES-15 shares this line of thought with RES-6, explaining that, it is the nature of interactions taking place between the representatives of the two contracting parties that gives the relationship a shape stating:

Yes, I am buying and they are selling which is the formal bit of the relationship but this depends a lot on the informal bit as well. The way we interact, I mean the way they talk to me, the way I talk to them, their concern for my wellbeing and my concern for their wellbeing too are all valued and all these are done on an informal basis and that's what enhances the relationship [RES-15].

Thus the informal component of the buyer-supplier relationship helps to build and strengthen a formal business-to-business relationship hence the two cannot be divorced. There is therefore a balance of the informal and formal relationship in SMEs' supplier relationship management as captured in the extract below.

Is a bit of both, is informal and formal, obviously you've built that relationship for nearly five years, there are some suppliers that I'll email an order to, it will come in with an invoice, that's it. There are others that I'll phone them up and they will sort me out so I try to keep it formal, I try to keep it a bit of informal, because you don't always want to talk about business. But I just think if you build that relationship you always get better out of people. Because obviously if you talk a little bit and find out about them and obviously a lot of suppliers come in to see me so you just got that little... which I'll rather have than just formal, formal, formal [RES-8].

Similar to the above view, there were respondents who expressed the view that buyer-supplier relationships have to be formal from the contractual point of view but informal at the interpersonal level:

It has to be formal from a contractual point of view so we make sure all the paperwork is all correct and signed but the interpersonal relationships, I mean because you are dealing with somebody, I mean our purchasing staff have got a very good informal relationships with our suppliers. But obviously from a contractual point of view, from the payment point of view it has to be formal [RES-3].

An interviewee who had both national and international suppliers pointed out the firm's relationship with UK-based suppliers tends to be more informal whereas their relationship with international suppliers is more formal because they don't get to meet them face-to-face.

I think probably more of the UK suppliers is more of an informal type of relationship. As soon as we think of the Chinese suppliers, it turns to be

more formal because you don't get to meet these guys face to face. So by nature is more of formal from China but certainly with the UK suppliers we get to meet them, we talk on the phone quite a lot, we email them and you know, it does become a little bit more informal and you do create friendships with these people that you work with [RES-11b].

The friendly nature of the buyer-supplier relationships in SMEs is perhaps made possible by the fact that these firms, particularly the small-sized enterprises, deal with a limited number of suppliers and this may be the reason why they tend to know them personally.

5.6.2 Longevity of buyer-supplier relationships

As a result of the friendliness of the buyer-supplier relationships, the contracting parties may stick together for a longer time. Longevity of individual buyer-supplier relationships was found to be very pervasive across all SMEs irrespective of the size.

I am a person that ultimately like to deal with British companies, British manufacturers where we can. I am pretty loyal to suppliers, although that loyalty has to work two ways. Some suppliers I've had for the past 10 to 12 years since taking over the purchasing. Some suppliers we've recently in the last 12 months dropped. 12 months ago we had a pretty harsh condition and went to some of our suppliers for cost reduction. Some of them every year come to us for little bit of increase and increase, some were pretty receptive, one or two haven't been receptive and I cut one or two suppliers out [RES-7].

The above data extract seems to suggest another reason why longevity of buyer-supplier relationship may be pursued by SMEs. For the reason that the buyer has engaged the services of a supplier over a longer time, the buyer implicitly expects reciprocity of his kind gesture from the supplier; a 'one good turn deserves another' kind of expectation. To this end, the buyers seem to hold the view that longevity of relationships could induce a supplier to concede to certain demands which are presumed to be within the capacity of the supplier to offer. It is perhaps due to this reasoning that RES-7 dropped some of his 12-year old suppliers for failing to grant a request.

5.6.3 Differentiation in buyer-supplier relationship management

Evidence also exists to suggest that SMEs, that have not embraced supply management thinking, generally adopt a 'one-style fits all' approach in their relationships with suppliers. They find it difficult to establish differentiated relationships, where the value of the product purchased, criticality of the product, or the volume of purchase have been used as the basis for differentiated buyer-supplier relationships. Suppliers are not classified into categories of importance for appropriate relationship type to be adopted. In contrast, SMEs which have embraced supply management thinking have adopted a differentiated relationships approach with suppliers. They put suppliers into categories depending on the criticality of the product supplied to enable the appropriate relationship to be developed and maintained. The extract below captures the differentiated approach to relationship management.

Well, we have a number of core suppliers. Our approved suppliers are split into three categories; we have category A which is our strategic suppliers, and these are suppliers that we can only buy that product from. Our category B suppliers are suppliers where we can switch around quite readily, and our category C suppliers are generally stock item suppliers, nuts, bolts, that sort of thing. That's how they're split up so we work quite closely with all the suppliers in our category A because they are seen as our strategic suppliers. They are the ones who get most of our business. We speak to them more or less on daily basis either through contract placement, order placement, request a quote, that sort of thing. So basically we get to know about their business, they'll come and visit us, we'll go and visit them so it's a good working relationship. It's not, I wouldn't suggest it's a power relationship at all. We don't attempt to do that. We have a good working relationship, we probably don't spend enough money with any one particular supplier to warrant a partnership approach [RES-5].

Suppliers vary in their level of importance depending on the criticality of their product to the operations of the buying firm. The relationship approach therefore needs to be aligned to the importance of a particular supplier. Hence, the 'one style fits all' approach may deprive firms adopting it of good value which can be exploited from the supply chain using differentiated relationship strategy.

5.6.4 Collaborative and transactional relationships

Although indications from respondents suggests that they have good working relationship with their suppliers, it appears this good working relationship is limited mainly to transactional activities. Collaborative relationship with suppliers exist in some of the SMEs, but it was not a common practice among the firms, particularly small enterprises. Again even though long term relationship with suppliers is widely practised, this also tends to be predominantly transactional in approach. Collaborative relationship requiring some form of joint resource investment for the purposes of product and quality development and cost improvement was very limited. Collaborative relationship according to some interviewees depends on how critical the component is to the firm's operations.

We collaborate with them because we know what we want but they may also or may offer us something better than what we are thinking of in the first place. So we just collaborate closely with these people. Because obviously they are the specialist in that field and may advise us on better options that we haven't thought of, for instance the product or packaging [RES-11].

The only time it would be collaborative is where we would engage a specialist supplier whereby we may have to buy in some specialist equipment and then that has to integrate into some other equipment that we are designing. That would be the only time we would have any kind of collaborative, I wouldn't say is an agreement, but would be a collaborative arrangement whereby we make sure their equipment fit with our equipment. So it's more about how interfaces work rather than its being a general business agreement. So both designers [buyer's and supplier's] get together and say this is what we've designed and this is how it works, and then we will fit that around with that of the suppliers [RES-5].

On the whole, the relationship style that SME's tend to adopt as discussed in the preceding paragraphs invariably drives down some advantages to these firms. The downside of the approach is that it limits the extent to which supply management tools may be used. Conceding to whether the present relationship approach contributes any benefit to the firm, an interviewee opined:

I would like to think so because I would like to think you know, the suppliers are more responsive to our needs and their keen to maintain this long term

relationships that we have and so it's in everybody's interest to, you know create that win-win situation for both parties [RES-11b].

5.7 Supply management contribution/performance in SMEs

Supply management is no doubt an important facet of every business operation. There was agreement among all interviewees to the effect that the supply side of business is as critical to meeting customer demand as marketing and sales. Emphasising the importance of supply management, RES-10 remarked, "so yes, supply is important, it's probably as important as sales". "The supply side of things is ever so important" was the view of RES-1. The comments point to the value of supply management to manufacturing operations. The unanimity in respondents' view of the supply side of business as an important operational component underscores the valuable contribution that the supply function can make to operations performance. This view may be so because of the huge proportion of manufacturing cost represented by material cost as revealed by RES-6; "a high percentage of our manufacturing cost is taken off by raw materials". Interviewees disclosed that material cost constitutes anything between 30% and 85% of sales turnover. RES-7 reported that material cost represents "about 30% of our turnover". This is the lowest percentage of materials cost component of turnover mentioned in the interviews. In other types of manufacturing, the figure was considerably high as evidenced in the quote below:

In what we manufacture, the supply of the materials and the products that make up our finished product represent a huge proportion of the finished good. In terms of before margins, it's roughly like 85-90%, huge [RES-1].

For the majority of the respondents, material cost was over 50% of sales turnover. Consequently one would expect to see a considerable recognition for the supply function in these organisations on the basis of the reasoning that it is the highest cost component in manufacturing operations. Unfortunately this was not the case observed. Many of the firms were of the view that even though the potential exists for the supply side of business to add value to firm performance, this is an area they've not done very well. In spite of the fact that they do it to the best of their ability, not much of a contribution really emerges from this side of operations. Whereas the supply function has a high status in some firms, particularly in the medium-sized enterprises, its status in other small-sized enterprises was found to be low. Thus the function's contribution to manufacturing operations was found to

be mixed. For some respondents, contribution from supply management is very minimal as the extract below depicts.

So it's a huge weakness and at the moment, we are not financially strong enough to employ somebody who could look after the whole of that administration and have account of the area and try and bring it into good shape [RES-1].

RES-1 seems to suggest in the above extract that because of the lack of the appropriate management expertise in this area, the firm does not enjoy the valuable contributions of supply management. Despite this, some interviewees attested to the significant impact supply management has had on their firm's operations over the years.

In procurement our success factors are really delivery performance and our quality performance overall. We are currently achieving above 75% delivery performance, that's on time every time and our quality performance is up around 99.8%. So the quality of the products that we get in is extremely high and delivery performance goes up and down. Some projects are better than others. Sometimes the lead-times that we're given to achieve, those project milestones can be quite onerous, and sometimes we do miss them. So delivery/quality is our main criteria [RES-5].

Similarly, in a practical demonstration of how supply management affects several operations dimensions, a respondent revealed an assessed performance of supply management in his firm.

We can demonstrate that. If you look at our own internal metrics, what we've been able to do over the last 4 or 5 years is we try to improve our processes. We have ...erm..., increased the number of turns, we've more than halved our value of finished goods inventory, we've reduced our manufacturing lead-times, we've also increased our sales forecast accuracy, you know, our sales forecast accuracy across the whole of Europe is within 3-4% every month meticulously. We've improved our customer satisfaction. We've seen the company grow from 88% to 94.5% in the last 3 years. Can you go beyond 94%? Yes, but then you start talking in dying cost, I mean when you start talking about 24-hour delivery in some areas. So, you can demonstrate through a robust supply chain process, improvement metrics

that show you can do it by having a disciplined, structured, differentiated supply chain [RES-6].

A scrutiny of the instances where supply management is claimed to be making significant operations contributions reveals that those instances occurred in firms which have a dedicated function for supply management. The same firms have also engaged staff with background training in supply management. Thus expertise and a dedicated function appear to influence good performance in supply management. This suggests that a dedicated supply management function and team which underlays a formal supply structure are important if good added value is expected from the supply side of business.

5.8 Capabilities in supply management

The six conceptualised supply management capabilities which emerged from the literature analysis were:

1. Long term collaborative relationship with suppliers,
2. Close working relationship with limited number of suppliers,
3. Open communication between exchange partners,
4. Integration between supply strategy and corporate strategic objectives,
5. Application of information technology in supply management, and
6. Highly skilled and empowered purchasing staff.

On the basis of these capabilities, the SMEs were assessed to ascertain the extent to which they possess these capabilities. The researcher however started this assessment by first asking the interviewees to share their opinion on what constitute capabilities in supply management to them. The thinking behind this approach was to establish whether any of the conceptualised capabilities in supply management or new capabilities outside the conceptualised ones would be mentioned. A mention of the conceptualised capabilities lends credence to the capability as being relevant to practice. Following this, interviewees were presented with the six perceived capabilities, asked to share their opinion on them and asked whether or not they agree that those could pass as capabilities in supply management. Interviewees view on what constitutes supply management capabilities is discussed next.

Interviewees identified three of the capabilities in the initial exploration of what constitute capabilities in supply management to them. These three were:

1. Application of information technology in supply management,
2. Highly skilled and empowered purchasing staff,
3. Close working relationship with a limited number of suppliers.

Interviewees did not allude to the following capabilities in the initial expression of their thoughts on what constitutes capabilities in supply management.

1. Long-term collaborative relationship with suppliers,
2. Open communication between exchange partners,
3. Integration between supply strategy and corporate strategic objectives.

However, when all six capabilities were mentioned to the interviewees and asked whether they are practically relevant and qualify as capabilities in supply management, there was complete agreement on all of them except integration between supply strategy and corporate strategic objectives which many were not sure about as shall be explained later in section 5.8.6. Interviewees did not mention any new capabilities outside those conceptualised.

5.8.1 Information technology

Having a dedicated software was identified by some interviewees as one of the capabilities required in supply management. A respondent remarked that, good software is an inevitable capability which facilitates the management process.

I think software is a good one. Yeah, with the abacus system that we have, once they are on the preferred supplier list, they are live to order from. The software will report on their performance. So if it was Joshua (researcher) supplying xxx (company name), and you were late all the time, the report will generate on you as being a poor supplier to xxx because you were late by and it will work out how many days you were late on average and your order intake will reduce and eventually you'll not be a supplier for xxx [RES-12b].

Similar other views were expressed. Mention was made of computer software packages such as ERP and SAGE. Emphasising the importance of information technology in supply management, an interviewee observed:

It's highly important, you know, we use a system, an ERP system to manage our supply chain, so, it is a capability I should imagine, analysing the forecast for instance, probably is [RES-11].

The employment of a computer package in supply management according to interviewees has many benefits including improvements in inventory management and the generation of bill of materials as indicated in the extract below.

Absolute, the inventory and the stock control and the utilisation of stock have improved dramatically since we adopted this integrated system and do the monthly checks. The way the IT works, we are really on top of inventory, where we are and where it is, so it's vital for us [RES-3].

We use SAGE so, it's got a very powerful supply side of it. On products, you know, we do 7000 different books and they've all got bill of materials in each book, and then that cascade down and it tells you when to reorder any particular product. So yeah, I think you'll struggle to run a modern business without IT. When we get power cut here, it's frightening, we realise how little you can do when the electric is off. Absolutely nothing works at all. So yeah, IT is very important, time saving, yeah [RES-10].

These extracts reveal some of the added value that can be derived from using a computer package in the management of the supply chain. These views support the conceptualisation of the "application of information technology in supply management" as a capability. Corroborating the view shared by RES-12 and RES-11, RES-13 added:

Without information technology it's ten times more difficult because you'd have to know every single product you've got in, how many you've got, when you sending out, when you do a purchase order; you'd have to go through that information manually, it takes ten times as lot [RES-13].

An interviewee expressed, "IT is the wheels on which supply chains run" and "wonders how anyone could do it without it" [RES-15]. Even small enterprises which were not applying information technology in their supply management acknowledged that the application of information technology is a vital capability if one needs to take control of the upstream supply chain. The importance of IT in supply management appears to be gaining prominence among manufacturers as small-sized enterprises without it at the time of the study were making attempts to introduce it. The case of RES-1 was a typical example.

We have invested in a new software system that we can bolt onto our account system in SAGE that is at the front end that does the quotations and then generates a purchase order somewhere but we haven't been able to implement it fully because of cost and time problems at the moment. It is extremely expensive so we are half-way through and we going to have to go really slowly because we haven't got much money to spend on it [RES-1].

5.8.2 Skilled supply management staff

Another capability that interviewees admitted to was the involvement of “highly skilled and empowered purchasing staff” in a firm's operations. The transcript below is an interviewee's response to what constitutes capabilities in supply management.

For me the answer to that is understanding our business and how the company operates, understanding demand patterns from our customers, understanding the supply chain capabilities such as lead-times and things like that, like new product introduction times. It's all about inventory management, managing our inventory, ensuring that we are not bringing in too much stock or that we're left with obsolete stock that we cannot sell. Because products do have life cycles, it's important that you understand that life cycle and managing the inventory in accordance with it [RES-11b].

The comment here emphasises the importance of relevant skills set for supply management staff. Thus, RES-11b implied that skilled staff is essential in supply management. A key skills requirement which was common among the views expressed was 'planning' as the following extract depicts:

Is planning and organisation. Definitely planning and organisation because you've got set deadlines as to when things are got to be out to the customer. The customer says I want that by such and such a date, you've got to get it all in and supply by that date, and you've also got to take into account weekends. If they want it early Monday, you've got to get everything in and ready and out on Friday. You've got to plan all that, and so you plan in advance, making sure everything is right, know that it's going to be in on time, know you've got your resources to pack it up and get it away [RES-13].

Managing a firm's supplies thus certainly requires proficiency in certain skills. Interviewees by their views reiterated some of the essential skills. Even though they did not explicitly cite “highly skilled and empowered purchasing staff” as a

capability, it is implicitly clear from their responses that it is. When the capability was specifically mentioned to interviewees and their views solicited, one CEO retorted:

Most definitely a capability. We've had lots of different people in the past in the purchasing role and depending on what background they come from and what capability they have, drives how successful that role is and how successful the company is and if you don't have those skills and capabilities, it can be seriously detrimental to the company. So you have to have the right people with the right ability in that role for sure [RES-11].

Some respondents admitted that although this is a capability, it is an area that carries a financial burden for which reason often times they look on helplessly as they lack enough resources to engage competent personnel to oversee the process. The following extract illustrates this deprived position of some SMEs.

Nobody really in our company has that type of mentality, so it's a human resource deficit, which would be able to or is capable of seriously looking at it. So it's a huge weakness and at the moment, we are not financially strong enough to employ somebody who could look after the whole of that administration and have account of the area and try and bring it into good shape [RES-1].

There were interviewees who agreed to having skilled purchasing staff as a capability, but did not concede to empowering them as being part of that capability. They expressed their reservation about empowering supply management staff although they agree that skilled purchasing staff is absolutely vital. The transcription below is one of such reservations:

They've got to be highly skilled; I won't say that they need empowerment because that can be abused. If they've got power to purchase what they want, then they can be purchasing something that the company don't need which then will mean the small company is tying up money in something that you never going to use. So the empowerment is something that it shouldn't really happen to our company. They should have the power to purchase the stuff that you need and then skill is needed to purchase it on a time scale, but empowerment as in ordering what they want in a small company I'd say no, it shouldn't [RES-13].

It appears this interviewee misconstrued the meaning of “empowerment” or did not have the full complement of the meaning. Empowerment goes with responsibility and accountability therefore the question with regards to its being abused can be kept under control as the quote below demonstrates.

We all have our particular skills and we get the requirement into the office. The guys in here are totally empowered to manage their own processes and their part of the business. You know, and any problems they've got then they'll come and speak to me and I'll try and resolve those issues....one of the things we encourage within the organisation is empowerment anyway. People are allowed to make decisions and where they are unsure, there are people over here they can ask help from and guide them through that process [RES-5].

Contrary to the view expressed by RES-13, others pointed out that empowerment of the supply management staff is essential. The extract below shows how knowledge (skill) and empowerment are crucial in managing complexities within supply chains.

The most difficult thing that we have to deal with is complexity which makes it very very difficult for us. We make I'll say to you about sixteen different product families and those generate a number of different SKUs and the complexity, it makes it very very difficult for us to manage our overall process and that makes it very difficult for us. I think what that does then is, because you've got a certain level of complexity, you've got to then have a certain high level of knowledge than you will be at just the bottom of it. You know, I mean that's crucial. I think the ability to lead cross-functional teams is also a benefit for anybody to be able to that. To have a good set of key performance indicators which you track on a regular basis is good, and empowerment of your people [RES-6].

One concept which interviewees frequently mentioned and identified as a required capability in supply management was negotiation. However, negotiation is a skill which a skilled purchasing staff ought to be familiar with and possess. The notion of good negotiation skills being important in supply management lends support to skilled and empowered purchasing staff as a capability in supply management.

5.8.3 Close working relationship with suppliers

In spite of the impression created by some interviewees that they have a close working relationship with their suppliers, only one response identified “close working relationship with limited number of suppliers” as a capability.

For me, there is the need to build a good working relationship with the relevant few suppliers. This has to be developed because it doesn't come by its own. This brings the supplier closer; he understands your business and you understand his as well, and he becomes very responsive. Trust and honesty are essential ingredients in supply management but can only come about when you work closely together with them, you see [RES-14].

An interviewee whose view sought to emphasise the importance of honesty in buyer-supplier relationships however lends support to the conceptualisation of close working relationship with limited number of suppliers as being a capability in supply management:

The ability to tell me the truth. Now that develops over time. My relationship with my particular suppliers of compressors in Leeds is extremely good, excellent, I mean one phone call and I know it's sorted. They know me I know them, I like them, they like me, they get paid, we all make a little money. They're probably over charging me; I don't mind [RES-2].

When the capability was mentioned to respondents and their views thoughts sought, there was a good agreement to it as being a capability. The interviews revealed that this capability is perhaps the most commonly practiced among SMEs. Interviewees contend that it is a capability that enables them to keep the operations of their suppliers under continual scrutiny and monitoring. RES-10 for instance claims he works closely with his suppliers because that enables him to assess suppliers' business continuity and sustainability. In his words, “I want to make sure that they're going to be there next year” [RES-10]. The transcripts below indicate some of the reasons why a close working relationship may be important.

Yeah we do that. I think that's fair yeah. I think I do, like I say, with over 50 suppliers, three or four are key so you try and make sure that whatever is happening in them you know about as far as you can and you're watching [RES-1].

Yes, we do work quite closely with them. We have a number of material suppliers that we engage with. We work very closely with them because of the nature of materials that we have to buy. Sometimes they're quite specialised and because of the industries that we're serving and because some of the other products that we buy are also specialised so we do have to have that quite close working relationship with those type of suppliers [RES-5].

There were other views which indicated that closely working together with suppliers builds a bond of friendship between the exchange parties and secures the buyer a place in the good books of the supplier; "it is one way of getting into the priority list of the supplier even when your orders are small" [RES-15]. Elaborating further on the benefits of closely working together with suppliers, an interviewee expressed:

The benefits are lead-time of the product, to get the product in here, we've got also probably a better chance of getting a quality product. You know very well the supplier you are dealing with, you know you can resolve issues quickly regarding design implications or things like that so all of those things add up to making a close working relationship and it means that we can get products quickly into the company if we need it. What also happens is we've got these types of suppliers who also will give us, they've got very flexible approach to our business so they've got the flexibility we expect to meet a lot of our demands, you know. Of course sometimes we may ask for something on a very very short lead-time; it might be something on a two week lead time but we may want it in three or four days and then.....is their ability to react to that and more so our key suppliers can do that. They've got that flexibility in their company to be able to do that [RES-5].

These views point to the direction that closely working together with suppliers is beneficial at least from the point of view of the buying firms. As noted from some of the responses, SMEs may have varying reasons for engaging in a close working relationship with their suppliers. Whatever the intention for engaging in it however, the ability to appropriately select suppliers to work closely with, appears to be a capability impacting on some dimensions of operations performance.

5.8.4 Long-term collaborative relationship with suppliers

On "long-term collaborative relationship with suppliers" even though there was agreement on it as a vital capability, not all the interviewees indicated they were

engaged in it. Only a limited number of interviewees admitted to its use but even with those, they claim collaboration is done on selective basis. This is expected as collaborative relationship cannot be established with each and every single supplier to a firm. It is the ability to ascertain when and with whom to set a collaborative relationship that makes it a capability. The extract below is an interviewee's response on this capability.

Oh yeah, that's key. I think I've mentioned it before, you know. That is the one... building relationships, it might be a bit old-fashioned but it works very well, yeah it does. That's probably my key supply thing is that, having that long term relationships. We try a bit hard to do that. There are people I've been dealing with now for almost 15 to 20 years [RES-10].

.....we've gone from analogue to digital as well. So what that meant for us was that we were taking steps out of our customer's manufacturing process. So what did that mean for us? It meant that the aluminium had to be a higher spec, had to be a higher grade, had to be a higher quality. You don't do that without collaboration [RES-6].

Thus even though interviewees agreed on "long-term collaborative relationship with suppliers" as a capability particularly with regards to long term product development, this capability is rarely developed among SMEs. Some respondents were open to admit that it is not something they do.

5.8.5 Open communication between exchange partners

There was unanimous admission by interviewees on "open communication between exchange partners" as an important capability in supply management. There was not a shred of doubt among interviewees regarding this concept being a capability in supply management. Not only was there agreement on it, but it also appears many interviewees practice and possess this capability as the following quote depicts:

Yes, we are open with our suppliers, we communicate loud and clear, we don't lie, we don't hide anything, we are very open and it's something we have and I agree with it as a capability [RES-12].

We do have an open relationship. They'll come and speak to us if they have issues, we'll speak to them. We quite often bounce ideas off our suppliers to

see the best way of manufacturing all sorts and sorts of parts, so yes we do have quite an open relationship with our suppliers [RES-5].

Commenting on open communication between exchange partners as a capability, RES-3 stated “it is absolutely vital and we are quite good at it. We believe if they know what our plans are, they will help us to achieve them”. An interviewee was of the view that being open with suppliers is good but being completely open is unacceptable. He stated, “to be open with suppliers, yes to about 75% yeah, some stuff need to be held back but fairly open” [RES-7]. The interviews further revealed that although the interviewees lay a general claim to being open with suppliers, their openness rarely extends to sharing sensitive information such as financial, design, production, research and/or competition, with their suppliers. Thus their openness to a large extent is limited to information such as production schedules, delivery schedules, honesty in transactions, and honouring their promises. Others argue that there is a limit to which one can go with respect to being open with trade partners. The limit they point out is the supplier himself; “how can you be open with a dodgy supplier? you shoot yourself in the foot if you do that” [RES-15].

5.8.6 Integration between supply strategy and corporate strategic objectives

Integration between supply strategy and corporate strategic objectives appears to be the least frequently acknowledged among the six capabilities investigated. Crafting a supply strategy from a firm’s corporate strategic objectives is a way of ensuring that activities of the supply side of the business match with the goals set at the customer end of the business. When interviewees were prompted on this capability and their views sought, it emerged that linking supply strategy to corporate objectives is not something most SMEs do. A further probe found that a formal corporate strategy in most cases is non-existent particularly in the small-sized enterprises. For small enterprises the strategy seems to be in the head of the owner-manager as confessed by the Managing Director of an eighteen member-staff manufacturing firm:

There is one (corporate strategy). It's in my head. Is not written down and that is probably, the strategy is between our sales, the paper mill and if I can call Amazon a supplier [RES-10].

Even among the medium-sized enterprises, a formal corporate strategy is equally hard to come by. A specialist manufacturer with two hundred employees had this to say on strategy:

There isn't really that sort of strategy in place. It's something we are looking at the moment....if you come and ask me again in twelve months' time I'll be able to answer that a bit more positively [RES-5].

In a response to whether her company has any supply strategy in place, RES-8 was apt to say "no, we don't". A similar response was given by RES-4 stating, "I don't think it's something that we do at the minute but I think is something that we should definitely be looking to implement to increase our capability in, once the new purchasing manager is in place". Although generally, interviewees admitted to the lack of formal integration between supply strategy and corporate strategic objectives, some pointed out that they do this as a matter of common sense and experience.

Probably from experience and knowing market cost and things; we are a sort of a value-based supplier and we obviously look at companies or organisations that can manufacture our supply or products within that value [RES-11].

There was however one firm that admitted to pursuing this capability. The owner explained how this is done:

The corporate objectives; that need to filter into any supply chain so you know, the intention of buying as near as possible to the factory ultimately to buy British where we can, because you can promote products that's been made in Britain, that is key to our export strategy as well. So yes, it does filter down and that has to be the core objectives and the core values of the company have to be filtered in to our supply chain. We wouldn't want to buy something from a third world that was being produced from slave labour or whatever. Probably not that key now, and environmentally as well [RES-7].

In effect, not many agreed to integration between supply strategy and corporate strategic objectives as a supply management capability. The reason for this may not be far-fetched; most SMEs do not have a formal corporate strategy from which a supply strategy can be crafted. Firms are therefore not likely to see this as a capability.

5.9 Operations performance dimensions

It was evident from the interviews that all five operations performance dimensions preoccupy the operations performance agenda of the SMEs. These dimensions (quality, cost, speed, flexibility and dependability) however appear to vary in their degree of importance to each individual firm. For instance, whereas to some firms quality is the topmost priority, to others, cost is. The interviews further established that active ownership involvement in the firm's operations tends to influence the prioritisation of the five performance dimensions. It appears the prioritisation of the performance dimensions is more of an owner's preference than a well-defined operations strategy. Cases of owner's active involvement show that the values of the owner is an influential factor in the prioritisation of the performance dimensions as captured in the extract below:

We try and focus on the quality of the product....and I think is my own personal values and attributes [RES-1].

Elaborating further on how his personal values influence his choice of a performance dimension, RES-1 pointed out that even though market intelligence point to cheaper products (cost) as customers' preference, his personal preference for quality products which leads to comparatively higher prices for his products is affecting his company's performance.

We stood there with the high quality offering and people talk about us, oh yeah xxx (company name) is a high quality manufacturer and all that but somebody with lower quality and more aggressive is more successful. They just want absolutely the cheapest price. NHS basically, they pretend, there is a lot of rhetoric, they pretend they're looking at value of purchasing but it isn't. It's ridiculous. They will not and cannot in their structure see their way past the cheapest price [RES-1].

This extract shows how personal values can influence business decisions. One would as a matter of common sense expect this manufacturer to focus a bit more on the trend in competition (cost), but his personal values would not let him. Another interviewee whose active involvement in the operations of his firm was prominent shared this characteristic. The owner revealed:

I've got a terrible little confession to make; I don't pay a lot of attention to my competition. We do little bits, I've got a couple of catalogues, trying to see

what they are charging and we get feedback off people who ring us up, but I've always approached the business from the angle that I'll do what I want to do and I should create the competition to them. So, either I produce something and is right and the price is OK, and I sell off them or I produce something and put it out there, but I've never really worried too much about competition [RES-10].

It is clear from the above excerpt that an owner's focus on a particular operations performance dimension is largely influenced by his or her personal beliefs and marginally by competition. This trend was observed predominantly in the less-formalised SMEs where active ownership involvement were largely found. This observation however does not mean that for the less-formalised SMEs, attention is not paid to the other performance dimensions. All five dimensions were given some level of attention but maximum effort was directed at achieving the prioritised performance dimension. Although evidence of prioritisation of the performance dimensions were found among the formalised SMEs, this category of SMEs to a large extent, seem to direct effort at achieving all five dimensions as pointed out in the following quotes:

We focus on product quality, we focus on lead time, we focus on reliability, how reliable is the supply chain, those are the three that we focus on and cost, you know you cannot do one in isolation, you have to do all of them [RES-6].

I think it's all five, yeah, I mean the quality is always there, the speed obviously customers push us further if they've got a Chinese (restaurant/takeaway) opening, you can't say sorry it's going to be three weeks. Obviously cost is very important to the purchasing department, I don't have anything to do with the sales side, but I do think that they are all five valid points [RES-8].

Among the formalised SMEs, cost appears to attract a good deal of attention relative to prioritisation of the performance dimensions. They argue that getting cost right is their biggest hurdle because if the cost is not right, price to the customer will not be right either, with the implication that the customer order will not be won. To some firms, cost must come first before other dimensions could follow. The extract below shows an interviewee expressing this sentiment.

If cost is not right in the first place, none of the others follow because we don't get the order. So the cost has to be right for the customer otherwise the factory doesn't win the work. So there will be no quality issue because we are not producing it. There will be no lead-time issue because we are not ordering it. So if the cost isn't right, the quality and the lead-time issues are all irrelevant. So that's the main one, is the cost. For me, it's the cost to the customer and the cost we buy from our mills has to be right, that will be the challenge I'd say [RES-12b].

It was interesting to note that for some firms, due to the nature of their operations, cost is the least considered dimension among the five performance dimensions. A typical example of operations of this nature is project-led manufacturing. One such firm represented by RES-5 remarked:

The bottom will be probably cost as far as the client is concerned...Cost is fairly low down in terms of the client. They are more interested in getting the right product, the right quality, on-time, at the right cost [RES-5].

All five dimensions were found to be relevant to the operations of SMEs as none was disputed. What dimension is important to a particular SME was found to be influenced by factors such as active ownership involvement and the level of formalisation. For most formalised SMEs, it appears equal attention is paid to all dimensions with occasional evidence of strategic prioritisation of the performance dimensions. On the other hand, though less-formalised SMEs also pay attention to all five dimensions, there is usually an emphasis on a particular dimension, based on the beliefs and values of the owner, irrespective of the dimension controlling competition.

5.10 Summary of the key findings

A number of key issues and interesting observations have emerged from the analysis of the interviews relating to supply management capabilities construct. The interviews have informed understanding of the construct and profiled the nature of SME supply management. Varying degrees of linkages and associations have also been found to exist among the research constructs - organisational attributes, supply management capabilities and operations performance dimensions. The interrelationships among the constructs and other outcomes from the analysis are discussed below.

5.10.1 The more-formalised and less-formalised SME divide

The qualitative analysis found that, on the basis of the level of formalisation in SMEs – more-formalised and less-formalised as categorised in the present study – structures for managing supply may also be affected. More-formalised SMEs are firms which have distinct functional demarcations and job roles. Less-formalised SMEs on the other hand operate largely without well-defined departments or have vaguely defined departments. In other words, the level of formalisation of management is low in less-formalised SMEs but high in the more-formalised SMEs. The extent of formalisation appears to depend on the number of employees. A lower number of employees were frequently found in less-formalised SMEs compared to the more-formalised ones. Similarly, the extent of formalisation appears to affect the way supply is managed and the extent to which supply management capabilities exist in these two categories of firms. The owner-manager is more likely to assume the responsibility for supply management in a less-formalised SME. In a more-formalised SME however, there is usually a dedicated supply function and experienced staff responsible for supply management. More-formalised SMEs thus appear to be more capable in supply management and thereby gives the indication that formalised SMEs are also more likely to adopt supply management thinking.

5.10.2 SMEs perception of supply management capabilities

The respondents' views on what constitutes supply management capabilities suggest that all six concepts derived from the literature analysis are fundamental to the efficient management of supplies. These six constructs constitute a bundle of skills and resources and may therefore be termed as capabilities. The views also show that SMEs differ in the extent of capabilities they possess depending on ownership involvement, firm size and age. The general observation was that medium-sized firms which were relatively older, have higher number of employees, and exhibit less ownership involvement, tend to possess more of these capabilities than small firms. Small-sized firms on the other hand appear to be more financially constrained to provide the resource support needed to develop the structure which engenders supply management capabilities.

5.10.3 Sources of supply management capabilities

The analysis so far shows that the development of the supply management capabilities may be linked to a number of factors as depicted in Figure 5.1.

Figure 5.1: Source mapping of supply management capabilities

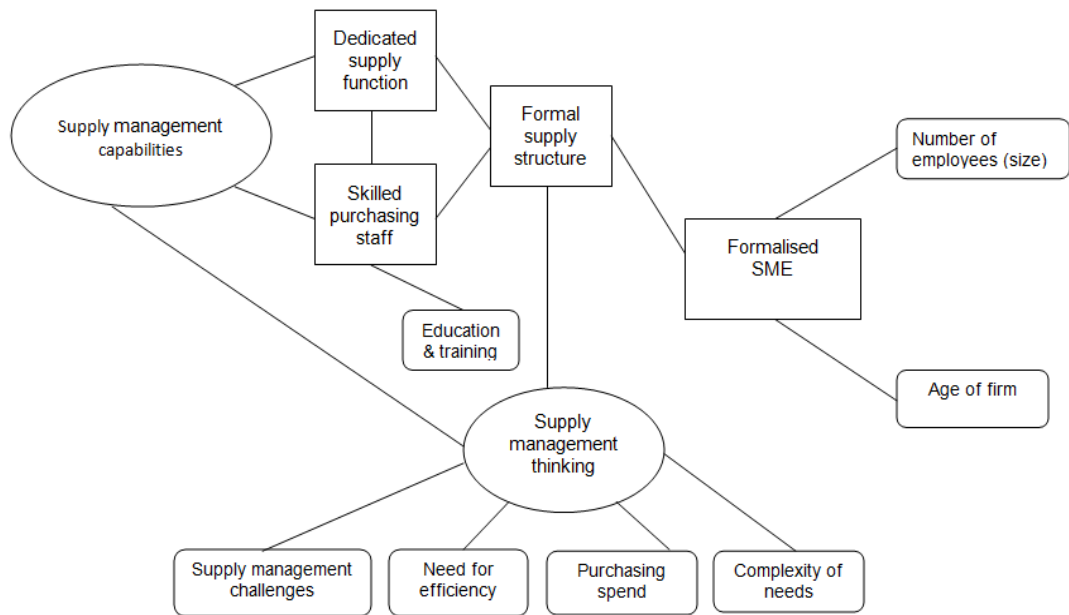


Figure 5.1 identifies a number of factors that the development of supply management capabilities may be sourced to. The analysis has highlighted developing supply management thinking as a fundamental prerequisite. Supply management thinking simply implies senior managers of the organisation being oriented to the value additions that potentially can be derived from the supply side of the business. Supply management thinking is invoked by exigencies such as high purchasing spend, increasing demand for efficiency, complexity of needs and the need to overcome supply management challenges. The thinking is more influenced if the firm has a formal organisational structure. The adoption of supply management thinking invokes the readiness of senior managers to put systems in place to harness the value contributions within the supply end of the operations. This is when a formal supply management structure becomes relevant. Setting up a formal supply structure becomes easier when formalisation already exists in the firm.

Formal supply management structure is an established organisation-wide procedure and processes for input acquisition and management. The structure includes a dedicated supply function staffed by skilled supply personnel. It was clear from the interviews that firms with established structures for supply management admitted to more of the assessed capabilities than their counterparts without. The skills and experience of persons involved in supply management appears to be relevant and is closely linked to the presence of a dedicated supply function in the firm. The evidence suggests that firms which have employed trained

supply staff in a dedicated supply function, thereby creating a formal structure for supply management, seem to rank higher on the capabilities than firms without these resources. The extracts below seem to identify experience and appropriate training as significant contributor to supply management capability development.

I think it's essential to have a good solid system, a robust system in place, but you also need excellent people adhering to that procedure as well. We've had in the past, where we had sort of the opposite extreme where we've had no process in place, and we are talking a long long time ago, and we've had inexperienced people working in that environment and that was sort of a recipe for disaster, but when we had the management changed several years ago, we've identified very early on, that we needed to have processes in place and the right people managing those processes. They are the right people with the right skills or the right abilities [RES-11].

I think as we're getting bigger, we train people, I still think it's down to what you know. I'm pretty sure I could teach anyone in less than a week how to deal with my suppliers because it's large volumes but from very few people [RES-10].

There seems to be evidence to suggest that experience is supplementary to education and training. This reasoning stems from the observation that firms having supply management staff with background education and training in supply management as well as experience appear to be high on the capabilities than firms having supply management staff with only experience. Theoretically, this may be supported as education and training equips staff with the knowledge on supply management tools which facilitates the administration of supplies. Education and training of staff is therefore a key focal point that the development of supply management capabilities can be linked to. Experience though is important, it is education and training that provide the knowledge and principle behind what we experience. To this end, the qualitative study has enriched our understanding of the process for the development of supply management capabilities as illustrated in Figure 5.1.

5.10.4 Firm Ownership and supply management capabilities

Ownership characteristics and involvement is another organisational attribute that seems to impact on the development of supply management capabilities. Firm owners' active involvement in the operations of a SME was found to be widespread

in small-sized enterprises. This might be so because for a small firm, the owner represents a source of direction. The capacity of the firm to grow depends largely on the vision of the owner and how he/she pursues this agenda. As the evidence suggests, SMEs where active involvement of the owners were found, appear to be largely less-formalised in nature and therefore generally lack the structures for developing supply management capabilities. Less-formalised SMEs were found to possess low supply management capabilities. Thus it may be posited that the higher the involvement of the owner in the operations of the firm, the lower the firm's capabilities in supply management.

5.10.5 Dedicated supply function and supply management capabilities

The presence of a dedicated supply function in the firm was found to have some association with the existing level of supply management capabilities. Firms which were found to demonstrate a number of the assessed capabilities were also found to have established dedicated supply functions. The creation of a dedicated supply function was largely found in medium-sized enterprises suggesting that medium firms may have more capabilities in supply management than small firms. Adopting supply management thinking and the creation of dedicated supply function appear to be associated. Thus, firms embracing supply management thinking were also found to have an established dedicated supply function. The association between the two may be explained that when firms adopt supply management thinking, they then develop a formal supply structure. A formal supply structure will consist of a dedicated supply function and the presence of skilled supply staff. This explanation may lend support to why firms with dedicated supply function were found to be more capable in their supply management.

5.10.6 Firm size and supply management capabilities

The interviews showed that the size of the firm mainly with regards to the number of employees has some close association with a firm's level of supply management capabilities. It was observed that firms with higher number of employees tend to be more managerial in nature and therefore can accommodate structures for supply management which engenders the development of these capabilities. This may be explained that medium-sized firms perhaps have more resources necessary to engage in this process than small firms. Again medium-sized sized firms perhaps because of the number of employees, appear to be more process-oriented and therefore highly likely to have in place a process approach for managing supply. Routinized processes generates experience and learning and promotes the

development of capabilities. In contrast, the less-formalised SMEs which were observed to be predominantly small firms, appear to be more resource-constrained and subsequently limited in their capacity to create a structure for supply management. Empirically, medium-sized enterprises were observed to be higher on supply management capabilities than small-sized enterprises. It may therefore be deduced that the size of the firm increases the chance of the firm to adopt supply management thinking. Size equally affects a process-approach to management thereby creating a routinized process that enhances capability development. Subsequently, medium-sized firms were found to demonstrate more supply management capabilities than the small-sized firms.

5.10.7 Firm age and supply management capabilities

The age of the firm as an attribute was found to have some influence on a firm's supply management capabilities. The interviews show that for the much younger SMEs, the active involvement of the owners was paramount. The active involvement of the owners however seem to contribute significantly to making such firms less-formalised in nature. Less-formalised SMEs somehow appear to be limited in their capacity to create structures which then affect their ability to develop supply management capabilities. In effect, older SMEs, largely represented by medium-sized enterprises seem to have higher capabilities in supply management than their much younger counterparts, which are the small-sized firms. On the basis of the evidence, the conclusion may be made that, all four organisational attributes do influence a firm's level of capabilities in supply management to some extent. However, it appears all four attributes are inter-twined and therefore have an aggregate impact on supply management capabilities development rather than an individual impact.

5.10.8 Supply management capabilities and operations performance dimensions

The evidence sufficiently suggests that there is a close association between supply management capabilities and the operations performance of SMEs. Interviewees intimated that the firm's performance at the supply side of business is a key factor in its performance at the customer end of the business. The following two excerpts show how supply management excellence and inefficiencies may influence a firm's operations performance:

Crucial to everything we do (supply management capabilities), all of them are probably key. Obviously we are a value-based supplier so cost is very very important to us. Speed again is very very important as well. Dependability is critical. Its impact on customer service whether it be, we can't deliver a quality product or we don't deliver it, or there is a problem with the product, absolutely key. So dependability is key as well.....now our stocks are high, 90's consistently, our customers come in, and that's one of our main strengths, you know, the ability that they can order something from us and they would always invariably get it whereas if they order off a competitor, they might not turn up [RES-11b].

I do think that our supply chain inadequacies are very much affecting our performance because we are not as efficient in that area as we thought we were. So obviously at the end of the year, we've kind of looked at where we are at and we're not where we thought we were. So that clearly affects us from the financial perspective [RES-4].

The two extracts above demonstrate that interviewees believe developing supply management capabilities can impact on their operational excellence. In the view of RES-6, supply management influences everything in operations, stating, "we do influence everything in terms of operations". RES-11b's remark that capabilities in supply management is "crucial to everything we do" is suggestive of how important supply management is to operations. It was revealed from the interviews that a major component of manufacturing operations is supply management. Hence, developing capabilities in supply management would impact on operations performance. There were interviewees who strongly believed that, the firm would do better if they improved their capabilities in supply management. "I think it will improve performance dramatically" was the response of RES-4 regarding why supply management capabilities must be developed. Commenting on the importance of supply management to their type of operations, RES-13 stated, "absolutely vital, you know, without supply management you don't have a product".

The interviews generally do show a consensus among interviewees regarding their views on the relevance of capabilities in supply management to operations performance dimensions. They seem to share the view that the six supply management capabilities as conceptualised from the literature seem to influence all five dimensions of operations performance. This association may exist because, as the interviews revealed, the quality, cost, speed, flexibility and dependability of

manufacturing operations are all supplier-dependent. Supply management was established to constitute a key component of manufacturing operations. Subsequently, any capabilities developed in supply management are likely to have an effect on the firm's capacity to be effective and efficient, which is the ultimate reason behind the performance objectives.

5.11 Conclusion

The qualitative component of the study has informed understanding and provided deeper insights into the supply management capabilities constructs. These insights relate to the constitution of the capabilities, development characteristics and relevance to manufacturing operations. These qualitative understandings and insights lend support to some of the research hypothesis as stated in chapter 3 and set the scene for a new theoretical understanding of supply management. The emerging findings indicate that SMEs are not homogeneous in their level of supply management capabilities; medium firms appear to have more capabilities than their counterpart small firms. Generally, SMEs differ by age, size and ownership involvement. These distinguishing characteristics in addition to the creation of a dedicated supply function, have been shown in this study to predict a firm's level of supply management capabilities. To what extent these characteristics individually predict the level of a firm's supply management capabilities and what specific capabilities they individually influence is difficult to establish in a qualitative study. These findings are expected to be put through a statistical test in a more detailed quantitative analysis in the next chapter.

Similarly, supply management capabilities were found to closely associate with the operations performance of a firm. Enhanced supply management capabilities were found to, more often than not, result in improved operations performance. The evidence is however limited on which capabilities are more influential and which dimensions of operations performance they significantly influence. Subsequently, a multivariate regression will be run in chapter 6 to ascertain the inter-relationships existing among the dimensions underlying the two constructs, supply management capabilities and operations performance dimensions. In addition, the inter-relationships between the four firm attributes and the six supply management capabilities would be statistically assessed in chapter 6.

Chapter 6

Quantitative Data Analysis

6.1 Chapter overview

This chapter contains the statistical analysis of the quantitative data collected from a large scale questionnaire survey. The analysis will establish statistically any correlations among the research constructs and their respective dimensions. In addition, the influences of supply management capabilities on operations performance dimensions will be modelled. This component of the study aims to produce findings which complement the results of the exploratory qualitative study presented in chapter 5. The analysis covers the description of the sample, initial data screening, test for assumptions underlying multivariate data analysis, and descriptive statistics. These are then followed with the reliability test, factor analysis and test of hypotheses. The main software package used for the analysis is the Statistical Package for Social Sciences (IBM SPSS statistics version 21).

6.2 Response rate

The survey questionnaire (see appendix B) was developed and distributed using an online survey package called "Qualtrics". The target sample comprised some 2,002 UK-based manufacturing SMEs purposefully selected from the FAME database. This database was used because of accessibility and the availability of key contact persons with their email addresses for the majority of the firms. The survey questionnaire was distributed to key contacts from the 2,002 selected firms through Qualtrics. Out of this number, 82 of the emails were not delivered because the email addresses did not exist, thereby reducing the sample size to 1,920. A further 23 contacts responded to the researcher's invitation email to say they would not participate, attributing their non-participation to one of the following reasons:

1. Restriction by company policy,
2. Relocation of manufacturing plant out of the UK,
3. No longer a SME,
4. Simply not interested in participating in the study.

Thus the effective sample size was reduced to 1,893 firms. From this, a total of 184 responses were received at the close of the survey on August 31, 2013, giving a response rate of 9.7%. This response rate compares favourably with similar studies in the operations management literature. Typical examples include 10% in Narasimhan *et al.*, (2001), 7.9% in Inman *et al.*, (2011), 5.1% in Tachizawa and Gimenez, (2010), and 7.5% in Nahm *et al.*, (2003). Evidence suggests that postal survey is superior to online surveys with regards to response rate (Tachizawa and Gimenez, 2010; Mavis and Brocato, 1998). However, the researcher was constrained from the choice of postal surveys because of its considerable administrative and cost implications. For convenience and timeliness, the online survey offered a better option to the researcher.

6.3 Data Checking

The first step in the analysis process was a thorough data checking exercise. This was done to ensure data quality and appropriateness for the intended analysis as well as to enable the researcher to familiarise himself with the data collected. In this exercise, the data were explored to ensure that the basic assumptions underlying multivariate regression were met. The danger of not meeting these assumptions are the possibility of Type I or Type II errors, that is, over or underestimation of significance or effect size (Jason *et al.*, 2002). Following the data checking exercise, 132 cases were retained while 52 cases were removed for reasons explained below.

The first two questions in the questionnaire were built in as part of the data screening process. Question 1 reads, "Is your firm a small and medium-sized manufacturing enterprise (SME) based in the UK?". This is followed by question 2; "Does the total number of employees for your firm fall between 0-249?". All respondents answering "No" to any of the first two questions were automatically taken to the end of the questionnaire and therefore did not have the chance to see the rest of questions. Thirty three and eighteen participants responded "No" to questions 1 and 2 respectively. There was one case that had to be set aside because it had too much missing data, i.e. more than 35% (Hair *et al.*, 2007:56). These categories of responses totaling 52 were the cases excluded from the analysis as stated in the previous paragraph.

The 132 valid responses were deemed a sufficient sample size in the literature to carry out a regression analysis on the basis of a 5:1 ratio (Hair *et al.*, 2010: 102). The 5:1 ratio means a minimum of five observations is required for every

independent variable. This study has six independent variables therefore 132 cases represent an adequate number of observations.

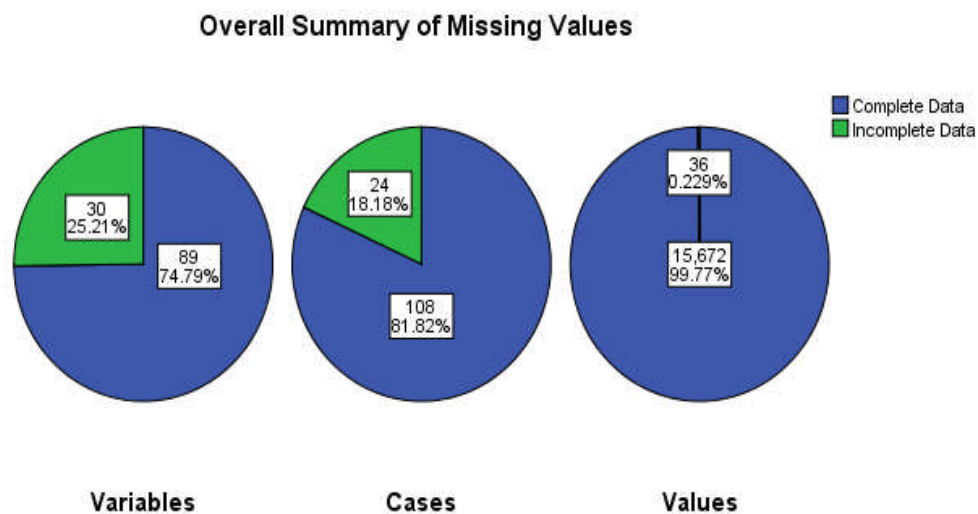
6.3.1 Accuracy of data entry

Data entry into SPSS was done automatically. Qualtrics collected the responses into a database. On closure of the survey, the responses were exported directly into SPSS by the researcher, hence potential transcription errors of data entry were avoided.

6.3.2 Missing value analysis (MVA)

Following the exclusions as indicated in section 6.3 (Data checking), the retained questionnaires were thoroughly checked for any missing data by visual inspection. This showed a few cases with missing values on some variables. Subsequently a MVA was executed in SPSS to reveal the percentage, patterns and randomness of the missing values as recommended by Tabachnick and Fidell (2007:66). The MVA showed a missing value range between 0.8% and 2.3% across 30 variables and 24 cases. In most missing cases, the amount of missing value per variable was one. The highest number of missing values per variable was found to be 3 and this occurred under “we make high quality products that meet our customer needs”, one of the variables measuring quality as a performance dimension. The summary of the MVA is shown in Figure 6.1. As can be observed from Figure 6.1, the overall missing values was 0.23% of the total values which occurred across 24 cases. Thus the amount of missing data was very small.

Figure 6.1: Overall summary of missing values



missing values. To further verify that the missing data was not MNAR (because all analysis have serious problems when the missing data is MNAR), Little's MCAR test was run to ascertain if the missing data occurred at random. This test resulted in $Chi-Square = 1925.649$, $DF = 1889$, $Sig. = 0.273$. The results here show that it is not statistically significant, indicating that the missing values occurred completely at random. Following the MVA, all 132 cases were considered usable and retained. Because the number of missing values was very small, they were not replaced and would appear in subsequent calculations as "missing system".

6.4 Sample representativeness

The UK's Department for Business Innovation and Skills in a statistical release stated that at the start of 2013, there were 274,000 manufacturing firms in the UK. The statistical release stated that small (0-49 employees), medium (50-249 employees) and large (>250 employees) firms constituted 98.8%, 1% and 0.2% respectively of private sector businesses. It is therefore estimated that the UK SME population being used for this study is comprised of 270,712 small firms and 2,740 medium firms totalling 273,452 (99.8% of 274,000) as shown in Table 6.1. The UK manufacturing sector employs approximately 2.5 million people out of which 58.1% (1,452,500) represents employment in manufacturing SMEs thereby giving the population mean for employment size to be 5.13. Subsequently, a one-sample t-test was run to assess sample representativeness. The results, $t(132)=20.303$, $p=0.000$, implying that the mean employment size (92.47 ± 49.32) for the sample was statistically significantly higher than the population mean of 5.13. Although a statistically significant difference was found, this is expected due to the distribution of small and medium firms in the targeted sample. The targeted sample comprised 30% small firms and 70% medium firms (due to data availability) compared to 99% of small firms and 1% of medium firms in the population. Thus, the data is biased towards medium firms. However, empirical data are rarely representative of the population in reality (Saunders *et al.*, 2007:212).

Table 6.1: Categorisation of participating firms

Firm type	Actual Respondents		Targeted Respondents		Population	
	Frequency	Valid Percent	Frequency	Valid Percent	Frequency	Valid Percent
Small firms	22	16.7	601	30.0	270,712	99.0
Medium firms	110	83.3	1401	70.0	2,740	1.0
Total	132	100.0	2002	100.0	273,452	100.0

The sample was selected from the FAME database. The database appears to contain more information on medium firms than small firms. The reason may be due to smaller firms not having enough resources to support their inclusion on the database or such firms not being interested in their inclusion to enhance their visibility. Thus, the bias towards medium firms was to be expected. This bias may however not affect the outcome of the study.

6.4.1 Assessment of non-response bias

Non-response bias arises when actual respondents to a questionnaire differ from those who did not respond (Bryman and Bell, 2003:94). Efforts were made during the respondent selection process to minimise the potential for the occurrence of non-response. As a result, only companies which strictly met the following criteria were selected:

1. UK-based manufacturer,
2. Employs between 10-249 people,
3. Has a contact person with email address with such contact being deemed qualified by the researcher to respond to the survey.

In order to assess non-response bias, a non-response bias test was carried out. This was done by comparing the arithmetic means of firm size, measured by the number of full time employees, and annual sales turnover for both early and late respondents (Armstrong and Overton, 1977). Early respondents in this study comprised all respondent who answered the questionnaire between June 19, 2013 – July 31, 2013. Late respondents refer to respondents who responded from August 1, 2013 when the last reminder was sent out. An independent-samples t-test was run to determine if there were any differences in means for the two groups. The test resulted in significance level (2-tailed) of $p=.192$ and $p=.648$ for the number of full time employees and annual sales turnover respectively. It was therefore concluded that there was no significant difference between early and late respondents on these size variables, suggesting that non-response bias may not impact the results.

6.5 Descriptive analysis

The following sections report on the initial descriptive analysis of the data. As stated earlier, a total of 132 responses were used in the analysis.

6.5.1 Categories of firms in the study

Table 6.1 above shows the total of small firms and medium firms which participated in the study. There were 22 (16.7%) small firms as against 110 (83.3%) medium firms giving a total of 132 valid responses. Thus participation in the study was dominated by medium-sized firms. This may be attributed to the reason that many of the firms from the FAME database which had contact persons with email address were in the medium firm category. As a result, the targeted sample contained more medium-sized firms than small-sized firms; there were 601 small firms compared to 1,401 medium firms. On the basis of the targeted sample size (2,002), response rate for small firms and medium firms stood at 3.7% and 7.9% respectively. It can be observed that the response rate for medium firms was 100% better than that of small firms thereby justifying the use of more medium firms.

6.5.2 Sector distribution of the firms

The 132 participating manufacturing firms were spread across a wide range of sectors. Notable among the sectors given were the ones listed in Table 6.2. The dominance of any particular sector was not observed.

Table 6.2: Manufacturing sectors of participating firms

Aerospace	Chemical processing
Health and medical equipment	Printing and education materials
Electronics	Food processing
Electrical/mechanical components	Textile manufacturing
Metal processing	Transportation
Timber processing	Steel fabrication
Building and construction	Packaging materials
Oil, gas and nuclear	Paints and coatings
Precision engineering	Plastics

6.5.3 Age distribution of the firms

The age distribution of the participating firms is shown in Table 6.3. It can be observed from the table that the majority of the firms represented by 87.1% were found to be less than 100 years old whilst 12.9% were over 100 years old. Specifically 67.4% of the firms were less or equal to 50 years old. The mean age of responding firms was calculated at 48.8 years with a standard deviation of 36.4.

Table 6.3: Age distribution of the firms

Age group (Years)	Frequency	Valid Percent	Mean age	Std. Deviation
0-25	38	28.8		
26-50	51	38.6		
51-75	19	14.4	48.8	36.4
76-100	7	5.3		
>100	17	12.9		
Total	132	100.0		

6.5.4 Job titles of respondents

The questionnaire was targeted at top and senior management staff who were thought to possess good knowledge about the whole operations of the firm. Table 6.4 shows the titles of the actual respondents. There were however 14 respondents whose title fell outside the ones stated on the questionnaire. As given by respondents, these are shown on Table 6.5.

Table 6.4: Job titles of the respondents

Job Titles	Frequency	Valid Percent
Managing director	74	56.1
General manager	5	3.8
Operations director/manager	21	15.9
Commercial director/manager	4	3.0
Supply chain director/manager	4	3.0
Procurement director/manager	3	2.3
Purchasing director/manager	7	5.3
Other	14	10.6
Total	132	100.0

Table 6.5: Other job titles of respondents

Job Titles	Frequency	Valid Percent
CEO	2	1.5
Chairman	4	3.1
Chairman and New Business Development Director	1	.8
Chief Executive	1	.8
Company Chairman	1	.8
Director	1	.8
Executive Chairman	1	.8
Joint MD	1	.8
Non Executive Chairman	1	.8
Pre-Production Manager	1	.8
Total	14	10.6

6.5.5 Management level of respondents

Table 6.6 represents the management level at which respondents were involved within their respective firms. Apart from one supervisory manager and 11 middle management staff, the rest (90.9%) were all top/senior management staff as anticipated.

Table 6.6: Management level of respondents

Level of Management	Frequency	Valid Percent
Top/senior management	120	90.9
Middle management	11	8.3
Supervisory management	1	.8
Total	132	100.0

6.5.6 Gender classification of respondents

Classification of respondents on the basis of gender shows that only 6 (4.5%) were females whilst the majority of 126 (95.5%) were males as represented on Table 6.7, indicating that top management positions in the sampled SMEs were male dominated.

Table 6.7: Gender classification of respondents

Gender	Frequency	Valid Percent
Male	126	95.5
Female	6	4.5
Total	132	100.0

6.5.7 Ownership involvement in firm's operations

Among the 132 respondents, 68 respondents representing 48.5% of the sample identified themselves as owners or part-owners of their company. The remaining 68 (51.5%) described themselves as non-owners. Owners' active involvement in the daily management of the firms was established in 100 (75.8%) firms. In 32 (24.2%) of the firms however, owners were found not to be actively involved in the management process. This result suggests that owners' involvement in the firm's operations is high in SMEs.

6.5.8 Business ownership classification of the firms

Table 6.8 shows that 81.8% of the firms were private limited liability companies. Public limited liability companies and partnership constituted 16.7% and 1.5% respectively. This is expected as SME owners are often reluctant to lose control of their firms through equity financing.

Table 6.8: Types of business ownership

Types	Frequency	Valid Percent
Public limited liability company	22	16.7
Private limited liability company	108	81.8
Partnership	2	1.5
Total	132	100.0

6.5.9 Specialisation of the supply management function

The analysis show that most of the participating firms had a specialised function responsible for supply management. This is evident by the 90 respondents (representing 68.18%) who confirmed the existence of a dedicated supply function in their firms. Non-existence of a dedicated supply function was established in 41 (31.06%) firms.

Table 6.9: Presence of dedicated supply function

Response	Frequency	Valid Percent
Yes	90	68.2
No	41	31.06
Missing system	1	0.76
Total	132	100.0

Interestingly, as revealed in Table 6.10, 93.9% of the respondents indicated a medium to high criticality of the supply function to their operations. Only 6.1% admitted to the low criticality of the function in their firms. With this level of criticality of the supply function, one would expect more firms than the 68.2% as study has established (see Table 6.9), to have a dedicated function for supply management.

Table 6.10: criticality of supply management to the firms

Criticality	Frequency	Valid Percent
High	97	73.5
Medium	27	20.5
Low	8	6.1
Total	132	100.0

6.5.10 Percentage of annual turnover on material purchases

The analysis of the percentage of annual turnover spent on purchasing of materials and components is shown in Table 6.11. For the majority (52.2%) of respondents, over 50% of their annual turnover is spent on external purchases of materials and components. This figure reveals the extent to which supply management affects the profitability of firms and may be an indication of the function’s importance within the operations of SMEs.

Table 6.11: Percentage of turnover spent on purchases

Percentage	Frequency	Percent	Valid Percent
0-29%	17	12.9	14.8
30-49%	38	28.8	33.0
50-69%	50	37.9	43.5
70-89%	10	7.6	8.7
Total	115	87.1	100.0
Missing System	17	12.9	
Total	132	100.0	

6.5.11 Supply management challenges facing SMEs

The qualitative analysis highlighted a number of supply-related challenges that SMEs face. In the questionnaire survey, the firms were assessed on fifteen supply-related challenges generally facing SMEs, some of which were confirmed in the qualitative analysis. In the coding, “strongly disagree” was coded “1”, “disagree” coded “2”, “neither agree nor disagree” coded “3”, “agree” coded “4” and “strongly agree” coded “5”. In this analysis, mean values less than “3” are deemed to show disagreement with a variable as a challenge in their firm. Mean values greater than “3”, on the other hand, are deemed to show agreement with a variable as a challenge facing the firm. It is interesting to note from Table 6.12 that respondents

only acknowledged high material cost and high fluctuations of material cost as the supply management challenges facing them.

Table 6.12: Supply management challenges facing SMEs

Supply management challenges	Mean	Std. Deviation
High cost of materials	3.70	.934
High fluctuation of material cost	3.18	1.133
Long supplier lead-times	2.98	1.000
Delays in delivery	2.85	1.001
High uncertainty in our supply markets	2.56	1.016
Supplier quality problems	2.50	.880
Shortages of key components and parts	2.41	.927
Stock rejection	2.35	.876
Supplier invoice discrepancies	2.33	.915
Professional supply management staff	2.21	1.067
Experienced and skilled staff	2.18	1.006
Weak buyer power	2.16	.975
Communication difficulties	2.06	.772
Redundant and obsolete stock	2.02	.804
Legal actions in supplier relationships	1.37	.586

N=131

Participants disagreed with the majority of the variables listed, as challenges confronting their operations. This finding is surprising as it creates the impression that SMEs generally do not have many supply management challenges. The supply management challenge that recorded the lowest mean value (1.37) was legal action in buyer-supplier relationships. By this, the respondents strongly disagree that it is a challenge. This is to be expected given that the qualitative analysis has shown that SMEs generally do build close and friendly working relationships with their suppliers. This may explain why legal actions are rare as problems will be solved amicably.

Even though the lack of resources to engage professional supply management staff emerged as a key challenge confronting SMEs in the qualitative analysis, it is contradicted here as respondents disagree to it as being a challenge. The reason may not be far-fetched; the majority (83.3%) of the firms in the questionnaire survey were medium-sized firms which are observed to have the capacity to create a dedicated supply function and therefore may have the resources to engage professional supply management staff. In the qualitative survey, there were seven

small-sized firms (46.7%) and eight medium-sized firms (53.3%) thus making the problem more conspicuous in the qualitative study.

6.5.12 SMEs’ supply management capability awareness

The extent to which respondents were aware of the six constructs measuring supply management capabilities is given in Table 6.13. The coding of the variables was the same as in Table 6.12 above. All the constructs constituting supply management capabilities recorded a mean value above “3”. This suggests that there is a strong recognition of the constructs among the respondents. By implication the respondents do agree with these constructs as being capabilities in supply management. Once again “long-term collaborative relationship with suppliers”, “close working relationship with limited number of suppliers”, and “open communication between exchange partners” emerged as the dominant capabilities as was found in the qualitative analysis.

Table 6.13: Supply management capability awareness

Supply management capabilities constructs	Mean	Std. Deviation
Long-term collaborative relationships with suppliers	4.22	.696
Close working relationships with limited number of suppliers	4.20	.698
Open communication between exchange partners (the firm and its suppliers)	3.98	.811
Integration between supply strategy and corporate strategic objectives	3.78	.915
Highly skilled and empowered purchasing staff	3.76	.888
Application of information technology in supply management	3.68	.900

N=130

6.5.13 SME supply management practices

The questionnaire contained fifteen supply management practices that respondents rated to determine their popularity among the SMEs. Table 6.14 shows that eight of the variables scored mean values above “3” indicating that the sampled SMEs were engaged in those practices. On the other hand, seven practices scored mean values below “3” which implied disagreement to engaging in those practices. The means scores show that the SMEs were engaged on balance, in the majority of the assessed practices within their supply management process as shown in Table 6.14. The evidence however suggests that SMEs seem to lag behind in the application of ICT in their supply management practices similar to the finding in the qualitative analysis.

Table 6.14: SME supply management practices

Supply management practices	Mean	Std. Deviation
We use negotiation to get better prices and other purchase terms from our suppliers	4.08	.788
We put our suppliers through a supplier approval system before accepting them onto our supply base	3.68	1.049
We have a call-off contract arrangement with some suppliers	3.68	.974
We undertake due diligence checks on all key component suppliers	3.65	.971
We have a supplier rating system in place to evaluate supplier performance	3.54	1.050
We employ a supplier certification system to assure supplier quality	3.51	1.143
We include purchased parts in our materials requirement planning system	3.49	1.108
We have just-in-time purchasing arrangement with some of our suppliers	3.20	1.144
We have vendor managed inventory arrangement with some suppliers	2.79	1.179
We use cross-functional teams in purchasing	2.69	1.167
We have electronic data interchange with our suppliers	2.64	1.155
We have an automatic stock replenishment system with our suppliers	2.59	1.083
Our supply management staff are trained in lean and six sigma philosophies	2.52	1.080
We use barcoding system to monitor and control stock movement (Raw materials/purchased components and parts)	2.25	1.109
We use a radio frequency identification (RFID) system to track and control stock movement	1.65	.567

N=130

6.5.14 Comparing small firms to medium firms

An independent-samples t-test was run to determine if there were differences between small firms and medium firms on the engagement of qualified supply management staff, presence of dedicated supply function, ownership involvement, and supply management capabilities. The t-test results summarised in Table 6.15 shows no statistically significant results for any of the mean scores on all the variables tested. The results suggest that there is no difference between small firms and medium firms in terms of their supply management capabilities. However, the dominance of medium-sized firms in the survey may have impacted this result.

Table 6.15: Independent-sample t-test of selected variables

	Categorisation of SMEs	Mean	Std. Deviation	t	df	Sig (2-tailed)	Mean Diff.
Does your firm have specialised staff with qualification and training in supply management?	Small firm	1.45	.510	.230	29.540	.820	.027
	Medium firm	1.43	.497				
Do you have a dedicated function responsible for supply management?	Small firm	1.50	.512	1.917	27.891	.066	.225
	Medium firm	1.28	.449				
To what extent is/are the owner/owners involved in the management of the firm?	Small firm	1.23	.429	-.181	30.160	.857	-.018
	Medium firm	1.25	.432				
Long term collaborative supplier orientation	Small firm	4.11	.435	-.033	39.381	.974	-.004
	Medium firm	4.12	.606				
Open communication between exchange partners	Small firm	3.76	.652	-1.796	28.446	.083	-.269
	Medium firm	4.03	.596				
Close working relationship with limited number of suppliers	Small firm	3.53	.584	-1.270	31.743	.213	-.176
	Medium firm	3.71	.634				
Integration between supply strategy and corporate strategic objectives	Small firm	3.17	.825	-.646	28.385	.523	-.123
	Medium firm	3.29	.751				
Application of information technology in supply management	Small firm	3.13	.575	.880	33.311	.385	-.122
	Medium firm	3.01	.666				
Highly skilled and empowered purchasing staff	Small firm	3.60	.882	-.328	27.358	.746	-.066
	Medium firm	3.67	.747				

6.6 Reliability analysis of measurement scales

Reliability of the measurement scale has to be ensured when scales are employed in a study (Pallant, 2005:90). Reliability simply means that the measurement scale should consistently reflect the construct it is measuring (Field, 2005:666). Thus a reliable scale should give the user consistent results over time and place. A good measurement scale requires an acceptable level of reliability. Data analysis

according to Bryman (2008:149) relies on a measurement scale being both reliable and valid.

Known methods for estimating the reliability of scales include, the test-retest method, alternative forms methods, and the internal consistency method which includes Cronbach's alpha (Cronbach, 1951). Cronbach's alpha is the most common measure of scale reliability (Field, 2005:667) and shows the extent to which a set of items constituting a scale are inter-related. In the operations management (OM) literature, Cronbach's alpha is the most commonly employed reliability indicator (Forza, 2002), and determines how much the items on a scale measure the same underlying dimension.

The values assumed by Cronbach's alpha range between zero and one (0-1). Higher values indicate a higher reliability of the scale and vice versa. As a general rule, for good reliability, Hair *et al.*, (2007:137) recommend that Cronbach's alpha values should be 0.70 or more. However, even though the value of 0.70 or higher is generally preferred, Nunnally (1978) recommends that a lower threshold of 0.60 be acceptable for work involving the use of newly-developed measures such as those in this study.

6.6.1 Results of the internal consistency analysis

In conformance to the general practice observed in the OM literature, Cronbach's alpha was used to analyse the internal consistency of the items measuring the research constructs. Coefficient alphas obtained for the variables measuring supply management capabilities and operations performance dimensions are reported in Tables 6.16 and 6.17. "Corrected Item-Total Correlation" represents the Pearson correlation between the specific item and the total of all the other items. A correlation coefficient lower than 0.3 is an indication that the item might not be measuring the same construct and therefore requires deletion (<https://statistics.laerd.com>). From both tables, none of these values is lower than 0.3. to require deletion.

Table 6.16: Cronbach's alpha values (supply management capabilities)

Constructs and measuring items	Cronbach's Alpha of scale	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
SMC1: Long-term collaborative supplier orientation	.886		
Long lasting key supplier relationships		.673	.872
Improve their quality in the long run		.638	.876
Relationship as a long-term alliance		.741	.860
Suppliers as an extension of our company		.704	.872
Joint problem solving		.762	.856
Relationship as mutually beneficial		.747	.860
SMC2: Open communication between exchange partners	.745		
Sharing of sensitive information		.328	.766**
Provision of helpful information to suppliers		.456	.719
Frequent exchange of information		.718	.658
Keeping each other informed about events or changes		.525	.701
Face-to-face planning/communication with suppliers		.599	.674
Supplier appraisal and feedback to suppliers		.422	.732
SMC3: Close working relationship with limited number of suppliers	.726		
Reliance on few high quality suppliers		.575	.644
Close relationships with a limited pool of suppliers		.633	.642
Valued relationships with suppliers		.450	.699
Consolidation of orders for key components		.600	.636
Adoption of single sourcing approach		.357	.784**
SMC4: Integration between supply strategy and corporate strategic objectives	.841		
Good knowledge of the firm's strategic goals		.607	.818
Purchasing performance measurement		.635	.813
Development of our purchasing professionals		.680	.803
Integral role of purchasing		.548	.830
Purchasing staff participation in strategic decisions		.579	.824
Strategy crafted from corporate strategy		.684	.802
SMC5: Application of information technology in supply management	.772		
Direct computer-to-computer		.544	.733
Inter-organisational coordination		.495	.744
Information technology enabled transactions		.589	.722
Electronic mailing capabilities		.344	.770
Electronic transfers		.380	.764
Advanced information systems		.605	.720
E-sourcing		.489	.745
SMC6: Highly skilled and empowered purchasing staff	.863		
Purchasing professionals		.514	.900**
Supply market skills		.845	.795
Technical capabilities of purchasing		.684	.834
Skills to improve total cost		.851	.798
Other purchasing skills		.644	.845

** Cronbach's alpha will improve if item is deleted

Table 6.17: Cronbach's alpha values (Operations performance dimensions)

Constructs and measuring items	Cronbach's Alpha of scale	Corrected Item-Total Correlation	Cronbach's Alpha if Item Deleted
OPD1: Quality	.899		
High performance products		.743	.880
Consistent quality products with low defects		.828	.861
Highly reliable products		.831	.865
High quality products		.803	.867
Minimal or no product returns		.623	.911**
OPD2: Cost	.779		
Low product cost		.641	.706
Low inventory costs		.557	.737
Low overhead costs		.659	.700
Price same as or lower than our competitors		.495	.761
Competitiveness		.436	.775
OPD3: Flexibility	.821		
Change in production volume		.546	.808
Customised product features		.499	.818
Broad product specifications		.636	.780
Rapid product mix changes		.750	.748
Change with minimal penalty		.659	.772
OPD4: Dependability	.884		
Correct quantity delivery		.662	.872
On-time delivery		.662	.878
Repeat orders		.698	.864
Reliable delivery		.832	.833
Trusted by customers		.791	.847
OPD5: Speed (time-based performance)	.776		
New products to market		.522	.745
Quick response to customer		.551	.736
Delivery lead-times		.687	.686
Manufacturing lead-times		.629	.708
Rapid order confirmation		.377	.785**

** Cronbach's alpha will improve if item is deleted

The internal consistency analysis shows that the alpha coefficients for the measurement scales as reported in Tables 6.16 and 6.17 all exceed the 0.70 threshold recommended by Hair *et al.*, (2007:137). The deletion of the items marked ** on the "Cronbach's Alpha if Item Deleted" column would have improved the resultant alpha coefficients. However, they were not deleted for two reasons. All the alpha coefficients obtained already exceed the acceptable threshold. In addition, these items were largely selected from the literature where they were

found to have met the reliability test. The researcher therefore made the decision to retain these items at this stage and delete them at the later stages of the analysis if that became necessary. In conclusion therefore, the analysis has established that the multi-item measurement scales used in this study had a high level of internal consistency as indicated by the resulting high Cronbach's alpha values.

6.7 Operationalising the supply management capabilities construct

To operationalise the supply management capabilities constructs, the underlying dimensions of the constructs were explored and analysed using SPSS. Field (2005:630) states that the two approaches to locating underlying dimensions of a data set are factor analysis and principal component analysis (PCA). Although there is a conceptual difference between the two approaches, they are often used interchangeably and a factor analysis procedure in SPSS includes PCA in practice. The key difference is in the communality estimates which are used (Field, 2005:630). Therefore to explore the underlying dimensions of supply management capabilities, the PCA approach was adopted. The choice was based on the reasoning that PCA is a psychometrically sound procedure and less complex as compared to factor analysis (Field, 2005:631). Moreover, PCA shares many similarities to exploratory factor analysis (<https://statistics.laerd.com>).

6.7.1 Principal component analysis (Exploratory factor analysis)

Similar to factor analysis, PCA is a variable reduction technique. The objective of PCA is to minimise a large set of variables into a smaller number called principal components which account for the majority of the variance in the original variables (<https://statistics.laerd.com>). PCA analyses the structure of the interrelationships among the variables and defines the sets of variables which are highly interrelated (Hair *et al.*, 2010:94). Generally, PCA addresses three major measurement scale issues. These are:

1. Remove superfluous/unrelated variables,
2. Reduce redundancy in a set of variables, and
3. Remove multicollinearity (<https://statistics.laerd.com>).

PCA was run with VARIMAX rotation on all 35 variables together comprising the six constructs. VARIMAX rotation is one of the orthogonal rotation methods. Tabachnick and Fidell, (2007:614) note that orthogonal methods, of which VARIMAX is the most common rotation option, are noted for their ease of

interpreting and reporting results. Kim and Mueller (1978:50) also advise the use of VARIMAX if orthogonal rotation is sought. A VARIMAX rotation attempts to reduce complexity by simplifying the columns of the factor matrix when only 1s or 0s are present. It minimises complexity of the components by making large loadings larger and small loadings smaller for each factor (Tabachnick and Fidell, 2007:595). The process produces factors which are independent of each other.

6.7.2 Checking the assumptions for PCA

In order for PCA to produce a reliable results, two assumptions must hold: 1. Linearity of relationship between variables and 2. There are no outliers. These assumptions were tested for in SPSS. Kaiser-Meyer-Olkin (KMO) measure of sampling adequacy was used to test for the linearity of relationship between variables. KMO measure represents an index of the linearity of variables and indicates the appropriateness of PCA to be run on the data set. KMO values can range from 0 to 1 with values above 0.6 considered as the minimum required for sampling adequacy. The overall KMO measure as recorded on the KMO and Bartlett's test (Table 6.18) is 0.808, which is deemed good, and indicative of the linearity of the variables and suggests the usefulness of running a PCA. An examination of the factor scores produced from PCA shows that all the scores were within the ± 3 range implying the absence of any significant outliers.

Table 6.18 also represents the test for sampling adequacy. The KMO measure of 0.808 is a good measure and indicates adequacy of sampling. The Bartlett's test of sphericity measured a p -value of $p < .0005$ which is statistically significant implying that the data was likely factorizable. Bartlett's test of sphericity seeks to test the null hypothesis that there are no correlations between any of the variables. With $p < .0005$, the null hypothesis is therefore rejected.

Table 6.18: KMO and Bartlett's Test

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.808
Bartlett's Test of Sphericity	Approx. Chi-Square
	2392.930
	df
	595
	Sig.
	.000

An examination of the KMO measures for the individual variables (see Appendix C1) shows that all the scale items were above the unacceptable level of 0.5 as recommended by Hair *et al.*, (2010:104). Hair *et al.*, (2010:104) interpreted KMO measures as follows: $KMO \geq 0.8$ = meritorious; $0.7 \leq KMO < 0.8$ = middling; $0.6 \leq$

KMO < 0.7 = mediocre; $0.5 \leq$ KMO < 0.6 = miserable; and KMO < 0.5 = unacceptable. Hence variables with measures of KMO < 0.5 must be deleted. It is evident from the table in Appendix C1 that all the variables in the scales satisfied this minimum requirement.

The correlation matrix produced by the analysis of the 35 variables was thoroughly scrutinised for any variables that were not strongly correlated with any other variable. The minimum level of correlation coefficient acceptable for a variable's inclusion in the interpretation of a factor is usually $r \geq 0.3$ (<https://statistics.laerd.com>). Thus every variable must have at least one correlation with another variable at the level of $r \geq 0.3$ to be included. An inspection of the correlation matrix found that all the scales items had at least one correlation coefficient greater than 0.3.

6.7.3 Component selection criteria

Four criteria may be used to determine the number of components (factors) to retain for rotation and interpretation (<https://statistics.laerd.com>). These include the eigenvalue criterion, proportion of total variance accounted for criterion, the scree plot test and the interpretability criterion. Using the eigenvalue criterion, where only items with eigenvalue > 1 are to be retained, nine components were revealed. On the proportion of total variance accounted for, the examination of the "cumulative %" column on the "Total Variance Explained" table suggested the retention of six components which explained 59.3% of the total variance. This is based on the recommendation to retain all components explaining at least 60% of the total variance (<https://statistics.laerd.com>).

A visual inspection of the scree plot suggested the retention of five components. A further inspection of the "Rotated Component Matrix" did not show a simple structure to meet the interpretability criterion. A rotated component pattern is described as a simple structure when most of the variables have high loadings on one component and near-zero loadings on other components. In addition, each component must load strongly on at least three variables (Hatcher, 1994:156).

To obtain a simple structure and facilitate interpretability, the analysis was re-run with SPSS specified to extract six components as per the original six-factor model. For a variable to be included in the interpretation of a component, Hair *et al.*, (2006:129) recommend factor loadings to be greater than $\pm .50$. Thus all factor loadings $\leq .50$ were suppressed. The six component solution obtained a simple

structure and met the interpretability criterion after all cross-loading variables (scale items) were deleted.

The six component solution explained 60.99% of the cumulative % of variance. The interpretation of the data matched the constructs they were designed to measure and therefore supported the six-factor model. The strong loadings of items on components 1 – 6 were consistent with the subscales: long-term collaborative supplier orientation (SMC1) ; Integration between supply strategy and corporate strategic objectives (SMC4); highly skilled and empowered purchasing staff (SMC6); open communication between exchange partners (SMC2); application of information technology in supply management (SMC5); and close working relationship with limited number of suppliers (SMC3) respectively. Table 6.20 is the rotated component matrix which shows the factor loadings and the respective communalities for each retained variable.

Even though the PCA maintained the six-factor model, the variables were reduced from 35 in the initial model to 27 in the new model. SMC1 had all the variables in the initial model retained in the new model. SMC2, SMC3, SMC4, SMC5, and SMC6 all saw reductions in the initial number of variables measuring them. In the resulting PCA model, SMC2 was reduced to three variables; SMC3 reduced to four variables; SMC4 reduced to four variables; SMC5 reduced to six variables and SMC6 reduced to four variables. Table 6.19 shows the number of variables in the initial model (model 1) and the PCA model (model 2).

Table 6.19: Number of variables (SMC)

Constructs	Construct Code	No. of Variables	
		Model 1	Model 2
Long-term collaborative supplier orientation	SMC1	6	6
Open communication between exchange partners	SMC2	6	3
Close working relationship with limited number of suppliers	SMC3	5	4
Integration between supply strategy and corporate strategic objectives	SMC4	6	4
Application of information technology in supply management	SMC5	7	6
Highly skilled and empowered purchasing staff	SMC6	5	4
Total		35	27

Table 6.20: Rotated component matrix^a and communalities (SCM)

Loading items (Variables)	Const ructs	Component						Commu nalities
		1	2	3	4	5	6	
Joint problem solving	SMC1	.785	.087	.050	.247	.029	.159	.713
Relationship as mutually beneficial		.774	.140	.119	.257	.069	.000	.703
Relationship as a long-term alliance		.769	.176	.097	.096	.128	.186	.692
Long lasting key supplier relationships		.742	.176	-.081	.112	.062	.140	.624
Suppliers as an extension of our company		.735	.041	.127	.099	.077	.143	.594
Improve their quality in the long run		.722	.064	.307	-.002	.148	.079	.648
Sharing of sensitive information		.451	.036	.259	.097	.011	.192	.318
Skills to improve the firm's total cost	SMC6	.121	.864	.194	.114	.079	.046	.819
Other purchasing skills		.131	.811	.134	.160	.052	-.031	.722
Supply market/product skills		.167	.800	.218	.115	.212	.117	.787
Technical capabilities of purchasing		.121	.768	.123	.088	.097	.227	.688
Purchasing professionals' development	SMC4	.189	.165	.765	.083	.158	-.020	.681
Purchasing performance measurement		.099	.190	.759	-.033	.164	-.079	.656
Supply strategy from corporate strategy		.230	.263	.691	-.055	.214	-.011	.648
Participation in strategic decisions		.039	.383	.584	.092	-.015	.148	.520
Supplier appraisal and feedback		.132	-.076	.474	.409	.097	.135	.443
Integral role of purchasing		.182	.396	.427	.310	-.059	.030	.473
Frequent exchange of information	SMC2	.294	.133	.129	.828	.039	.059	.811
Keeping each other informed on changes		.097	.173	.052	.794	.065	.035	.677
Provision of helpful information		.224	.293	-.085	.709	-.018	.050	.648
Face-to-face planning/communication		.283	-.066	.453	.485	.167	.197	.592
Electronic transfers	SMC5	.232	.094	-.132	.014	.719	.018	.598
Advanced information systems		.174	.123	.297	-.229	.648	.157	.631
E-sourcing		.015	.134	.267	.139	.625	-.001	.499
Electronic mailing capabilities		.175	.029	-.127	.110	.609	-.017	.431
ICT-enabled enabled transactions		-.129	.006	.383	.008	.603	.134	.544
Direct computer-to-computer links		-.033	.032	.314	.044	.541	.077	.401
Close relationships with a limited pool of suppliers	SMC3	.140	.210	.019	-.017	-.028	.810	.721
Reliance on few high quality suppliers		.148	.119	-.007	.070	.088	.784	.663
Order consolidation for key components		.245	.093	.035	.211	.161	.664	.581
Adoption of single sourcing approach		.111	-.060	.051	-.001	.024	.601	.381

Extraction Method: Principal Component Analysis. Loadings under .50 excluded

Rotation Method: Varimax with Kaiser Normalization.

a. Rotation converged in 7 iterations.

6.8 Principal component analysis on operations performance dimensions (OPD)

PCA was run on the 25-item scale measuring the construct OPD. PCA was checked for its suitability on this data before the analysis. Following examination of the correlation matrix, it was established that all variables had at least one correlation coefficient greater than 0.3. The KMO and Bartlett's test (Table 6.21) produced a KMO measure of .807 which is a 'meritorious' value according to Hair *et al.*, (2010:104) and an indication of the linearity of the variables. This value also represents a good measure of sampling adequacy. All the individual KMO measures (Appendix C2) were above 0.7 except one (0.699) which is equally above the unacceptable level of 0.5 (Hair *et al.*, 2010:104). Bartlett's test of sphericity was statistically significant at $p < .0005$ (Table 6.21). The factor scores were all within ± 3 suggesting outliers may not be present. These various tests confirm the suitability of PCA to be run on the data.

PCA revealed six components with eigenvalues > 1 . Six components explained 70.9% of the cumulative percentage of variance. The scree plot revealed a five-component solution. A five-component solution based on varimax orthogonal rotation however met the interpretability criteria, hence the retention of five components. The five component solution explained 68.9% of the cumulative percentage of variance. The rotated solution yielded a simple structure.

The factor loadings were all well-above the recommended level of $\pm .50$ (Hair *et al.*, 2006:129). The factor loadings matched the constructs the survey was designed to measure. There were strong loadings of OPD1 (quality), OPD4 (dependability), OPD3 (flexibility), OPD2 (cost) and OPD5 (speed) items on components 1 to 5 respectively as shown on Table 6.22.

Table 6.21: KMO and Bartlett's test (OPD)

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.807
Bartlett's Test of Sphericity	Approx. Chi-Square
	1966.599
	df
	300
	Sig.
	.000

Table 6.22: Rotated component matrix^a and communalities (OPD)

Loading items (variables)	Const ructs	Component					Commu nalities
		1	2	3	4	5	
Highly reliable products	OPD1	.858	.219	.106	.106	.106	.800
High quality products		.858	.189	.088	-.119	-.012	.794
Consistent quality products with low defects		.843	.238	.110	.110	.019	.791
High performance products		.831	.147	.116	-.117	.048	.741
Minimal or no product returns		.700	.108	.101	.076	.208	.561
Reliable delivery	OPD4	.180	.855	.120	.072	.233	.838
Trusted by customers		.293	.805	.049	-.111	.210	.793
Repeat orders		.291	.788	.083	-.090	.109	.732
On-time delivery		.178	.716	.126	.190	.247	.658
Correct quantity delivery		.363	.536	.222	-.026	.345	.588
Broad product specifications	OPD3	.251	-.063	.820	-.046	.108	.754
Customised product features		.172	-.073	.778	-.116	.036	.655
Rapid product mix changes		.001	.349	.759	.135	.206	.759
Change with minimal penalty		.012	.399	.618	.212	.362	.717
Change in production volume		.090	.367	.606	.181	.053	.546
Low overhead costs	OPD2	.000	.037	.117	.859	.053	.761
Low inventory costs		.055	-.113	-.033	.847	.088	.736
Low product costs		-.152	.064	-.009	.784	.040	.688
Quick response to customer	OPD5	.143	.081	.067	.037	.834	.729
New products to market		.054	.170	.102	.236	.660	.534
Delivery lead-times		-.081	.295	.191	.394	.603	.648
Manufacturing lead-time		-.051	.336	.140	.395	.547	.591
Rapid order confirmation		.140	.308	.133	-.113	.538	.434

Extraction Method: Principal Component Analysis. Loadings under .50 excluded

Rotation Method: Varimax with Kaiser Normalization.^a

a. Rotation converged in 6 iterations.

It can be observed from Table 6.23 that all the variables in the initial model were retained on the five components except on component 4 (Cost) where two variables were dropped. Thus the initial 25-item model (model 1) was reduced to a 23-item model (model 2) after the PCA.

Table 6.23: No. of variables (OPD)

Constructs	Construct Code	No. of Variables	
		Model 1	Model 2
Quality	OPD1	5	5
Cost	OPD2	5	3
Flexibility	OPD3	5	5
Dependability	OPD4	5	5
Speed	OPD5	5	5
Total variables		25	23

6.9 Validity tests for SMC and OPD scales

Whereas reliability of the measurement scale is necessary, it is not sufficient; it also needs to be valid. Thus a measurement scale has to be both reliable and valid. Validity describes the extent to which a research scale measures the intended purpose. It is important to ensure that the scale is valid for the findings to be accurately applied and interpreted. Ensuring validity of a test instrument means that findings truly represent the phenomenon one intended to measure. Among the different types of validity, the three most widely used types of validity for ensuring good measurement scale are, content validity, convergent validity, and discriminant validity.

6.9.1 Content validity

A measurement scale is required to have content validity. Content validity, is also referred to in some quarters as face validity (Hair *et al.*, 2006:137). This type of validity assesses the correspondence existing between each scale item and the construct it is measuring. Content validity is not measured statistically and therefore involves theoretical and practical considerations in composing the scale to ensure it is achieved. To establish content validity for the measurement scales in this study the following procedures were followed.

1. Review of the literature. The concepts were identified through a thorough review of the relevant literature (see chapter 2). The variables measuring the constructs or the concepts were selected from related study.
2. Review by experts. The measurement scales were subjected to rounds of review by the researcher's two academic supervisors as well as three other academics with specialisations in operations and supply management. Two industrial experts also contributed to this review.
3. Pilot test. The scales were pilot tested on ten participants comprising academics, practitioners and colleague researchers. Feedback from the pilot test was used to refine the scales to ensure that they measured the constructs as proposed.
4. The PCA results also confirmed the content validity of the scales as all retained variables for both SMC and OPD loaded strongly onto the factors as envisaged.

6.9.2 Convergent validity

The PCA was used to assess the convergent validity for the scales in this study. Convergent validity establishes that there is a high correlation among the variables loading on to a single factor. It ensures that a set of variables are measuring the same concept (Hair *et al.*, 2007:137). Convergent validity can be determined by the sufficient/significant factor loadings. Field (2005:637) states that the significance of factor loadings depends on the sample size. The lower the sample size, the higher the factor loadings required to be considered significant. Hair *et al.*, (2006:128) provides a guide for identifying significant factor loadings based on the sample size: sample sizes of 70, 85, 100, 120, 150 and 200 requires factor loadings greater or equal to .65, .60, .55, .50, .45 and .40 respectively to be significant. This guide was used to ascertain the convergent validity in this study as SPSS does not provide significance test for factor loadings. Per this guide, a factor loading will be considered significant if it is $\geq .50$ since the sample size is 132. As shown in Tables 6.20 and 6.22, all the factor loadings for both SMC and OPD subscales respectively were greater than .50. Significant factor loadings were obtained for all six and five factors on SMC and OPD respectively, hence suggesting a high convergent validity.

6.9.3 Discriminant validity

Discriminant validity assesses the extent to which two similar concepts are distinct (Hair *et al.*, 2007:137). It indicates the degree to which factors/components are unique and uncorrelated. To determine discriminant validity, the correlation between two scales measuring two similar concepts should be small (Hair *et al.*, 2007:779). The rule is that variables should relate more strongly to their own factor than to another factor. One way to determine discriminant validity is to examine the pattern matrix where variables are required to load significantly only on one factor to provide evidence for factor distinctiveness. An examination of the rotated component matrix for the six-factor model (SMC dimensions) and the five-factor model (OPD dimensions) showed a clean factor structure with discriminant validity being evident by the high loadings within factors, after some cross-loadings factors were deleted (see Tables 6.20 and 6.22). The correlations suggest that the variables on each factor for both the SMC and OPD dimensions discriminate hence this shows a good discriminant validity for the constructs.

6.10 Composite scores

To provide a more stable measures of the underlying dimensions of both the SMC (Predictor variables) and OPD (Criterion variables) constructs, composites scores were calculated by taking the arithmetic mean of variables that loaded strongly onto a factor (Ackerman and Cianciolo, 2000:264). It is the composite scores that are used in the regression analysis that follows shortly. Table 6.24 reports the means and standard deviation of the composite scores for the subscales (dimensional constructs).

Table 6.24: Descriptive statistics of composite scores (SMC)

Composite variables	Code	N	Mean	Std. Deviation
Long term collaborative supplier orientation	SMC1	132	4.12	.580
Open communication between exchange partners	SMC2	132	3.98	.611
Close working relationship with limited number of suppliers	SMC3	132	3.68	.628
Highly skilled and empowered purchasing staff	SMC6	132	3.66	.768
Integration between supply strategy and corporate strategic objectives	SMC4	132	3.27	.762
Application of information technology in supply management	SMC5	132	3.03	.651

Table 6.25: Descriptive statistics of composite scores (OPD)

Composite variables	Code	N	Mean	Std. Deviation
Dependability	OPD4	132	4.48	.499
Quality	OPD1	131	4.43	.538
Flexibility	OPD3	132	4.09	.656
Speed	OPD5	132	3.77	.663
Cost	OPD2	132	2.87	.934

6.11 Correlation analysis

Correlation analysis forms the basis for estimating all regression relationships (Hair *et al.*, 2006:231). The analysis is important for estimating associations between two variables. The correlation coefficient (r) enables the strength of the linear relationship between the dependent and independent variables to be quantified. Coefficients assume values between -1 and +1 which represents negative and positive correlations respectively. A value of zero means that there is no

relationship between the variables (Saunders *et al.*, 2007:451). In the present study, a correlation analysis was run to examine the associations between the six SMCs (IV) and the five OPDs (DV). Again, correlation analysis was used to check the relationships between the four firm attributes (IV) and the six SMCs (DV). These analyses were also used to check for some of the violations of the assumption in multiple regression.

Table 6.26 summarizes the correlations among the IVs and the DVs. As reported in the table, significant small (.10-.29) to medium (.30-.49) positive correlations were found between some SMCs and OPDs. Quality (OPD1) correlated strongly with all the six SMCs at $p < 0.01$. Dependability (OPD4) also correlated ($p < 0.01$ and $p < 0.05$) with all the SMCs, except “close working relationship with limited number of suppliers” (SMC3). Flexibility (OPD3) correlated with three SMCs namely, “integration between supply strategy and corporate strategic objectives” (SMC4) at $r = 0.273$, $p < 0.01$, “application of information technology in supply management” (SMC5) at $r = 0.196$, $p < 0.05$, and “highly skilled and empowered purchasing staff” (SMC6) at $r = 0.231$, $P < 0.01$. Speed (OPD5) correlated with “long-term collaborative supplier orientation” (SMC1), “integration between supply strategy and corporate strategic objectives” (SMC4), “application of information technology in supply management” (SMC5) at $r = 0.185$, $p < 0.05$; $r = 0.201$, $p < 0.05$; $r = 0.207$, $p < 0.05$ respectively. Speed however correlated with “open communication between exchange partners” (SMC2) at $r = 0.248$, $p < 0.01$. A notable observation was that no correlation was found between cost (OPD2) and the SMCs.

Among the four firm attributes, “firm size” (SizeS) measured by sales turnover correlated only with “integration between supply strategy and corporate strategic objectives” (SMC4) at $r = 0.209$, $p < 0.05$. Similarly, “ownership involvement” only correlated with “open communication between exchange partners” (SMC2) at $r = -0.171$, $p < 0.05$. Firm age, measured by how long the firm has been in existence showed a non-significant negative correlations with all the SMCs and OPDs. “Dedicated supply function” (DSF) correlated with “long-term collaborative supplier orientation” (SMC1) at $r = 0.188$, $p < 0.05$, “open communication between exchange partners” (SMC2) at $r = 0.258$, $p < 0.01$, “integration between supply strategy and corporate strategic objectives” (SMC4) at $r = 0.333$, $p < 0.01$, and “highly skilled and empowered purchasing staff” (SMC6) at $r = 0.266$, $P < 0.01$. These results show that although firm age, size and ownership involvement statistically do not associate with the presence of supply management capabilities. On the contrary, “dedicated supply function” seems to have a strong influence on the SMCs.

Table 6.26: Correlation matrix

Code	Variables	SMC1	SMC2	SMC3	SMC4	SMC5	SMC6	OPD1	OPD2	OPD3	OPD4	OPD5	SizeS	Age	OI	DFS
SMC1	Long term collaborative supplier orientation	1														
SMC2	Open communication between exchange partners	.451**	1													
SMC3	Close working relationship with limited number of suppliers	.398**	.243**	1												
SMC4	Integration between supply strategy and corporate strategic objectives	.346**	.211*	.146	1											
SMC5	Application of information technology in supply management	.275**	.133	.222*	.450**	1										
SMC6	Highly skilled and empowered purchasing staff	.366**	.378**	.270**	.454**	.299**	1									
OPD1	Quality	.351**	.325**	.252**	.292**	.326**	.388**	1								
OPD2	Cost	-.054	-.013	-.007	.073	-.035	.145	-.054	1							
OPD3	Flexibility	.119	.064	.031	.273**	.196*	.231**	.336**	.131	1						
OPD4	Dependability	.285**	.293**	.151	.231**	.181*	.337**	.513**	.085	.450**	1					
OPD5	Speed	.185*	.248**	.072	.201*	.207*	.144	.232**	.334**	.466**	.552**	1				
SizeS	Sales turnover	.019	.002	-.130	.209*	.165	.103	.087	-.037	.111	.023	.127	1			
Age	Age of the firm	-.035	-.006	-.045	-.020	-.087	-.081	-.099	-.126	-.129	-.148	-.109	-.073	1		
OI	Ownership involvement	.097	-.171*	.079	.005	.047	-.115	.007	.066	.041	.010	.020	-.051	-.054	1	
DFS	Dedicated supply function	.188*	.258**	.155	.333**	.041	.266**	.159	-.030	-.028	.203*	.036	.169	.015	-.150	1

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

* . Correlation is significant at the 0.05 level (2-tailed).

6.12 Testing the assumptions in multiple regression analysis

Multiple regression analysis is required to meet some important underlying assumptions. These assumptions relate to the relationships between the dependent and independent variables with regards to the statistical procedures that are employed in the analysis process. It is essential for these assumptions to be met in order for results obtained to be truly representative of the sample as well as establish that the best possible results are obtained (Hair *et al.*, 2010:208). The four key assumptions; linearity, homoscedasticity, independence of the residuals and normality (Hair *et al.*, 2010:220) are tested for and reported on in the current study.

The assumptions of homoscedasticity and linearity were tested for in SPSS by the visual examination of the scatterplots while the assumption of normality was tested for by the visual inspection of the P-P plots produced from the analysis. These inspections showed that these assumptions were satisfied.

The assumptions of independence of the residuals was tested for using the Durbin-Watson test. The Durbin-Watson test should be above the cut-off point of one (1). Any values below one are usually a cause for concern. As can be found on Appendix C3, all the results for the Durbin-Watson test were above the cut-off point to suggest the independence of the residuals, hence the assumption is met. Cook's distance was used to check for the presence of outliers. Cook's distance tells how much the regression coefficient will change if a particular case is removed. Cook's distances greater than one ought to be analyzed as such cases may be too influential. Appendix C3 shows that none of the Cook's distances was greater than one and therefore the presence of outliers may not be an issue in this study. These results confirm that the key assumptions underlying multiple regression analysis were met in this study.

6.13 Analysis of proposed relationships (multiple regression)

A key research task in this study is the examination of the influences of supply management capabilities on the operations performance dimensions of the manufacturing SMEs. Multiple regression analysis in SPSS is used to examine the relationships proposed in chapter 3. Multiple regression analysis is a general statistical technique employed to evaluate relationships between a single dependent variable and at least two independent variables (Hair *et al.*, 2006). Regression analysis is used to assess the strength of a relationship between the

independent variables and a dependable variable. To assess the relationship between firm attributes and supply management capabilities, the standard multiple regression method was used. Between supply management capabilities and the operations performance dimensions however, the hierarchical multiple regression method was used as there was the need to control for the effect of potential confounding variables (age, size, ownership involvement and dedicated supply function). In the hierarchical method, the criterion variable was regressed on all predictors and control variables at the same time. The predictors and the control variables were however put in different blocks within the SPSS analysis. The purpose of this analysis was model-testing and therefore the choice of multiple regression analysis was appropriate (Tabachnick and Fidell, 2007:143). The sections which follow reports on the analysis of the proposed relationships. Tables 6.28 and 6.29 summarize the results for the eleven regression models comprising six models on firms attributes and SMCs, and five models on SMCs and OPDs.

6.13.1 Effect of firm attributes on SMCs

The hypotheses H_{1a} - H_{1d} as summarized in chapter 3 (pages 116-117) were tested using multiple regression analysis. Table 6.28 and Figure 6.3 summarize the results of the six regressions run on firm attributes and supply management capabilities. Firm attributes as a whole were found to have a positive and statistically significant associations with “open communication between exchange partners” (SMC2) at adjusted $R^2=0.057$, $p=0.026$; “integration between supply strategy and corporate strategic objectives” (SMC4) at adjusted $R^2=0.110$, $p=0.001$; and “highly skilled and empowered purchasing staff” (SMC6) at adjusted $R^2=0.057$, $p=0.026$. Although the adjusted R^2 values indicate weak prediction power of firm attributes, the results establish that these firm attributes as a whole, do influence the development of supply management capabilities to some extent. “Integration between supply strategy and corporate strategic objectives” was the most influenced capability by the firm attributes. The results show that firm attributes predicted this capability by 10.7% while “open communication between exchange partners” and “highly skilled and empowered purchasing staff” were predicted by 5.7% and 5.6% respectively.

In all three instances of statistically significant relationships between firm attributes and supply management capabilities, only one predictor (dedicated supply function) made a statistically significant unique contribution. Its relationship with “long-term collaborative supplier orientation” was $\beta=0.209$ and significant at $p<0.05$ ($p=0.024$). Its relationship with “open communication between exchange partners” was

significant at $p < 0.01$ ($p = 0.007$) and $\beta = 0.246$. On “close working relationship with limited number of suppliers”, the relationship was significant at $p < 0.05$ ($p = 0.031$) and $\beta = 0.198$. The influence of “dedicated supply function” was highest on “integration between supply strategy and corporate strategic objectives”, with $p < 0.01$ ($p = 0.000$) and $\beta = 0.315$. The association between “dedicated supply function” and “highly skilled and empowered purchasing staff” was also significant at $p < 0.01$ ($p = 0.007$) and $\beta = 0.247$.

The study has thus established that the existence of a “dedicated supply function” has a significant influence on all the supply management capabilities, except “application of information technology in supply management”. Age, size (turnover) and ownership involvement on the other hand did not have any individual statistically significant association with any of the supply management capabilities. On the basis of these outcomes, Table 6.27 summarizes the results for the test of hypotheses H1_a – H1_d.

6.13.2 Effects of SMCs on OPDs

The hypotheses H2_a – H2_f were tested for by assessing the effects of the SMCs on the OPDs. Here, hierarchical multiple regression was used as there was the need to control for the effect of “age”, “size”, “ownership involvement”, and “dedicated supply function” (firm attributes). Table 6.29 and Figure 6.4 summarize the five sets of multiple regression analysis results. Quality (OPD1) was regressed on all six SMCs simultaneously while at the same time controlling for the effects of all four firm attributes. The resultant R^2 Change = 0.221 was statistically significant at $p < 0.01$ ($p = 0.0005$). This means that 22.1% of the variance in OPD1 was explained by the SMCs making SMCs a good predictor of a firm’s quality. However, among the SMCs, only SMC6 was found to make a unique statistically significant contribution with $\beta = 0.194$ at $p = 0.054$, implying that “highly skilled and empowered purchasing staff” enhances the “quality” dimension of operations performance.

A statistically significant relationship was also established when flexibility (OPD3) was regressed on the SMCs. The results, R^2 Change = 0.098; $p < 0.05$ ($p = 0.053$), means that, the independent variables explained 10% of the variance in the dependent variable. An examination of the individual unique contributions of the predictors found that only SMC4 made a statistically significant contribution of $\beta = 0.221$ at $p = 0.053$, to the model. The result suggests that the “flexibility” dimension of operations performance is enhanced by the “integration between supply strategy and corporate strategic objectives”.

When dependability (OPD4) was regressed on the SMCs, a statistically significant relationship of R^2 Change = 0.124; $p < 0.01$ ($p = 0.011$) was established. This result implies that 12% of the variance in the criterion variable (dependability) is explained by the SMCs. Among the SMCs however, SMC6 made the only unique statistically significant contribution ($\beta = 0.194$, $p = 0.054$) to the model, implying that “dependability” is enhanced by “highly skilled and empowered purchasing staff”.

When cost (OPD2) was regressed on the SMCs, this model resulted in R^2 Change of 0.052, $p > 0.05$ ($p = 0.391$), indicating that SMCs do not have any statistically meaningful effect on cost. Similarly, the regression of speed (OPD5) on the SMCs produced R^2 Change = 0.096, and $p > 0.05$ ($p = 0.061$), implying there is no statistically significant relationship between the SMCs and OPD5. However, an examination of the individual unique contributions of the SMC variables reveal a statistical significant relationship ($\beta = 0.233$, $p = 0.029$) between SMC2 and OPD5. Thus, “open communication between exchange partners” contributes to the “speed” of operations performance. By these outcomes, the results for the test of hypothesis $H_{2a} - H_{2f}$ are summarized in Table 6.27.

Table 6.27: Summary of test of hypotheses

Hypothesis	Ref.	Regression	Test Regressions	Results
The age of a SME influences the extent to which they are able to develop supply management capabilities.	H _{1a}	SMCs regressed on attributes	Regression models 1, 2, 3, 4, 5 and 6	Not supported
The size of a SME (turnover) has a positive effect in fostering the development of supply management capabilities.	H _{1b}	SMCs regressed on attributes	Regression models 1, 2, 3, 4, 5 and 6	Not supported
Ownership involvement (Founder-led/controlled) in SMEs’ operations fosters the development of supply management capabilities.	H _{1c}	SMCs regressed on attributes	Regression models 1, 2, 3, 4, 5 and 6	Not supported
Dedicated supply functions in SMEs increases the development of supply management capabilities.	H _{1d}	SMCs regressed on attributes	Regression models 1, 2, 3, 4 and 6	Supported
A long-term collaborative relationship with suppliers has a positive influence on the operations performance of a manufacturing SME.	H _{2a}	OPDs regressed on SMCs	Regression models 7, 8, 9, 10 and 11	Not supported
Open communication with suppliers has a positive effect in enhancing the operations performance of a manufacturing SME.	H _{2b}	OPDs regressed on SMCs	Regression model 11	Partially supported
Close working relationship with a limited number of suppliers has a positive influence on the operations performance of a manufacturing SME.	H _{2c}	OPDs regressed on SMCs	Regression models 7, 8, 9, 10 and 11	Not supported
Integration between supply strategy and corporate strategic objectives has a positive influence on the operations performance of a manufacturing SME.	H _{2d}	OPDs regressed on SMCs	Regression model 9	Partially supported
The application of ICT in supply management has a positive influence on the operations performance of a manufacturing SME.	H _{2e}	OPDs regressed on SMCs	Regression model 7, 8, 9, 10 and 11	Not supported
Highly skilled and empowered purchasing staff have a positive impact on the operations performance of a manufacturing SME.	H _{2f}	OPDs regressed on SMCs	Regression models 6 and 11	Partially supported

Table 6.28: Summary of results for SMCs regressed on firm attributes

Predictors (Independent variables)	Criterion (Dependent variables)											
	SMC1		SMC2		SMC3		SMC4		SMC5		SMC6	
	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig
Age	-.032	.722	-.020	.816	-.054	.543	-.010	.910	-.073	.418	-.085	.333
Size (Turnover)	-.012	.892	-.048	.589	-.163	.073	.158	.070	.158	.085	.051	.564
Ownership involvement	.126	.164	-.138	.122	.097	.281	.060	.484	.054	.551	-.080	.370
Dedicated supply function	.209	.024*	.246	.007**	.198	.031*	.315	.000**	.024	.798	.247	.007**
Adjusted R²	.021		.057		.030		.110		.004		.057	
Sig.	.165		.026*		.103		.001**		.350		.026*	
Models	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	

* = Significant at $p < 0.05$; ** = Significant at $p < 0.01$. Standardized Beta used.

Table 6.29: Summary of results for OPDs regressed (Hierarchical) on SMCs

Predictors (Independent variables)	Criterion (Dependent variables)									
	OPD1		OPD2		OPD3		OPD4		OPD5	
	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig	Beta	Sig
Age	-.095	.293	-.125	.170	-.118	.193	-.156	.091	-.099	.274
Size (Turnover)	.055	.546	-.041	.658	.111	.226	-.022	.805	.118	.202
Ownership involvement	.028	.761	.055	.549	.034	.709	.033	.715	.023	.798
Dedicated supply function	.155	.096	-.013	.880	-.040	.662	.214	.020*	.021	.824
Sig.	.312		.627		.448		.084		.508	
Age	-.055	.501	-.120	.192	-.102	.253	-.125	.144	-.088	.325
Size (Turnover)	.033	.698	-.054	.570	.057	.542	-.041	.646	.094	.313
Ownership involvement	.032	.711	-.087	.363	.033	.723	.053	.554	.038	.681
Dedicated supply function	.018	.844	-.064	.530	-.144	.146	.104	.274	-.071	.475
SMC1	.116	.258	-.128	.262	.007	.949	.106	.319	.034	.762
SMC2	.153	.117	-.007	.946	.000	.998	.147	.149	.233	.029*
SMC3	.069	.454	-.010	.924	-.032	.748	-.027	.781	-.015	.885
SMC4	.029	.783	.106	.365	.221	.053*	.024	.823	.108	.342
SMC5	.174	.069	-.108	.310	.043	.667	.059	.555	.108	.297
SMC6	.194	.054*	.205	.067	.152	.159	.194	.054*	-.028	.797
R² Change	.221		.052		.098		.124		.096	
Sig. F Change	.000**		.391		.053*		.011*		.061	
Models	Model 7		Model 8		Model 9		Model 10		Model 11	

* = Significant at $p < 0.05$; ** = Significant at $p < 0.01$. Standardized Beta used.

6.13.3 Summary of the relationships established

The observed relationships among the research constructs are presented in the Figures 6.3 and 6.4. Firm attributes as a whole predicted three of the supply management capabilities (SMC2, SMC4 and SMC6) even though their predictive power is found to be weak. On the basis of individual unique contribution to the dependent variable (SMCs) however, only “dedicated supply function” was found to be statistically influential. Age, size and ownership involvement were found not to have any statistically relevant association with the supply management capabilities.

The test of the relationships between the supply management capabilities and the operations performance dimensions revealed that the SMCs collectively had a positive relationship with the “quality” (OPD1), “flexibility” (OPD3) and “dependability” (OPD4) dimensions of operations performance. “Open communication between exchange partners” (SMC2) and “integration between supply strategy and corporate strategic objectives” (SMC4) were found to make unique positive contributions to “speed” (OPD5) and “flexibility” (OPD3) dimensions respectively. “Highly skilled and empowered purchasing staff” (SMC6) on the other hand made a unique statistically significant contributions to “quality” (OPD1) and “dependability” (OPD4). The relationship between the SMCs and the OPDs was measured excluding the confounding effect of “age”, “size”, “dedicated supply function” and “ownership involvement”.

Figure 6.3: Effects of firm attributes on SMCs

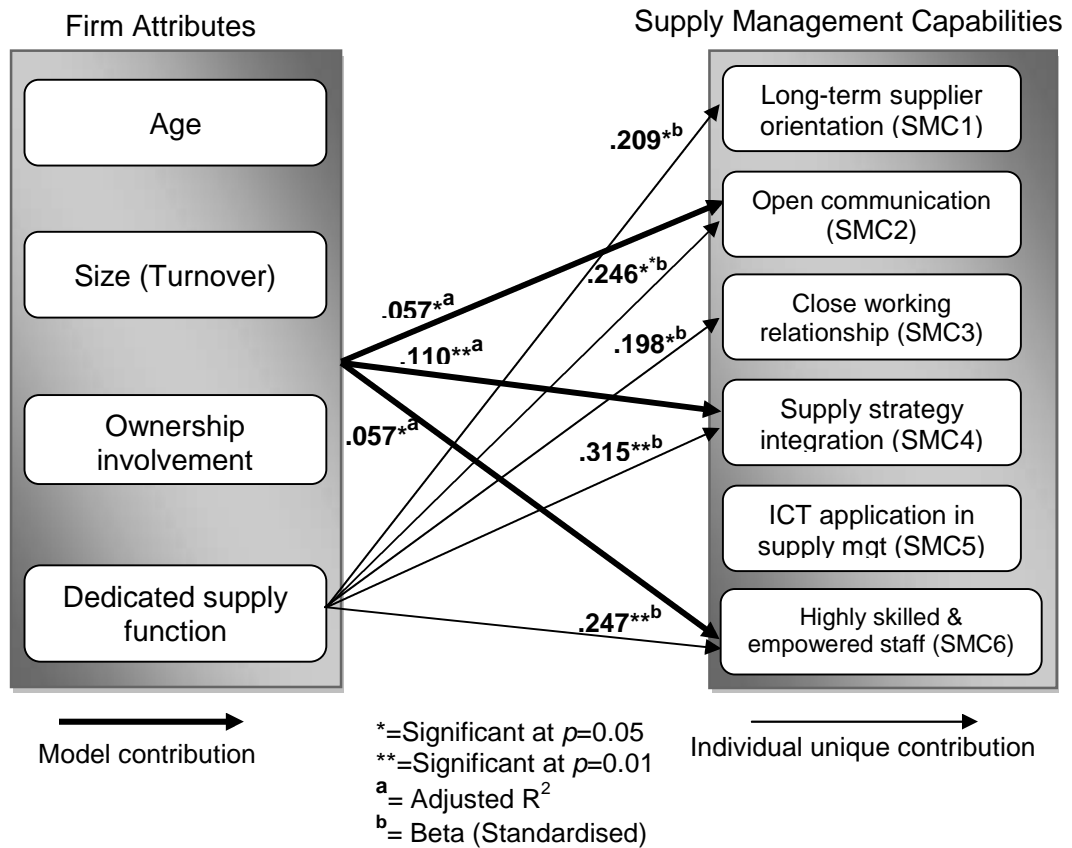
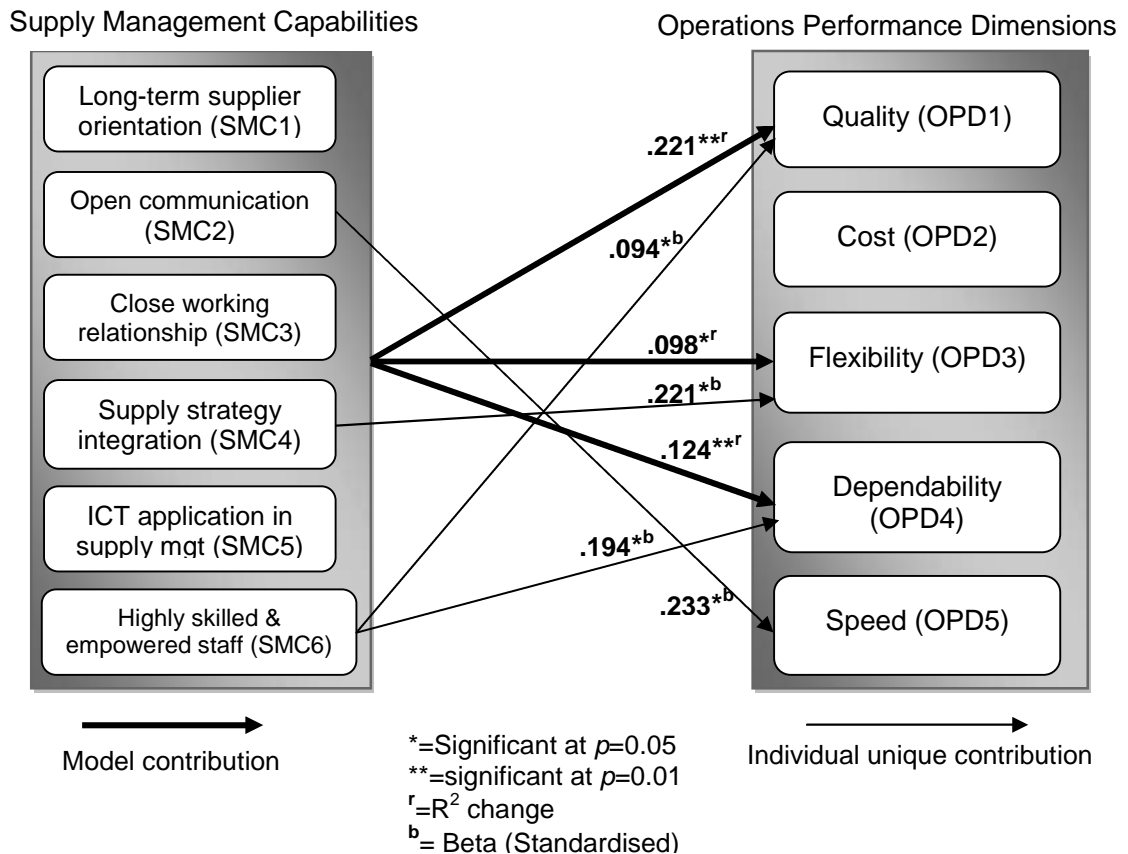


Figure 6.4: Effects of SMCs on OPDs



6.14 Conclusion

The questionnaire survey data has been analysed in this chapter using IBM SPSS statistics 21. The data was thoroughly checked to ensure that it was appropriate for the intended statistical test. Following reliability tests of the measurement scales, the scales were further explored in principal component analysis to generate six-dimensional components for the supply management capabilities and five-dimensional components for the operations performance dimensions. A standard multiple regression procedure was used to examine the proposed relationships between firm attributes and the supply management capabilities. However, between supply management capabilities and the operations performance dimensions, the hierarchical multiple regression was used because of the need to control for the effect of firm attributes.

The results show that firm age, size (turnover) and ownership involvement do not individually make any unique statistically significant contribution to supply management capabilities. Dedicated supply function was found to be an influential variable as it made statistically significant contributions to five supply management capabilities (SMC1, SMC2, SMC3, SMC4 and SMC6). The firm attributes collectively predicted “open communication between exchange partners” (SMC2), “integration between supply strategy and corporate strategic objectives” (SMC4) and “highly skilled and empowered purchasing skills” (SMC6).

The relationship between supply management capabilities and the operations performance dimensions were also tested. The six-dimensional supply management capability construct collectively predicted the “quality” (OPD1), “flexibility” (OPD3) and “dependability” (OPD4) dimensions of operations performance. “Open communication between exchange partners” (SMC2) and “integration between supply strategy and corporate strategic objectives” (SMC4) were found to make unique contributions to “speed” (OPD5) and “flexibility” (OPD4) respectively. “Highly skilled and empowered purchasing staff” (SMC6) contributed to “quality” (OPD1) and “dependability” (OPD4). Discussions of these results is presented in the next chapter.

Chapter 7

Discussion of Qualitative and Quantitative Results

7.1 Chapter overview

This chapter discusses the findings from the two empirical chapters. First, the results of SMC and OPD operationalization are discussed. This is followed by the discussion of the findings on supply management capabilities in SMEs. The findings on the relationships between supply management capabilities and operations performance dimensions are discussed next. A discussion of the exploratory findings on supply management is then presented. The final section draws the practical and managerial implications of the study after which a chapter conclusion is made. It must be emphasized that the discussions focus on the quantitative results while the qualitative results is used in a supportive role.

7.2 Discussion of results of SMC construct analysis

Analysis of the literature shows evidence that supply management contributes significantly to firm performance although available evidence relates predominantly to large firms. The evidence that supply management is a significant firm performance enhancer implies that there are some latent capabilities embedded within the supply management role. Unfortunately, not much exists in the literature regarding these capabilities. This observation represents one of the focal points of this study; to identify what capabilities are required in supply management and subsequently develop a scale for measuring them.

The creation of a measurement scale for the SMC construct started from the analysis of the literature. A thorough review of the literature led to the conceptualisation of six sub-constructs or variables as constituting the underlying dimensions of supply management capabilities. Following on, a comprehensive 35-item scale was constructed to measure the six sub-constructs. The scale items were derived from the literature as well as consultations with academics and practitioners. The six dimensions of the SMC construct were thoroughly evaluated in the qualitative study. The dimensions were positively acclaimed by interviewees as constituting the competences fundamental to an efficient supply management

function. There was consensus among interviewees that the dimensions were broad enough to represent the SMC construct.

At the quantitative data analysis stage, reliability tests and principal component analysis (PCA) were used to evaluate the acceptability of the scale and also ascertain the extent to which the scale measured what it was intended for. The reliability tests showed that the scale sufficiently met all required statistical conditions. It also satisfied all necessary validity tests. The scale was further explored using PCA to evaluate the underlying dimensions of supply management capabilities. This analysis assessed the structure of the interrelationships among the variables and defined the sets of variables which were highly interrelated. The PCA resulted in a six component solution with an interpretation that matched the constructs they were designed to measure. This outcome therefore supported the six-dimensional model as conceptualised from the literature. The exploration of the original 35-item model led to a refined 27-item model following the PCA. This was because cross-loading items were deleted whilst some items did not show strong loadings on any of the six components. The positive outcome from the PCA implies that confidence can be placed in the scale to be used in any future research. The model has high internal consistency measures, comprises interrelated but distinct concepts, and measures accurately what it is intended to measure.

In conclusion, the scale measuring supply management capabilities has gone through successive stages of analysis and refinement resulting in a 27-item scale for the six-dimensional construct, SMC. The outcome of the PCA is a set of reliable, valid, and multidimensional measurement scale that future researchers may find useful. The outcome supports the conceptualisation that all six dimensions constitute dynamic capabilities required at the buyer-supplier interface.

7.3 Discussion of results of OPD construct analysis

Operations performance dimensions (OPD) in this study were conceived as constituting a multidimensional construct. This conception was in agreement with the view of Peng *et al.*, (2008) that operational strengths are commonly assessed with a multidimensional measure of operational performance. Consequently, five underlying dimensions were derived from the literature as representing the commonly-used measures of operations performance (Prajogo and Olhager, 2012; Prajogo *et al.*, 2011; Peng *et al.*, 2008; Devaraj *et al.*, 2007). The five dimensions were quality, cost, speed, flexibility and dependability. The quantitative analysis

determined the performance of the firms on these measures and highlighted how the dimensions are prioritised.

The statistical analysis revealed, on the basis of statistical mean scores that, dependability was the topmost competitive priority SMEs target. Dependability had a mean score of 4.48 and a standard deviation of 0.50. this was followed by quality, flexibility, speed and cost in that order. Cost had the lowest mean score of 2.87 although with a high standard deviation (0.93), indicating wide variations in the responses. This evidence is supportive of the literature view that UK manufacturing is shifting away from competing on the basis of cost to competing on 'something else' (MacBryde *et al.*, 2013; Martinez *et al.*, 2008). The qualitative evidence also highlights quality and dependability to be key competitive priorities pursued by SMEs in their manufacturing strategy. Interviewees however showed a split opinion on the relevance of cost as a priority. Whereas some firms considered cost as the most critical performance measure, others regarded cost as the least important due to the nature of their operations. The latter were firms identified to be predominantly project-based. Thus even though efficiency may be considered in the operations of the SMEs, cost doesn't seem to be an attractive competitive priority. This explanation may also account for the underlying reason why no significant correlation was observed between cost and supply management capabilities in the quantitative analysis.

Both the quantitative and qualitative analyses suggest that all five performance dimensions being examined in the present study were considered relevant to UK SME manufacturing operations. By this observation, UK manufacturing SMEs may seem to be largely pursuing the integrative model in operations strategy by maintaining a balance between the trade-off and cumulative perspectives of operations strategy. Thus, the claim by Shavarini *et al.*, (2012) that manufacturers frequently adopt an integrative approach in their operations strategy development may be supported in this study. These firms may develop the relevant capabilities in selected competitive priorities which allow them to maintain a predetermined market position, but at the same time leverage their capabilities in other performance dimensions to support their selected priorities.

In small-sized firms, the qualitative analysis indicates that the prioritisation of the performance dimensions was to some extent influenced by the personal values and beliefs of the owner-manager. It is the personal values of the owner-manager that drives the less-formalised SMEs. Therefore any performance measure that closely

associates with such values attracts significant attention from the owner-manager irrespective of the dominant market competitive priority. The evidence shows that personal traits of the owner play a critical role in small firm decision-making including operations performance targets as confirmed in some earlier studies such as Park and Krishnan (2001) and Gupta and Muita (2013).

7.4 Findings on SME supply management capabilities

SMEs heterogeneity (Morrissety and Pittaway, 2004) means that they differ in terms of each firm's level of supply management capabilities. This was evident in the qualitative analysis. Medium firms (the majority of which can be described as maturing firms) seem to be higher in their level of supply management capabilities than the smaller ones. Medium firms in the qualitative analysis were found to be more formalised and managerial in nature. Influenced by size, which is measured by the number of employees, medium firms tend to have a formal structure for supply management. This included a dedicated supply function and trained supply staff.

The observation of fewer capabilities in the smaller firms may be partly attributable to active ownership involvement in such firms. This is because the evidence from the qualitative analysis seems to suggest that firms with less ownership involvement demonstrate more of the capabilities compared to firms with active ownership involvement. The qualitative analysis indicated that, there is a close association between firm attributes (firm age, size, ownership involvement and dedicated supply function) and supply management capabilities. Further statistical analysis showed that majority of the observed relationships between the two set of variables as found in the qualitative analysis was not statistically significant in the quantitative analysis as will be discussed shortly. With the exception of "dedicated supply function", firm size, age and ownership involvement did not have a statistically significant relationship with any of the supply management capabilities.

7.4.1 Capability difference between small firms and medium firms

The quantitative analysis show that there is no difference between small firms and medium firms relative to their supply management capabilities. The results of an independent-samples t-test did not find any statistically significant difference between small firms and medium firms with regards to the six supply management capabilities. This quantitative result was not expected. It must have occurred possibly because the quantitative data was bias towards medium firms. Thus, the

more medium-sized firms in the data may have contributed to explain the lack of difference between the two groups. This statistical finding contradicts the qualitative finding on the same issue. The qualitative analysis gave the impression that small firms differ from medium firms in terms of their level of supply management capabilities. Medium firms most of which were formalised and managerial in nature appeared to have higher level of supply management capabilities than the small firms.

In both the qualitative and quantitative analysis, it was revealed that among the six supply management capabilities, three were less prominent in SME operations. These three capabilities were, "integration between supply strategy and corporate strategic objectives" (SMC4), "application of information technology in supply management" (SMC5) and "highly skilled and empowered purchasing staff" (SMC6). Again, in both the qualitative and quantitative analysis, the three remaining capabilities namely, "long-term collaborative supplier orientation" (SMC1), "open communication between exchange partners" (SMC2) and "close working relationship with limited number of suppliers" (SMC3), were found to be prominent in SME operations. Sections 7.4.2 and 7.4.3 respectively provide the underlying explanations for why some capabilities were not prominent and why others were.

7.4.2 Explanation for less prominent capabilities

SMEs generally exhibit little tendency towards formalised corporate planning and control systems (Towers and Burnes, 2008; Vaaland and Heide, 2007). The implication is that corporate strategy is less likely to exist, which in turn limits the tendency to develop a supply strategy. Besides, SMEs are said to be more short-term goal-oriented and therefore the need to create a supply strategy from a long-term corporate strategic objectives is often hindered. Towers and Burnes (2008) state that SMEs misdirect their efforts at short-term sales maximisation rather than focusing attention on maximising opportunities in the long-term supply chain performance. The general lack of long-term focus of the firm will affect its ability to develop an appropriate long-term supply strategy. Again, the largely non-strategic nature of supply management in SMEs further affects their capacity to develop a long-term supply strategy. In both the qualitative and quantitative analyses, the SMEs to a large extent, failed to demonstrate their possession of the capability to integrate supply strategy with corporate strategic objectives. The above explanation may have contributed to this finding. This finding supports the claim by Ellegaard

(2009) that most SMEs seem not to have a supply strategy whilst purchasing actors have limited education and information systems.

Both the quantitative and qualitative analyses provided evidence to suggest that engaging professional supply management staff in SMEs is a “luxury” for a limited few. The description of purchasing actors by Ellegaard (2009) that they have limited education was observed in the qualitative analysis. The qualitative analysis pointed to financial resource constraints as the key reason behind most SMEs’ inability to engage skilled supply staff. In this regard, the view by Tan (1990) that SMEs are generally weaker in planning, finance and technical skills is partly corroborated. The absence of skilled supply staff contributes essentially to the non-strategic nature of the supply function in SMEs as found by Arend and Wisner (2005). The supervisory management level at which the function is commonly found in the SMEs may be an equally good reason why the “highly skilled and empowered purchasing staff” was not found to be a prominent capability. At the supervisory level, not much skills are required as the activities are subject to internal control mechanisms. Decisions at this level are subject to approvals from senior management. The presence of senior management controls as well as other internal control mechanisms tend to cater for the skills deficiencies in supervisory level activities. The largely lack of skills and empowerment on the part of supply management staff affect the significance of the function in the organisation. When this situation is compounded by the absence of supply management thinking among senior managers of the firm, the chances of the firm to develop the capability of “highly skilled and empowered purchasing staff” will be severely hampered.

On the application of information technology in supply management, even though SMEs seem to be aware of the potential gains, again, financial constraints was found to be a limiting factor in its implementation. This finding is not surprising given that the literature (see Vaaland and Heide, 2007; Wagner *et al.*, 2003) highlights the limited use of e-commerce among SMEs’ supply relationships. Morrissey and Pitttaway (2004) found that the use of e-commerce in SMEs is mainly at the customer end of the business rather than at the supply side of business. An emerging trend regarding the application of information technology in supply management was however found during the interviews. Many SMEs have begun appreciating the value of information technology in supply management. Subsequently, some firms were observed to have introduced, or in the process of introducing, companywide ICT platforms that would enhance their supply management systems.

7.4.3 Explanation for prominent capabilities

“Close working relationship with limited number of suppliers” was found to be very prominent among SMEs in the qualitative analysis. The informal and friendly nature of SME buyer-supplier relationships as found in the qualitative study may be the reason for this capability being found prominent in the analyses. The literature suggests that SMEs use many suppliers (Koh *et al.*, 2007; Ulusoy, 2002) in an attempt to keep prices low and ensure continuous supply. On the contrary, this study has found that SMEs rather keep a smaller supply base and work closely with them. A comment by a respondent expresses this close relationship:

...they know me I know them, I like them, they like me, they get paid, we all make a little money. They're probably over-charging me; I don't mind [RES-2].

The comment above symbolises the use of social factors in SME buyer-supplier relationships as previously observed by Morrissey and Pittaway (2006). By extension, the use of social factors in the relationship nurture trust and loyalty which potentially underlies why SMEs may want to commit to as few buyer-supplier relationships as possible and for a longer period of time. The use of social factors may also be the reason for the largely informal nature of these relationships as revealed in the qualitative analysis. Other qualitative evidence suggests that the use of the close working relationship approach among the SMEs is a strategy to gain priority attention from their suppliers, a relational rent that enhance manufacturing speed.

SMEs according to Ellegaard (2009) tend to favour single sourcing which means that their supplier base is kept low. Ellegaard (2009) further states that SMEs tend to have a smaller supplier base manageable by one person. The qualitative analysis showed that SMEs indeed keep a smaller supply base. By keeping the supplier base small, they are able to establish close working relationships with the relatively few suppliers. This offer them the opportunity to move the relationship to the friendly and informal level. The statistical analysis further confirmed “Close working relationship with limited number of suppliers” as a prevalent capability among the SMEs on the basis mean scores. The manufacturers may develop this dynamic capability to overcome the complex and dynamic business environment confronting their operations. As a capability, it delivers relations rents through the cooperative relationship approach with suppliers.

“Long-term collaborative supplier orientation” emerged from the quantitative analysis as the most prevalent capability with a mean score value of 4.22 and a standard deviation of 0.696. Incidentally, it was also found as the most prevalent supply management capability in the qualitative analysis. Although interviewees admitted having collaborative relationships with suppliers, many were quick to add that their collaborations do not extend to joint resource investments. The analysis seem to suggest that these collaborations largely centred on ‘less-sensitive’ information sharing, capacity and input requirement planning, and occasionally product design issues. This finding contradicts an earlier finding by Morrissey and Pittaway (2004) that SMEs feel reluctant moving towards collaborative relationships. The finding however supports the claim by Mudambi and Schründer (1996) that even though the collaborative indicators in SMEs is still below expectation, progress is being made in this direction. Long-term collaborations with suppliers may have been adopted by the firms on the basis of relational norms such as reciprocity, solidarity and flexibility between the exchange parties (Nesheim, 2001). These relational norms can encourage the development of trust, loyalty and commitment in their exchange relationships (Zacharia *et al.*, 2011). With these ingredients, SMEs’ stand a better chance of exploiting relational opportunities to enhance their performance.

In both the qualitative and quantitative studies, “open communication between exchange partners” was found to be highly recognised. In particular, the qualitative study established that owner-managed SMEs tend to demonstrate a high level of open communication with their suppliers. The use of social factors in the relationships as earlier explained may underlie the presence of this capability among the SMEs. One area that the interviews revealed were frequently excluded from the openness in buyer-supplier communication is the sharing of financial and other sensitive information. Thus, there is a limit to which the act of openness can be within SMEs’ buyer-supplier relationships. The presence of this capability in SME buyer-supplier relationships is important because of the inter-organisational learning opportunity it offers to them. Open communication generates relational rent through sharing tacit and critical information and knowledge (Lavie, 2006; Dyer and Singh, 1998).

This study has by far found SMEs to possess some level of supply management capabilities. Both the statistical and qualitative evidence show to a varying extent, the presence of three of the supply management capabilities. The study reveals that SMEs capabilities in supply management is increasingly demonstrated in their

“open communication with suppliers”, “close working buyer-supplier relationships” and “long-term supplier orientation”. In both the qualitative and quantitative components however, SMEs appear to lack the capabilities in “integrating supply strategy with corporate strategic objectives”; “applying information technology in supply management”; and the use of “highly skilled and empowered purchasing staff”. Pearson and Ellram (1995) caution that the general absence of formalised procedures in SMEs does not necessarily indicate the lack of management sophistication in these firms. The finding that SMEs sufficiently demonstrate at least three of the supply management capabilities lends support to the caution.

7.5 Result of relationship between firm attributes and supply management capabilities

As stated in the preceding sections, the qualitative analysis pointed to a close association between firm attributes as examined in this study and the level of supply management capabilities. On the surface, it appears these firm attributes do influence the extent to which supply management capabilities exist in SMEs. A rigorous statistical analysis showed that a few of the associations that the qualitative results seem to suggest, were statistically significant whilst the majority of the associations were found not to be statistically significant.

Firm attributes as a whole were found to associate significantly with three of the supply management capabilities namely; “open communication between exchange partners”, “integration between supply strategy and corporate strategic objectives”, and “highly skilled and empowered purchasing staff”. The strongest association was with “Integration between supply strategy and corporate strategic objectives” with an adjusted $R^2=0.110$ at a significant level of $p<0.01$. Among the four firm attributes, only “dedicated supply function” was found to make a unique statistically significant contribution to supply management capabilities. It uniquely contributed to five of the six supply management capabilities. Its largest effect, a beta value of .315 at a significance level of $P<0.01$ was observed on “integration between supply strategy and corporate strategic objectives”. It is interesting to find that “dedicated supply function” contributes significantly to nearly all the supply management capabilities. Thus, the presence of a “dedicated supply function” in a firm to a large extent, impacts on the firm’s level of supply management capabilities.

It was observed during the interviews however that many so-called dedicated supply functions were fundamentally reduced to ‘running errands’. In other words,

the few supply staff who were found in these units anchor their expertise on executing instructions. They appear to be divorced from the core activities of the supply function. Key activities such as materials planning, supplier selection, negotiations etc were found to be often times done by people outside the supply function. Supply management activities in these firms appear to focus mainly on price contrary to the view of Gadde and Snehota, (2001). The authors propose that in its current nature, supply management strategies should move beyond the price focus to achieving cost efficiencies through total cost reductions. The owner-manager as well as the operations manager appears to be the key personnel with regards to planning strategies in supply management. This is not a bad thing in itself. However, considering the level of responsibilities of these top officials within the firm, not much critical thinking would go into executing these roles as a lot more effort is concentrated on the customer-end of the business. Again personnel in some of the supply units were found not to have the educational background and the expertise relevant to the supply management role. In spite of these observations, the statistical analysis has found a significant relationship between “dedicated supply function” and supply management capabilities. There is therefore a higher potential for “dedicated supply function” to even contribute more if the function is reorganised to assume a more relationship management approach and given a strategic focus.

Firm age, size (turnover) and ownership involvement did not have individual unique prediction power on any of the supply management capabilities. There was no statistically significant relationship between any of these stated attributes and the supply management capabilities as can be seen in Table 6.28. This may be explained by the earlier qualitative finding that irrespective of the size and age of the firm as well as active ownership involvement, as long as supply management thinking is not nurtured, supply management capability development would be retarded. The development of the capabilities is engendered when the firm adopts supply management thinking and subsequently creates a formal supply management structure. This reasoning may seem a plausible explanation why “dedicated supply function” was found to be the only variable having a statistically significant relationship with the supply management capabilities. As dynamic capabilities, supply management capabilities may be developed by the SMEs to enable them enact or seize opportunities, or neutralise threats from the supplier environment (Chen *et al.*, 2004). This allows the firm to achieve congruence with a changing supplier environment, yielding competitive advantage in the form of relational rents to support manufacturing operation strategy.

7.6 Results of relationship between supply management capabilities and operations performance dimensions

The multiple regression analysis confirmed that there are statistically relevant relationships between some supply management capabilities and the operations performance dimensions. The six supply management capabilities as a whole were found to predict quality, flexibility and dependability dimensions of operations performance. This is an important finding as quality, flexibility and dependability are core to manufacturing operations. Quality and dependability in particular are viewed as order winning criteria (Adamides and Voutsina, 2006). The Sand Cone model by Ferdows and De Meryer (1990) depicts dependability as an important factor required for achieving improvements in flexibility, speed and cost efficiency. Dependability thus underlies all the performance dimensions examined in this study. This finding therefore emphasises the important role supply management capabilities play in ensuring the dependability of the firm. The finding is however not surprising, given that supplier uncertainty is a major threat to dependability of the firm as found by Davis (1993). Supply management capabilities bring supplier uncertainty under control which in turn improves the dependability of the focal firm.

It is equally important to note the significant statistical relationship between capabilities in supply management and the quality dimension. Quality has the single most important influence on customer satisfaction (Fynes *et al.*, 2005; Forza and Filippini, 1998). To this end, the evidence that capabilities in supply management predicts 22.1% of the variance in quality underscores the need for such capabilities in manufacturing operations. This evidence is in agreement with the finding by Fynes *et al.*, (2005) that by developing capabilities to manage supply chain relationships, firms are able to improve their product quality. The relationship between supply management capabilities and quality as found in this study further supports the claim by Giunipero *et al.*, (2006) that strong buyer-supplier association engendered by supply management capabilities promote innovations which improve quality. The finding further corroborates the view that capabilities in supply management enhance the quality of a firm's products as espoused by Bernardes and Zsidisin (2008) and Burt *et al.*, (2003).

The observation that supply management capabilities do impact on the flexibility of operations is an important finding. In recent times, businesses have adopted the concept of flexibility to buffer their operations against the high levels of environmental uncertainties they are confronted with. Flexibility has also become a

concept empowering organisations to accommodate increasingly varying customer expectations. Avittathur and Swamidass (2007) note that manufacturing flexibility is dependent on the firm's supply chain flexibility. In the present study, supply management capabilities were found to predict 10% of the variance in flexibility. This finding lends support to the literature view (Tachizawa and Gimenez, 2010; Swafford *et al.*, 2006) that supply management influences manufacturing flexibility.

Within the set of six capabilities, "open communication between exchange partners", and "integration between supply strategy and corporate strategic objectives" made unique individual contributions to speed and flexibility respectively. "Highly skilled and empowered purchasing staff" on its own contributed to quality and dependability. The qualitative analysis indicated that openness in communications between exchange partners enhances problem solving. Openness in communication also represents a sign of honesty and trust between the partners. The effect of open communication on speed may therefore be sourced to these embedded characteristics. It has the potential for quick joint problem solving approach and resolving material problems and design issues. The statistical association between "integration between supply strategy and corporate strategic objectives" and flexibility lays emphasise on the need to link supply plans to the overall company plan. This finding seems to suggest that by integrating supply strategy with the overall corporate strategy, the firm becomes empowered and better prepared to manage operational uncertainties to enhance manufacturing flexibility. This finding supports the claim that "with the requisite capabilities and opportunities, supply management can leverage and align a firm's internal skill sets and strategic direction with that of the supply base to effectively and efficiently manage its supply chains" (Bernardes and Zsidisin, 2008:209).

A statistically significant relationship was found between "highly skilled and empowered purchasing staff" and quality as well as dependability of operations performance. This evidence is in agreement with the claim by Pearson and Gritzmacher (1990) that the skill set of supply management staff enables the firm to satisfy the customer's quality requirement. The presence of highly-skilled and empowered purchasing staff is fundamental to material specifications and the implementation of strategies to maximise supply chain opportunities. The present day business environment according to Giunipero *et al.*, (2006), requires a skill set which demonstrates competence and excellence in the supply management profession. Giunipero *et al.*, (2006) argue further that success in supply management is dependent on the skills and capabilities found in its people. This

skill set includes the ability to evaluate the supply base and select suppliers, identifying the appropriate level of investment in suppliers' relationship specific assets, among others. Given the finding in the present study that skilled and empowered supply management staff impacts on the quality and dependability of manufacturing operations, the need for supply management competence as called for by Giunipero *et al.*, (2006) is indeed necessary. This evidence emphasises the importance of the presence of "highly-skilled and empowered purchasing staff" in manufacturing operations and its inclusion in a formal supply structure.

These findings suggest that possessing dynamic capabilities in supply management will yields competitive advantage for the firm through the improvement of its quality, flexibility and dependability capabilities. The evidence support the claim by Cepeda and Vera (2007) that supply management capabilities can enhance operational capabilities and ultimately the overall customer experience. Supply management capabilities exploit the relational advantages embedded in the buyer-supplier dyad. This observation supports the assertion by Rudawska (2010) that relationships are embedded with value which can act as a source of sustainable competitive advantage. The evidence further support the theory that idiosyncratic relations with external parties including suppliers may be a source of superior firm performance (Rudawska, 2010; Lavie, 2006; Dyer and Singh, 1998).

The emergent of quality, flexibility and dependability as competitive priorities impacted on by supply management capabilities is in agreement with the High Value Manufacturing (HVM) concept which is emerging as the new face of UK manufacturing. The seeming focus on quality, flexibility and dependability suggests that UK manufacturing SMEs are becoming less reliant on cost as the basis for global competition. Instead, UK manufacturers seem to be perusing differentiation strategy as characteristics for high value-added manufacturing sector. The HVM philosophy is founded on these characteristics where manufacturers are encouraged to move up the value chain by emphasising on high skills and high value products to deliver customer value (MacBryde *et al.*, 2008; Porter and Ketels, 2003). Customer value is core to HVM as an operations strategy and therefore represents the basis on which UK manufacturers are seeking competitive advantage (MacBryde *et al.*, 2013).

7.7 Discussion of exploratory findings on SMEs' supply management

The section discusses the exploratory findings depicting the current breadth of supply management activities in SMEs. Some of these exploratory qualitative

findings provide further explanations and consolidate the statistical findings discussed above.

7.7.1 Nature of SME supply management

The formalised and less-formalised categorisation of SMEs appear to associate with how supply management exists in these two group of firms. Less-formalised SMEs tend to have no dedicated supply functions. These firms are relatively young in age and smaller in terms of employment size. The responsibility for supply management in such firms is usually the prerogative of the owner-manager or some senior company executive. This evidence supports the finding of Park and Krishnan (2001) that supply management in small firms is largely the responsibility of the owner-manager. The qualitative evidence shows a less-developed structure for supply management in young and small firms. Consequently, it is the initiative, experience and expertise of the owner-manager that determines what supply-related capabilities may exist in the firm. This is because, the traits of the owner-manager, including age, educational level, and work experience have been found to influence supply-related decisions in small firms (Park and Krishnan, 2001). The finding in this study that supply-related responsibilities are largely handled by the owner-manager in smaller firms confirms the claim in the literature that supply management is usually the preserve of owner-managers in SMEs (Morrissey and Pittaway, 2004; Pittaway and Rose, 2006).

For the majority of the less-formalised SMEs, supply management activities are largely informal as found by Pearson and Ellram (1995). In this regard, the view by Gadde and Hakansson (2001) that purchasing is an integral part of managing the business for small firms is supported. Persona *et al.*, (2004) make the claim that small firms are resource-constrained and therefore tend to lack essential staff skills. This development compels the owner-manager to take on as many responsibility as his/her capabilities would accommodate. These responsibilities, most often than not, include supply management particularly as this function tends to consume the bulk of the annual sales turnover. This may partly explain why purchasing usually becomes an integral part of small firm management.

SMEs which demonstrate the characteristics of formalisation appear to behave somewhat differently in terms of their supply management. Such firms tend to have a formal structure in place for managing supply. In the present study, it was not uncommon to find a unit within such firms dedicated to managing supplies. This situation was further confirmed in the quantitative analysis where 68.2% of

respondents indicated the presence of a dedicated supply function in their respective firms. In the qualitative analysis, firms where a dedicated supply function was found, it existed frequently as a two or three-person unit. In most cases, the unit was found attached and reporting to a more recognised function, e.g. production, manufacturing or operations. This structure limits supply management staff's participation in the decision making process. In particular, supply staff were observed to be predominantly order-fulfillers with limited capacity for the strategic management of supply. This finding seem to corroborate the view in the literature that supply management is probably the function that receives the least attention from SME owner-managers (Ogden *et al.*, 2007; Ellegaard, 2006).

Among the fifteen SMEs which participated in the interviews, there were only two where a discrete supply function with substantive heads who participated the decision making process were found. For the majority of the participating firms, supply management was found to be far from being a strategic function. This evidence from the qualitative analysis confirms the literature view that strategic supply management is not a common practice in SMEs as earlier claimed by Ellegaard (2006). In spite of the function being largely non-strategic, its criticality to operations was emphasised by the participants. Similarly, the quantitative analysis found 94% of respondents rating the criticality of the supply function to operations from medium (20.5%) to high (73.5%). Although the qualitative analysis seems to suggests that small firms differ from medium firms relative to their level of supply management capabilities, this difference was not established in the quantitative analysis. There was no statistical difference between medium firms and small firms relative to their level of supply management capabilities.

Informal buyer-supplier relationships were found in the qualitative analysis to be predominant among the participating firms. This approach to buyer-supplier relationship management adopted by SMEs tends to promote business friendship, loyalty and trust between exchange partners. The friendship approach to buyer-supplier relationships appears to be an 'open' strategy used by the SMEs to get into the priority list of their business partners. Thus, the informal nature of the relationships provide some added benefits to SME operations. This observation is in consonance with the view by Pearson and Ellram (1995) that informal relationships may be the reason behind the success of SMEs and therefore may be as effective as formal ones.

7.7.2 Status of the supply function in SMEs

A seemingly low status for the supply function was the general observation among the fifteen SMEs involved in the interviews. Status was measured by the position of the function, where it exists, within the organisational set up or the management hierarchy. Thus, along the three levels of management (i.e., top level, middle level and supervisory level), the supply function was commonly found at the supervisory level. This status of the function may explain the largely non-strategic nature the function assumes in SMEs hence, supporting the finding by Paulraj *et al.*, (2006) that purchasing practices in 51% of the firms they surveyed could be described as non-strategic. The non-strategic nature of the supply function among SMEs according to Pearson and Ellram (1995) implies a general purchasing absence from the strategic planning process. However, studies have questioned the relevance of strategic supply function to the operations of SMEs due to size asymmetries (Ramsay, 2001; Pressey *et al.*, 2009). Pressey *et al.*, (2009) for instance did not find enough evidence to suggest the relevance of strategic supply management to SMEs. This critique notwithstanding, the status of the supply function within the organisation impacts to a large extent on the function's ability to utilise supply management tools. The lower the status, the lower the function's ability to exploit supply management tools. The capability of the function to exploit value-adding supply management tools is enhanced when it assumes a top level management status.

The supply function was found to enjoy top level management status in two of the participating firms whilst in three firms, the function enjoyed a middle level management status. The status of the supply function within the organisation may be an indication of how beneficial senior management perceives the function to be. The largely supervisory status the function is placed as found in the qualitative study is in agreement with the argument by Crichton *et al.*, (2003) that SMEs, compared to large firms, are less-positive about the impact of supply management on their operations.

In contrast to the above qualitative findings, the quantitative analysis found supply management to be largely a middle-level management function. The level of purchasing spend is one of the indicators for determining the criticality of the supply function. Criticality of the supply function influences the status of the function to a large extent. The quantitative study found the majority of respondents spend over 50% of their annual turnover on external purchases. Furthermore, 94% of the

respondents indicated a medium to high criticality for the supply function. The level of spend together with the criticality, should have resulted in a high status (top management level) for the supply function among SMEs.

This was however not the case. An important question arises from this finding. If manufacturing SMEs consider supply management to be that critical, why was the function commonly found as a low (supervisory level) to middle management level function in both the qualitative and quantitative components of the study? The answer may be revealed in section 7.7.4, an evidence which seem to contradict a claim by Ramsay (2001) and Pressey *et al.*, (2009). These authors attribute the non-strategic nature of the supply function in SMEs to relevance, implying that strategic supply management may not be relevant in SME operations. As explained in section 7.7.4, relevance may not be the fundamental factor contributing to the low status nature of supply management in most SMEs. Rather, the low status nature may be explained the absence of 'supply management thinking'.

7.7.3 Supply management practices of SMEs

There are a number of tools or supply management practices that can be exploited in buyer-supplier relationships to enhance cost efficiencies and improve the firm's competitive priorities. The implementation of these practices which range from simple to advanced, depends on the experience and skills of the purchasing actors involved in the process. This is why a supply function at the supervisory level status may not make any significant contribution to operations performance. Purchasing actors involved in a low status supply function tend to be limited in their usage of purchasing practices and tools due to their general lack of skills and appropriate training. The qualitative analysis showed limited use of value-enhancing supply management practices by SMEs. The evidence also show that, the practices migrate from simple to advance as the status of the supply function moves up the hierarchy from the supervisory management level to the top management level. Simple practices such as single sourcing, supplier appraisal and rating, supplier certification, supplier quality assurance, due diligence checks, call-off contracts etc. were found to be in use at nearly all management levels of the supply function.

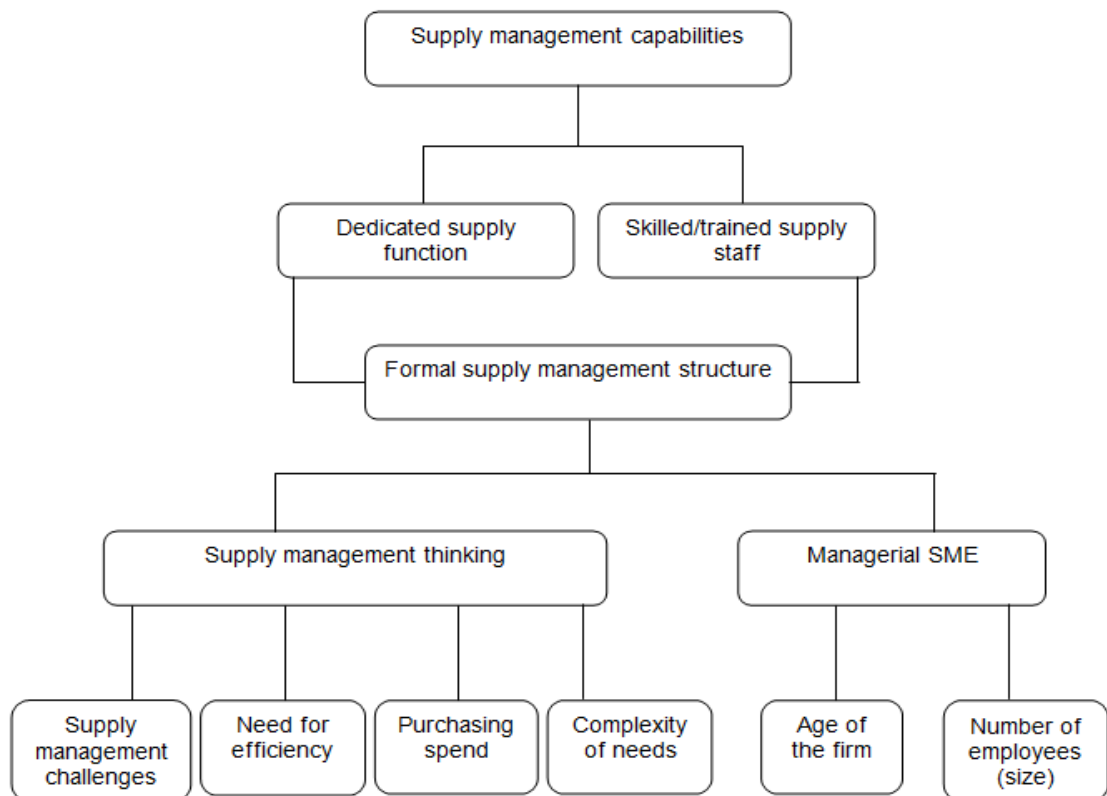
On the other hand, advanced practices such as vendor managed inventory, just-in-time, automatic stock replenishment, high level negotiations, cross-functional supply teams, electronic data interchange, materials requirement planning etc. were found in firms where the supply function enjoys middle to top level management status. A similar finding emerged in the quantitative analysis where respondents

indicated little or no usage of advanced supply management practices. It was particularly observed in the qualitative analysis that larger SMEs tend to be more sophisticated in their supply practices than the smaller SMEs. This observation upholds the assertion by Morrissey and Pittaway (2006) that the extent of SME sophistication in their supply management practices depends on their maturity level and size of operations.

7.7.4 Source of supply management capabilities

The qualitative analysis found that a key source to developing supply management capabilities is senior managers' consciousness of "supply management thinking". Subsequently, the adoption of "supply management thinking" may promote a growth in a firm's level of supply management capabilities. The envisaged process for developing supply management capabilities is presented in Figure 7.1.

Figure 7.1: Sources of supply management capabilities



"Supply management thinking" simply refers to the awareness among senior managers of the competitive value embedded in the upstream supply chain which could be exploited to enhance the firm's performance. As senior managers of the firm become oriented to "supply management thinking", they begin to pay more

attention to the supply side of business which leads on to creating appropriate structures for supply management. Reed (2000) asserts that adopting “supply management thinking” requires firms to make a dramatic shift from transactional approach to emphasise on a "relationship management," approach. Hence, adopting the “supply management thinking” leads to the subsequent adoption of a relationship management approach to supply management. Reed (2000) explains further that this shift requires trained supply staff possessing a much broader business skills. Making the shift to “relationship management” may imply a shift in the status of the function as trained supply staff with broader business skills are not likely to be attracted to a supervisory level function. On this premise, A formal supply structure may include policies and procedures relating to supply management, a dedicated supply function and the presence of trained and empowered supply staff.

In the present study, the qualitative analysis revealed that “supply management thinking” was normally triggered by senior managers realising the need for the firm to be efficient or to address mounting supply management challenges. The complexity of needs and the value of the purchasing spend were also found to contribute to adopting the thinking. Thus, it appears the case for creating a supply function is often a spontaneous action subsequent to senior managers’ adoption of “supply management thinking”. The supply management orientation of senior managers precedes the development of most of the capabilities in supply management. This probably explains why the quantitative analysis found age, size and ownership involvement, as not being good predictors of supply management capabilities. It may be reasoned that irrespective of a firm’s status on these attributes, as long as supply management thinking is not nurtured, the development of the capabilities is likely to be retarded. “Supply management thinking” is fundamental to all supply management-related advances; the presence of this thinking influences the creation of the appropriate structures for managing supplies which in turn leads to the development of the capabilities. Where the thinking exists, a dedicated supply function together with trained supply staff is most likely to be found and the firm would most likely demonstrate high capabilities in supply management.

The qualitative analysis found that “supply management thinking” tends to exist frequently in formalised and managerial organisational environment. Managerial SMEs may be described as maturing SMEs. Morrissey and Pittaway (2006) defined maturing SMEs as firms which are over 10 years old, have 26 or more employees

with an annual turnover of more than £1million. The tendency of managers of maturing SMEs to exploit potentials in supply management as found in the current study is consistent with the findings of Morrissey and Pittaway (2006). Morrissey and Pittaway (2006) found that there is an increasing tendency for maturing manufacturing SMEs to have discrete purchasing functions. In the present study, the tendency for SMEs to have discrete purchasing function appears not to differ between the small-sized firms and medium-sized firms. The quantitative analysis established that there is no statistically significant difference between small and medium firms with regards to having a dedicated supply function. The quantitative analysis also did not establish any link between the age of the firm and supply management capabilities. These quantitative findings strengthens the claim being made here that, the adoption of “supply management thinking” underlies supply management capability development. The insights into the development of supply management capabilities as provided by the qualitative analysis generates a theoretical understanding of the source of supply management capabilities.

7.7.5 Professional supply management staff

It appears most SMEs do not engage professional supply management staff. Evidence from the interviews suggests that financial constraints seems to be a key factor which tends to limit the engagement of trained supply management staff. This finding is in agreement with the claim by Persona *et al.*, (2004) that, resource-constraints affect the ability of SMEs to engage essential skilled staff. The qualitative analysis showed a consensus among interviewees that supply management staff needed to have specialised skills set in order to make any impact. Cousins and Spekman (2003) emphasise that, a more sophisticated set of procurement skills and competences are required to effectively manage the buyer-supplier interface. This view may be true considering the evidence from the qualitative analysis. There were indications from the interviews that, in organisations where essential supply management skills were found to be absent, participants admitted to serious concerns in their supply management as the function appears to fall short of expectations. Hence, supply staff are essential component in a formal supply management structure.

From the qualitative analysis, the majority of the participants indicated their awareness of the need for specialised skills in supply management. In spite of this awareness, participants admitted to not having professional supply staff. The statistical analysis further confirmed that the majority of the SMEs (57%) did not

have skilled or trained supply management staff although 68% of respondents indicated the existence of a dedicated supply function in their firms. Trained supply management staff were usually found in firms where a dedicated supply function exists as it is a key component in a formal supply structure. Morrissey and Pittaway (2006) found larger SMEs to have better supply management structures than the smaller ones. Therefore the high percentage of firms having a dedicated supply function as revealed in the quantitative analysis is not surprising, given that the data was dominated by medium-sized firm. It is however surprising to find that a higher proportion of respondents did not have trained supply staff although they claim to have dedicated supply function.

For many of the SMEs, the common practice as was found in the qualitative analysis, was to engage two or three persons in the supply function. In most cases, the educational background of these staff were unrelated to supply management. Often times, the unit was overseen by the owner-manager in entrepreneurial SMEs, or a senior executive with a substantive role other than supply management in the managerial SMEs. Major supply-related decisions are taken by these top executives thereby reducing the role of the supply management function mainly to fulfilling orders and executing supply-related instructions. This supply arrangement partly explains why strategic supply management appears to be less predominant in SMEs; the arrangement limits the capacity of the supply function to adopt strategic approaches in managing supplies partly due to insufficient supply management skills and lack of staff empowerment. This observation notwithstanding, there were widespread evidence of at least short term supply planning, which contrasts with the claim by Arend and Wisner (2005) that purchasing is generally reactive in SMEs.

To conclude, the exploratory study has provided detailed insight into the supply management activities of SMEs. These insights have also modelled a theoretical understanding of the source of supply management capabilities. On the basis of these insights, the adoption of "supply management thinking" by senior managers of SMEs, supported by the firm assuming a formalised managerial nature may be seen as the source for supply management capabilities. Though the lack of sufficient resources as found by Ellegaard (2006) may be a relevant factor, it is not as fundamental as having "supply management thinking" adopted by the decision-makers in the firm.

7.8 Practical and managerial implications

The present study has explored some capabilities in supply management and provided insight into how these capabilities might be developed within the context of UK manufacturing SMEs. The study has further modelled the influence of supply management capabilities on the five traditional operations performance dimensions. The results of the study have far-reaching practical and managerial implications particularly for SME manufacturing operations in the UK.

The study has identified six major constructs which have been statistically verified as constituting capabilities in supply management. The identification of these capabilities is in the interest of SMEs. By these findings, SMEs can concentrate efforts in their supply management endeavours to develop these capabilities. The study shows that SMEs are more likely to develop three of the capabilities namely, “long term collaborative supplier orientation”, “open communication between exchange partners” and “close working relationship with limited number of suppliers”. The other three capabilities namely, “highly skilled and empowered purchasing staff”, “integration between supply strategy and corporate strategic objectives”, and “application of information technology in supply management” represent challenging capabilities for SMEs to develop. This shows where more effort will be required when SMEs are developing capabilities in supply management. Capabilities such as “application of information technology in supply management” and “highly skilled and empowered purchasing staff” are financial resource-based. SMEs may therefore require some level of financial support in order to develop them.

The modelling of the influence of supply management capabilities on operations performance shows that having these capabilities have beneficial operations performance implications. The study has established that developing supply management capabilities will significantly enhance product quality, flexibility and dependability of the firm. These are order-winning performance indicators and therefore emphasises the importance of developing these capabilities. The results show that UK manufacturers are moving away from competing on cost basis to competing on superior customer-value delivery. Manufacturers appear to be competing on the basis of high quality, innovative products; and flexibility and responsiveness which are aspects of customer service as earlier established by MacBryde *et al.*, (2013). This observation reflects the changing trend in UK manufacturing and consolidates the view that the HVM philosophy is gaining

grounds as a superior manufacturing strategy. It is a wakeup call for manufacturers who are still competing on the basis of cost to consider making the transition to the HVM strategy as cost is no longer a sustainable competitive priority in the UK.

There is a general perception in the literature that SMEs lack supply management expertise due to insufficient buying power, and lack of resources to engage supply management professionals. Whilst these claims may hold to certain extent, they may not be the fundamental reason underlying the perceived lack of supply management expertise by SMEs. This study has established that the very source of supply management capabilities is the adoption of “supply management thinking” by the decision-makers in the firm. This thinking, once developed engenders the creation of a formal supply structure that enhances the development of those capabilities. The adoption of the thinking must also be supported by the firm assuming a managerial nature where it is not. These two antecedents represent the foundation on which a formal supply management structure is built.

For SME owner-managers to systematically develop supply management capabilities, they must as a matter of importance accept and appreciate the value potential embedded in the supply side of the business. This awakening will lead on to finding appropriate resources to create the structures that engender the development of the capabilities. A formal supply structure becomes a support base for developing the capabilities in supply management. The identification of a dedicated supply function as a variable that affects almost all six capabilities is of material importance and emphasise the need for a formal supply management structure in SME operations. A formal supply structure would include a dedicated supply function and skilled/experienced supply staff. The findings on the existence of a dedicated supply function means that if SMEs are able to reorganise their supply functions to give them that strategic appeal, their supply management capabilities would be enhanced significantly. It is in this regards, that this researcher suggests to decision makers in SMEs to make conscious efforts to develop their capabilities in supply management which in turn would positively impact on their operations competitive priorities.

7.9 Conclusion

The findings of the study from the two preceding empirical chapters have been fully discussed in this chapter. The discussion of the results have shown that supply management capabilities relate strongly to the operations performance of

manufacturing firms. Subsequently, if firms are able to develop their supply management capabilities, they would improve their operations performance to a large extent. In this regard, the importance of a “dedicated supply function” in engendering supply management capabilities as emphasised in this discussions cannot be overemphasised. In a complementary approach, evidence from the qualitative and quantitative analyses have been integrated to provide a holistic view on the research issues examined. It has been demonstrated in this chapter how integration between research methods provides a better understanding of the phenomenon under investigation.

Chapter 8

Summary of Research and Conclusion

8.1 Chapter overview

This chapter summarises the key contents of the thesis and as well discusses the contributions of the study. First, the research issues, key research question, literature analysis, conceptual framework and the research methodology are summarised in that order. These are followed by the summary of the key research findings. The contributions of the study are presented next. The final two sections discuss the limitations of the study and makes recommendations for future research.

8.2 Summary of thesis content

The key contents of the thesis have been summarised and presented in the subsections that follow.

8.2.1 The research issue

Much work has been done on organisational capabilities within the strategic management literature. However, not much is known with regards to specific capabilities in supply management. This is in spite of the avalanche of studies examining the relationship between supply management and firm performance (see for example, González-Benito, 2007; Li *et al*, 2006; Paulraj *et al.*, 2006; Tracey *et al*, 2005; Vickery *et al.*, 2003; Narasimhan and Das, 2001). These studies largely focus on examining the relationship between supply management and some firm performance indicators such as financial performance, profit, market share, cost and customer response. In these studies, supply management is frequently measured in terms of strategies, strategic nature, practices, behaviour, perception, purchasing actors, influence, maturity etc. The concept of supply management capabilities has therefore not been rigorously examined in the literature.

The literature has it that supply management does influence firm performance. By reasoning, the capacity of supply management to influence firm performance may be attributed to the capabilities therein. Unfortunately not much exists in the literature to explain the constitution of these supply management capabilities. The

issue of limited knowledge on supply management capabilities introduces the problem of how these capabilities may be measured. Of key concern was the need to know the source of these capabilities and how relevant the capabilities might be to the competitive priorities of manufacturing SMEs. The focus on SMEs was important because the majority of supply management studies are large company centred to the neglect of SMEs. This choice was also informed by the criticality of the purchasing spend to manufacturing and the importance of manufacturing to the UK economy. Within the manufacturing sector, the purchasing spend usually assumes about 65% of the sales turnover on the average in the UK.

Subsequently, the research issues for this study were to discover the constitution of capabilities in supply management and develop a scale to measure them, understand how these capabilities may be developed, determine the extent to which SMEs possess them and assess the impact of these capabilities on SMEs' operations competitive priorities. The present study examines these research issues in the context of UK manufacturing SMEs.

8.2.2 Research aim and question

The main research aim was to establish the extent to which UK manufacturing SMEs possess supply management capabilities and determine the links (if any) existing between such capabilities and their competitive priorities. To achieve this aim it was imperative for the researcher to address a fundamental research question:

- How do supply management capabilities influence operations performance of UK manufacturing SMEs?

This overarching question is broken down into the following specific research questions:

- 1) What constitutes supply management capabilities and how can they be measured?
- 2) To what extent do UK manufacturing SMEs possess supply management capabilities?
- 3) To what extent do firm age, size, ownership involvement, and dedicated supply function affect the level of supply management capabilities?
- 4) What constitutes the operations performance of SME manufacturers and how can this be measured?

- 5) To what extent is the effect of supply management capabilities on operations performance independent of firm age, size, ownership involvement and dedicated supply function?

8.2.3 Literature analysis

As depicted in Figure 1.1, the literature analysis for this study delves into three blocks of literature. These are the supply management, operations performance, and the SME literature. The literature analysis led to establishing six supply management capabilities and five operations performance dimensions or competitive priorities. The supply management capabilities were: long term collaborative supplier orientation; open communication between exchange partners; close working relationship with limited number of suppliers; integration between supply strategy and corporate strategic objectives; application of information technology in supply management; and highly skilled and empowered purchasing staff. The five operations performance dimension were; quality, cost, speed, flexibility and dependability.

The analysis further revealed some important literature gaps in concepts and empirical study. One, the purchasing literature on SMEs and for that matter, manufacturing SMEs, is very much limited. The few studies in this area have been carried out by almost the same handful number of researchers. Furthermore, no study exists on the supply management capabilities of SMEs to the best of the researcher's knowledge. In addition, the extent to which capabilities in supply management associates with operations competitive priorities has not been rigorously investigated. By addressing the above-mentioned gaps, this study will potentially enrich multiple streams of literature namely supply management in SMEs, operations strategy, and UK manufacturing SMEs.

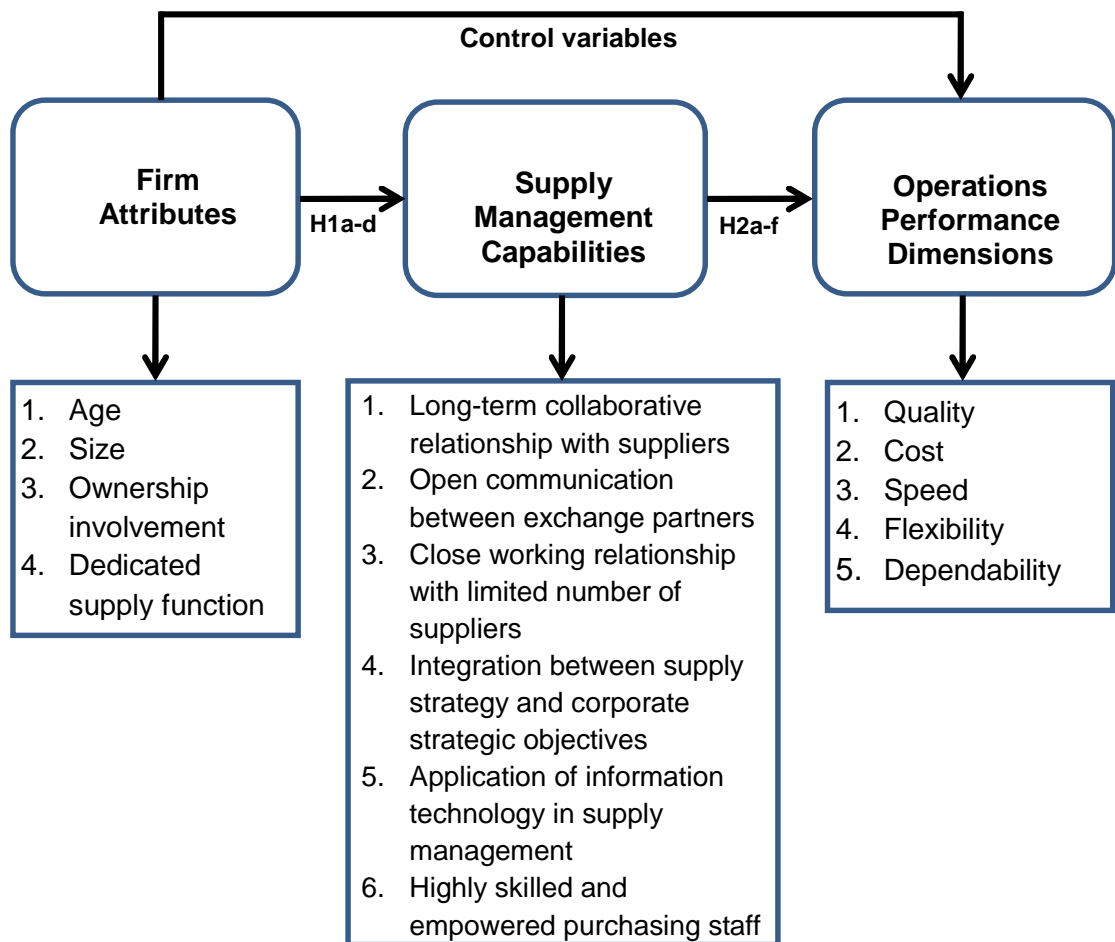
8.2.4 Conceptual framework

The conceptual framework for this study was constructed from the explanations of two theories; the dynamic capabilities theory and the relational view of the firm. The two theories provided the theoretical underpinnings which explained how the research constructs interrelate. Teece *et al.*, (1997:516) define dynamic capabilities as "the firm's ability to integrate, build, and reconfigure internal and external competences to address a rapidly changing environment". The phenomenon is knowledge-based and developed systematically by an organisation through learning to modify operating routines to become more effective. The relational view

on the other hand posits that firms earn relational rents created jointly by exchange partners through critical resources that may be external to them (Lavie, 2006). The relational view of the firm offers an approach to understanding competitive advantage emerging from dyad/network routines and processes. It assesses inter-firm relationships as a source of competitive advantage. In this case, the relationships developed by the firm with its partners through its supply management capabilities.

Two sets of interactions were examined using the two theories. The first set, was the interaction between firm attributes and supply management capabilities. The second, was the interaction between supply management capabilities and operations performance dimensions. The theories offered a sound theoretical base for analysing what relationships exist among the research variables. The explanatory power of these theories on the relationships resulted in the formulation of the research hypotheses (see section 3.7) and the research model presented in Figure 8.1.

Figure 8.1: Research model



8.2.5 Methodology

The methodology chapter discussed the methodological choices for the study along with the underlying reasons. The chapter also discussed the philosophical assumptions of the researcher which subsequently informed the methodological choices made. The study was positioned on the critical realist ontological view of reality. The critical realist philosophy espouses that there are objectively, knowable, mind-independent realities, but also accepts that human perception and cognition are influential in shaping that reality (Evely *et al.*, 2008). The philosophy suggests an interaction between objective measurement of observable entities and human perception to analyze non-observable entities in order to give reality a shape. It is thus a philosophy that uses causal language with thinking.

In line with the philosophical assumptions of the researcher, the mixed method approach to the research process was adopted as it aligns well with the critical realist philosophy. This is because critical realism captures the validity and reliability values of positivism and simultaneously allows insight from human perception as pertains in social constructionism. In this regard, an integration of quantitative and qualitative methods was employed to achieve the research aim. The sequential mixed design approach was used.

The initial qualitative component of the study particularly focused on enhancing understanding of the constitution and the source of supply management capabilities within the firm. The quantitative component on the other hand, focused on modelling the interrelationships among the research variables. Data collection started by interviewing senior managers of fifteen UK manufacturing SMEs. This constituted the first phase of the data collection. A thematic analysis approach was applied to the transcribed data. The results of the analysis of the interviews partly informed the construction of the survey questionnaire used in the second phase of the data collection. The second phase involved a large scale online survey with a targeted sample size of 2,002 firms. At the end of the survey, 132 responses were considered complete and valid to be used in the multiple regression analysis that followed. The findings from the analysis of both the qualitative and quantitative data are summarised in the next section.

8.2.6 Summary of research findings

The key findings from the study are summarised and presented below.

8.2.6.1 Capabilities in supply management

Operationalization of the supply management construct confirmed the six dimensions constituting the construct as anticipated. These dimensions were: long term collaborative supplier orientation; open communication between exchange partners; close working relationship with limited number of suppliers; integration between supply strategy and corporate strategic objectives; application of information technology in supply management; and highly skilled and empowered purchasing staff.

8.2.6.2 Influence of firm attributes on supply management capabilities

Some statistically significant relationships were found between firm attributes and supply management capabilities. Age, size, ownership involvement and dedicated supply function constituted the firm attributes examined in the present study. These attributes together were found to impact on “open communication between exchange partners”, “integration between supply strategy and corporate strategic objectives” and “highly skilled and empowered purchasing staff. Among the four attributes, only “dedicated supply function” made a unique statistically significant contribution. “Dedicated supply function” correlated positively with all the capabilities except the “application of information technology in supply management”. The significant contribution of “dedicated supply function” to supply management capabilities echoes the need for the function in manufacturing firms.

8.2.6.3 Operations performance dimensions

The principal component analysis carried out on the operations performance dimensions generated five factors. These factors corresponded with the five dimensions explored in the study. These dimensions were; quality, cost, speed, flexibility and dependability.

8.2.6.4 SMCs Influences on operations performance dimensions

The hierarchical multiple regression analysis found statistically significant relationships between the supply management capabilities and three operations performance dimensions. The six capabilities together predicted the quality, flexibility and dependability dimensions of operations performance. “Open communication between exchange partners” and “integration between supply strategy and corporate strategic objectives” made unique contributions to the speed and flexibility dimensions respectively. “Highly skilled and empowered purchasing

staff” was found to contribute to the “quality” and “dependability dimensions of operations performance.

8.2.6.5 Supply management capabilities in SMEs

UK manufacturing SMEs possess differing levels of supply management capabilities. The results show SMEs capabilities in supply management are mainly demonstrated in: long term collaborative supplier orientation, open communication between exchange partners, and close working relationship with limited number of suppliers. On the basis of the level of formalisation of management within the firm, two types of SMEs were found; more-formalised and less-formalised. The more-formalised SMEs are more managerial in nature and have distinct functional demarcations and job roles. The less-formalised SMEs on the other hand, operated largely without well-defined departments or have vaguely defined departments and with low level of formalisation in management. The more-formalised SMEs, largely medium-sized firms, appear more capable in supply management than their less-formalised counterpart.

8.2.6.6 Source of supply management capabilities

The qualitative study found that the fundamental source of supply management capabilities is the adoption of “supply management thinking”. Supply management thinking is the orientation of the senior management to the competitive value embedded in the supply side of business. When the adoption of this thinking by senior management is supported by the firm assuming a managerial nature, this leads to the creation of formalised structures for supply management. A formal supply structure includes a dedicated supply function manned by trained and experienced supply staff. Formalisation of the structures for managing supply is shown in the study to be an important foundation for capability development. Senior management’s adoption of the thinking was found to be usually occasioned by factors such as the complexity of needs, the purchasing spend, the need for efficiency and the need to overcome supply management challenges. These operational challenges are often the triggers for the adoption of supply management thinking.

8.3 Research contributions

The research process and the resultant outcomes of the present study contribute significant knowledge to theory, policy and practice. These contributions are discussed in the next sections.

8.3.1 Contribution to theory

This study has operationalised the supply management capabilities construct. A rigorous statistical analysis has established the underlying dimensions of this construct. The discovery of the six capabilities as the dimensions of the construct is an important learning point in the study of supply management. This finding suggests that indeed there are relational capabilities embedded in the buyer-supplier dyad which can be exploited by the supply management function to enhance operational capabilities. The study has produced a measurement scale for supply management capabilities. Researchers may adopt the scale for any future research work that explores the concept further.

The finding that supply management capabilities predict quality, flexibility and dependability of operations performance is equally important. Quality and dependability are often classified in the literature as important order-winning criteria. Therefore the knowledge that capabilities in supply management correlate strongly with these two order-winning criteria represents an significant theoretical contribution. The present business environment is faced with a high level of uncertainty characterised by customer unpredictability and sophistication. The concept of manufacturing flexibility has become a major tool adopted by companies to manage this trend. In view of this, the knowledge from the present study that supply management capabilities influence the flexibility of operations performance is a relevant theoretical contribution. The established relationships means that developing dynamic capabilities in supply management may lead to improved competitive dimensions through the generation of relational rents. The study supports the view that UK manufacturers are changing the basis on which they compete; they seem to be perusing differentiation strategy as characteristics of emerging high value added manufacturing sector. The findings shows that cost has become a less attractive competitive priority as manufacturers move up the value chain to become high value manufacturers.

Another contribution is the finding that dedicated supply function makes statistically significant contribution to supply management capabilities. Dedicated supply

function forms part of a formal supply structure required to engender supply management capabilities. The presence of trained supply staff is an important element in a formal supply structure and often co-exist with a dedicated supply function. By this outcome, the study has identified the importance and the need for a dedicated supply function in SME operations.

In practice however, dedicated supply functions in SMEs were observed during the interviews to be mainly two or three person unit reporting to a more recognised function in the firm. Often times these supply staff were found to be with minimal education. This disposition tended to affect the skills level and empowerment of supply staff thereby reducing their role largely to executing supply-related instructions and fulfilling orders. Major supply-related decisions were taken by top executives who for lack of the appropriate skill, may not be aware of or unable to adopt strategic supply approaches. With insufficient skills and staff empowerment, the capacity of the supply function to adopt strategic approaches in managing supplies would be limited. Thus, the potential for dedicated supply function to impact supply management capabilities could be further enhanced if its current nature is revised and given a strategic appeal.

The study has enhanced our understanding of the source of supply management capabilities. The knowledge from the study that supply management capabilities have a strong foundations in the adoption of “supply management thinking” by top management represents an important contribution to theory. The adoption of the thinking must be complemented with the firm assuming a managerial nature if it is not. The literature currently attributes the lack of supply management competences in SMEs mainly to insufficient resources. The current study has found grounds to challenge that claim as it may not be entirely true. On the basis of the evidence from the present study, the fundamental reason for SMEs’ perceived lack of supply management competence appears to be the absence of “supply management thinking” among senior managers.

There is a general perception in the literature that SMEs lack supply management competences. Findings from this study indicate that perception may not be entirely true. This study has shown that UK manufacturing SMEs do possess some supply management capabilities including; long-term collaborative supplier orientations, open communication between exchange partners, and close working relationship with limited number of suppliers and to some extent, highly skilled and empowered purchasing staff as per the quantitative evidence. Supply management research

has mainly focussed on the operations of the large firms. The present study has increased our knowledge of the nature of supply management and the capabilities thereof in SMEs. By focusing attention on SMEs, the study has contributed to the supply management literature on SMEs which has been acknowledged in the literature as being limited.

In conclusion, the study's contribution to theory can be viewed in two dimensions; operationalization of the supply management capabilities construct and the contribution to SME supply management knowledge in general. This study has enhanced our understanding of the latent capabilities in supply management, the source of these capabilities, and their relationship with operations performance dimensions. The study has also provided significant insights into the nature of SME supply management and enlightened us on SMEs' level of capabilities in supply management.

8.3.2 Contribution to practice

The findings from this study have a number of implications for practice. The development of a measurement scale for the supply management capabilities construct is an important contribution to research and managerial practice. With this measurement scale, a practitioner or researcher can measure the firm's present level of capabilities in supply management and subsequently determine whether improvements are needed.

The insights from the study regarding the sources of supply management capabilities have an important managerial implication. Managers who intend to develop their firm's capabilities in supply management will first have to adopt supply management thinking following which a formal supply structure will be developed. In this regard, the study contributes to practice by providing practitioners with the knowledge on the source of supply management capabilities. As a result, firms which have the interest of developing their capabilities in supply management will know where to start from.

The study has established the importance of dedicated supply function by evaluating its impact on the existence of supply management capabilities. SME senior managers who may be curious of improving the firm's supply management capabilities would recognise the importance of having a dedicated supply function.

Furthermore, the study informs SME owner-managers of the need for supply management capabilities in their operations. The study demonstrates the effect of supply management capabilities on five operations performance dimensions. By this knowledge, the need for supply management capabilities is justified to any interested practitioner or researcher. Findings also highlights the manufacturing drift from cost-based competition towards HVM. As manufacturers become aware of this emerging trend in operations strategy, those still competing on cost will make the effort towards transiting into HVM.

In the course of the research process, the researcher undertook two industrial placements, one at a company in Leeds and the other at a company in Sheffield. These placements projects were sponsored by The University of Leeds under the Higher Education Innovation Fund (HEIF). The coverage of the Fund include research support to local businesses, such as the one offered under the postgraduate placement scheme . Each placement lasted for a 13-week duration. In both placements, the researcher investigated supply-related challenges confronting the firms using the supply management capabilities construct developed in this study as the basis. At the end of each placement, a formal placement report containing appropriate recommendations to enhance supply management performance of the firms was submitted. Feedback from one of the companies indicates that the company has found the placement report very useful. The present study has thus contributed to practice in this regard.

8.3.3 Contribution to policy

The insights provided by this study has policy implications that could potentially benefit manufacturing SMEs. First, the measurement scale developed in this study could be used by government support agencies to assess the supply management capability level of manufacturing SMEs. Such an assessment will help establish the strengths and weaknesses of SMEs relating to their supply management capabilities and determine appropriate support requirement to enable them develop the capabilities they lack.

The knowledge from the study may also contribute to policy development with regards to enhancing SME manufacturing in the UK. A policy could be developed to systematically encourage owner-managers of SMEs to adopt supply management thinking as the basis for developing the supply management capabilities. This effort could be in the form of government raising the awareness of senior managers of SMEs on the competitive value embedded in the supply side of business. When this

awareness is created, the adoption of supply management thinking among senior managers of SMEs will be promoted. Subsequently, SMEs' supply management capabilities will be improved leading to an enhanced supply management practices and experience. Based on the knowledge that cost is becoming less attractive as a competitive priority to UK manufacturers, the government may decide to implement policies that will encourage manufacturing SMEs to make the transition to HVM.

The finding that a dedicated supply function correlate strongly with the majority of supply management capabilities has a policy implication. Given the impact of dedicated supply function on supply management capabilities, a government policy could be rolled out in support of SMEs to set up these units. The government can provide funding to develop an appropriate methodology that could guide SMEs on how to create and manage an effective and efficient supply function.

Information technology has been identified in this study as an important facet of supply management. However, application of information technology in supply management as a capability was found to be limited among the SMEs investigated, with the underlying reason being cost. To this end, an appropriate enterprise resource planning software package could be developed and distributed or subsidized for SMEs as part of government support to these firms. Such a policy would not only improve operations integration in SMEs, but also promote the application of ICT in supply management.

Finally, the findings could be considered by government support agencies such as the UK's Department of Business Innovation and Skills, where relevant, in developing business support strategies for manufacturing SMEs.

8.4 Limitations of the study

Given the constraints of time and resources, some limitations are identifiable with this study. The representativeness of the sample for the study is one of such limitations. The UK manufacturing SME population has 98.8% small firms and 1% medium firms. However, in this study, there were 17% small firms and 83% medium firms. The study is therefore biased towards medium firms. The sample might also not be representative enough as only 2,002 (0.73%) were sampled from the total UK manufacturing SME population estimated to be 273,452 firms at the start of 2013. The sample however does not affect the outcome of the research since the number of responses received was sufficient and met the requirement for multiple regression analysis. On the qualitative component of the study, the use of a sample

size of 15 firms selected from the Yorkshire region of the UK could be another limitation. However, the Yorkshire region is typical of the UK and therefore this may not affect the result of the study.

Related to the limitation of bias, is the actual sample size for the study. The large scale questionnaire survey resulted in 132 valid responses. Though this number of responses was sufficient for the multiple regression analysis applied, enough time would have allowed for more companies to have responded to the survey. This could have possibly included more small firms which in turn would have enhanced the generalizability of the results.

Another limitation of the study is the absence of an inter-sector evaluation for differences in their level of supply management capabilities. Manufacturing in the UK consists of different sectors. An enhanced response rate would have allowed the use of structural equation modelling (SEM) to make a more meaningful inter-sector comparison. SEM could not be used for the present study because the number of responses were far below acceptable levels that permits SEM to be used. Based on the number of variables examined in the present study, a minimum of 200 responses were required to have permitted the use of SEM.

Significant efforts have been made to integrate the results of the two phases of the study. However, it is still evident that both the qualitative and quantitative studies prioritise different dimensions of the research issue. Though this in itself is not wrong, it would be interesting to see more integrated results where both studies had focused on the same priorities. The study is limited to firms in manufacturing industry and to the buyer-supplier dyad. The results may therefore not apply to firms in other industries such as service or construction if their operational dynamics are not similar to manufacturing.

Capabilities are often developed from resources. The current study examined supply management capabilities without investigating the resource support for maintaining these capabilities. A knowledge of the resource support for maintaining these capabilities would be a useful complement to the present study for SMEs. However, had this component been added, the research task for the present study would have been difficult to finish on time. It must also be conceded that some survey questions were not analysed as these were later to be of little relevance to the substance of the study.

8.5 Agenda for future research

Based on the outcomes of this study, a number of research directions have emerged which are worth investigating in future research. These include:

1. The construct, supply management capabilities, can be explored further for any possible refinements to the six capabilities as found in this study.
2. The study can be extended to large manufacturing firms to ascertain their level of supply management capabilities. A comparative study between SMEs and large firms in manufacturing will give insight into any differences.
3. The same study could be replicated in other industries (e.g. construction, retail and service industries) in the UK. This would help ascertain how UK SMEs in manufacturing compare with SMEs in other industrial sectors with regards to their supply management capabilities.
4. The finding on the impact of a dedicated supply function is very important. It would be interesting to know the influence of a dedicated supply function on supply management capabilities in large firms.
5. Supply management capabilities may require specific resource support to develop and maintain. A study is therefore needed to determine the resource support requirement for these capabilities.
6. The concept of supply management thinking needs further exploration to clearly determine all antecedents and actor/agency roles in setting this organisational agenda.
7. Finally, other research methodologies such as case studies could be used to explore the concept of supply management capabilities for an in-depth contextual insights.

8.6 Conclusion

The aim of the study was to contribute to the knowledge and understanding of supply management capabilities in the context of UK manufacturing SME operations. The researcher believes this aim has been achieved. Important contributions have been made to theory, practice and policy. Of immense value to the researcher in the whole research process is not only the contributions, but also the proficient research skills acquired. Inspired by a future career in academia, the researcher believes the study experience to be invaluable.

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Appendix A

Copy of Interview Guide

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“SUPPLY MANAGEMENT CAPABILITIES AND OPERATIONS PERFORMANCE OF UK MANUFACTURING SMEs”

INTERVIEW GUIDE

INTERVIEW THEMES

The interviews shall be based on the following themes representing the key issues underlying the research topic:

7. **Organisational attributes.** Assess the firm on its ownership, age and size, products, functional areas (departments), strategic objectives, type of industry, position in industry and industry challenges.
8. **Supply management structures and processes.** Assess the firm on its suppliers, type of materials purchased, the annual spend, the purchasing process, status of purchasing in the organisation, people in purchasing, and relevance of supply management to operations.
9. **Supply management capabilities.** Assess the firm’s capabilities in supply management, how they are developed and the perceived importance of these capabilities. Measure the firm’s status on known capabilities.
10. **Operations performance objectives/dimensions.** Assess the firm on its operations strategic priorities, integration of operations strategic priorities with corporate strategic objectives, relevance of performance objectives to competition.

DIMENSIONS OF ENQUIRY

For each of the interview themes, the following will be the dimensions of enquiry.

1. **Current status.** Ascertain the firm’s present operating conditions relating to the themes; people, position, nature, processes, reasons for activities and impacts. Where appropriate, documentary evidence will be requested.
2. **Strategic relevance.** Ascertain the impact of the themes on the long-term success of the firm. Find out the extent to which themes contribute to achieving strategic objectives. Assess the importance of these contributions.
3. **Challenges/Critical success factors.** Ascertain how successful the firm might be with regards to some of the themes. Reasons for successes and failures as well as challenges being encountered. Opinions on how to overcome the challenges?

INTERVIEW QUESTIONS

Theme 1: Organisational attributes

1. Please give an overview of the firm's **current** organisational attributes with reference to ownership structure, age, headcount, departments, type of industry and the firm's position in the industry.

Researcher prompts:

- a. Is it a private limited liability company? Is it private or public company? Are the owners part of management? Has ownership been the same since its inception? If changed, why?
- b. Has the firm got other business units operating in other locations? Can you mention some of the functional departments? Can you provide organisational chart and a brief on company history?
- c. What sort of products do you deal in? Do you manufacture or assemble? Do you do mass or customised production?
- d. Which sector of manufacturing are you in? Health, education, construction, etc? How would you describe your position in the industry, top, middle, bottom? What competitive challenges do you face in the industry?

2. What is the **current** strategic direction of the firm within the industry?

Researcher prompts:

- a. Market leaders or Innovators?
- b. Cost leaders or quality leaders

3. To what extent is the organisational attributes **strategically relevant** to the firm's overall strategic direction in the industry?

Researcher prompts:

- a. What is the level of management expertise? How does involvement or otherwise of owners in the management affect performance?
- b. Is age and size an issue in your performance?
- c. Are the types of product you deal in a crucial success factor?

4. What **success factors and challenges** can be associated with the current organisational attributes particularly, ownership, age and size?

Researcher prompts:

- a. Success factors relating to ownership, age and size.
- b. Challenges faced in the industry as a result of ownership, age and size.

Theme 2: Supply management structures and processes

5. Please give an overview of your firm's **current** structures and processes for managing supplies.

Researcher prompts:

- a. The buying process and types of inputs purchased
- b. Existence of purchasing department and its status within the organisation
- c. Estimated number of suppliers and whether domestic or abroad. The estimated annual spend and its percentage of the annual revenue
- d. Are there purchasing operating objectives and are these linked to the strategic objectives of the firm?

6. Could you please describe the level of professionalism demonstrated by the people involved in supply management?

Researcher prompts:

- a. Qualifications, skills, experience and number?
- b. Any perceived advantages from their expertise?

7. What is your relationship orientation with your suppliers and how beneficial is this type of orientation?

Researcher prompts:

- a. Informal vs. formal
- b. Collaborative vs. transactional

8. To what extent is the current supply management structure and processes **strategically relevant** to the firm's operations performance objectives?

Researcher prompts:

- a. What are the top management functions in the firm and is purchasing part of these?
- b. What supply management practices exist in the firm? How are these practices developed? How critical are these practices to your operations?

9. What **success factors and challenges** can be associated with the current supply management structures and processes of your firm?

Researcher prompts:

- a. Successes impacting operations performance objectives
- b. Challenges limiting effective contribution from the structure and processes

Theme 3: Supply management capabilities.

10. What in your view constitutes capabilities in supply management for your type of operations?

11. Please describe the **current** capabilities in supply management your firm has.

12. In your view how are supply management capabilities developed?

Researcher prompts:

- a. Would you associate the capabilities to the firm's purchasing expertise?
- b. Would you associate the capabilities with supply management processes and structures?

13. How correct is the view that supply management capabilities are exhibited by advanced management practices?

14. Please comment on your firm's status with regards to the following supply management capabilities identified from the literature.

1. Creation of long-term collaborative relationship with suppliers
2. Open communication between exchange partners
3. Close working relationship with limited number of suppliers
4. Integration between supply strategy and corporate strategic objectives
5. Application of information technology in supply management
6. Highly skilled and empowered purchasing staff

15. To what extent are the current supply management capabilities **strategically relevant** to the attainment of the firm's operations performance objectives?
16. Please describe the **challenges** associated with developing the required supply management capabilities for your type of operations?

Theme 4: Operations performance objectives/dimensions

17. Please give an overview of your firm's **current** operations performance objective(s) which supports its competitive direction.
Researcher prompts:
 - a. Why is/are these objective(s) chosen?
 - b. Are these objectives measured and how?
18. To what extent is/are the firm's operations performance objective(s) **strategically relevant** to industry competitiveness?
19. Would you say the firm's operations performance objectives are contributing to its overall performance, and how?
20. Please describe the **challenges** if any, associated with pursuing your current operations performance objective(s)

Appendix B

Copy of survey questionnaire

Supply management capabilities survey

Q1.1 Many thanks for accepting to complete our survey. The survey takes approximately 25 minutes to complete. Please be reassured that all data provided will be treated in the strictest confidence and in accordance with the Data Protection Act requirement. The data provided will be analysed anonymously. Thank you again for your help. Click on the double arrows below to start.

Q2.1 Is your firm a small and medium sized manufacturing enterprise (SME) based in the UK?

- Yes
- No
- If No is selected, then skip to End of Survey

Q2.2 Does the total number of employees for your firm fall between 0-249?

- Yes
- No
- If No is selected, then skip to End of Survey

Q2.3 Which of the following aspects of manufacturing is your firm currently engaged in? (Please select all that apply)

- Manufacturing
- Assembling
- Design
- Distribution
- Installation
- Maintenance and after sales service
- Sales and marketing

Q2.4 Please give your name?

Q2.5 What is your gender?

- Male
- Female

Q2.6 Please give your job title?

- Managing director
- General manager
- Operations director/manager
- Commercial director/manager
- Supply chain director/manager
- Procurement director/manager
- Purchasing director/manager
- other _____

Q2.7 Please state the name and address of the firm

Q2.8 Which of the following categories of business ownership best describes your firm? (Please tick all that apply)

- Public limited liability company
- Private limited liability company
- Partnership
- Sole trader

Q2.9 Are you the owner or part-owner of this firm?

- Yes
- No

Q2.10 To what extent is/are the owner/owners involved in the management of the firm?

- Actively involved
- Not actively involved

Q2.11 Is the firm a family-run business?

- Yes
- No

Q2.12 Control of the firm is predominantly in the hands of which one of the following?

- Owner (s)
- Management
- The board

Q2.13 What is the level of your involvement in the management of the firm?

- Top/senior management level
- Middle management level
- Supervisory management level

Q2.14 Please give the standard industrial classification code (SIC) code for your firm

Q2.15 What sector of manufacturing is your firm involved in?

Q2.16 How many main product lines does your firm offer?

Q2.17 What type of production do you operate? (Please tick all that apply)

- Manufacture to stock
- Manufacture to order
- Assemble to stock
- Assemble to order
- Other _____

Q2.18 What percentage of your firm's products is exported overseas?

Q2.19 What is the number of full time and part time employees in the firm?

- Full time _____
- Part time _____

Q2.20 What is the approximate value of the firm's annual sales turnover?

Q2.21 For how many years has your firm been in existence/operation?

Q3.1 Approximately how many suppliers does the company have in its active supply base?

Q3.2 What percentage of these suppliers are critical (you cannot do without) to your operations?

Q3.3 What percentage of your suppliers are UK-based?

Q3.4 To what extent is supply management critical to the objectives of the firm?

- High
- Medium
- Low

Q3.5 What percentage of annual sales turnover is spent on external purchases? (approximate)

Q3.6 What is the annual spend on external purchases? (approximate)

Q3.7 In your opinion, which of the following statements is true in relation to your firm?

- Supply management should receive more attention in my company
- Supply management receives sufficient attention in my company

Q3.8 Does your firm have specialised staff with qualification and training in supply management?

- Yes
- No

Q3.9 Do you have a dedicated function responsible for supply management?

- Yes
- No

Q3.10 If no, please indicate who is responsible for supply management and related activities? (title of the person/persons or department involved)

Q4.1 Supply management challenges: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We have high cost of materials	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We experience high fluctuation of material cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We experience high uncertainty in our supply markets	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We frequently experience supplier invoice discrepancies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We frequently experience delays in delivery	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We frequently experience shortages of key components and parts	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We frequently experience supplier quality problems	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We frequently reject stock from suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have long supplier lead-times for many of our purchases	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have considerable redundant and obsolete stock	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have communication difficulties with our suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We feel suppliers take advantage of the firm's weak buyer power	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We frequently see legal actions in our relationship with suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We lack experienced and skilled supply management staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We do not have the resources to employ professional supply management staff	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q5.1 Supply management capabilities awareness: Please indicate the extent to which senior management of your firm are aware (have knowledge) of the following capabilities in supply management. Supply management capabilities is defined as "bundles of skills and resources that are developed through a strategic supply approach" (Bowen et al. 2001:176).

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
Senior management are fully aware of long-term collaborative relationships with suppliers as a capability in supply management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Senior management are fully aware of open communication between exchange partners (the firm and its suppliers) as a capability in supply management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Senior management are fully aware of close working relationships with limited number of suppliers as a capability in supply management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Senior management are fully aware of	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

integration between supply strategy and corporate strategic objectives as a capability in supply management					
Senior management are fully aware of application of information technology in supply management as a capability in supply management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Senior management are fully aware of highly skilled and empowered purchasing staff as a capability in supply management	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q6.1 Supply management practices: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We have an automatic stock replenishment system with our suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have electronic data interchange with our suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use barcoding system to monitor and control stock movement (Raw materials/purchased components and parts)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use a radio frequency identification (RFID) system to track and control stock movement	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use cross-functional teams in purchasing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have just-in-time purchasing arrangement with some of our suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use negotiation to get better prices and other purchase terms from our suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our supply management staff are trained in lean and six sigma philosophies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We employ a supplier certification system to assure supplier quality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have a supplier rating system in place to evaluate supplier performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We put our suppliers through a supplier approval system before accepting them onto our supply base	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have vendor managed inventory arrangement with some suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have a call-off contract arrangement with some suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We include purchased parts in our materials requirement planning system	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We undertake due diligence checks on all key component suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7.1 Long-term collaborative supplier orientation: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We expect our relationship with our key suppliers to last a long time	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We work with key suppliers to improve their quality in the long run	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We believe our suppliers see our relationship as a long-term alliance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We view our suppliers as an extension of our company	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We believe our relationship with suppliers facilitates joint problem solving	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We and our suppliers see our relationship as mutually beneficial	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7.2 Open communication between exchange partners: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We share sensitive information (financial, design, production, research and/or competition) with our partners/suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We provide our suppliers with any information that might help them fulfill our order	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We exchange information frequently, informally and in a timely manner	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have frequent face-to-face planning/communication with suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We appraise our suppliers annually and provide them with feedback on performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7.3 Close working relationship with limited number of suppliers: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We rely on a small number of high quality suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We maintain close relationships with a limited pool of suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We value our relationships with our suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We consolidate our orders for key components with a limited number of suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We adopt a single sourcing approach for the supply of key components	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7.4 Integration between supply strategy and corporate strategic objectives (Strategic purchasing): Please indicate the extent to which you agree or disagree with the following statements.

	Strongly	Disagree	Neither	Agree	Strongly
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	Disagree		Agree nor Disagree		Agree
Our purchasing function has good knowledge of the firm's strategic goals	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We measure purchasing performance in terms of its contribution to the firm's success	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We focus development of our purchasing professionals on elements of the competitive strategy	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our purchasing department plays an integral role in the management of suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our purchasing staff participate in strategic decisions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have a supply strategy crafted from the corporate strategic objectives	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7.5 Application of information technology in supply management: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We have direct computer-to-computer links with our key suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We achieve Inter-organisational coordination using electronic links	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use information technology enabled transaction processing	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have electronic mailing capabilities with our key suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use electronic transfer of purchase orders, invoices and funds	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use advanced information systems to track and/or expedite shipments	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We use e-sourcing extensively	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q7.6 Highly skilled and empowered purchasing staff: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We employ purchasing professionals to manage our supplies	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our purchasing staff have the necessary skills to monitor and interpret changes in the supplier market/product base	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our purchasing staff have the technical capabilities to help our suppliers improve their processes and products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our purchasing staff have the necessary skills to improve the firm's total cost of doing business with the firm's suppliers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
Our purchasing staff demonstrate perseverance, imagination, decisiveness and interpersonal skills	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8.1 Quality: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We make high performance products that meet our customer needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We make consistent quality products with low defects	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We make highly reliable products that meet our customer needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We make high quality products that meet our customer needs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have minimal or no product returns	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8.2 Cost: Please indicate the extent to which you agree or disagree with the following statements

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We make products at low cost	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We make products with low inventory costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We make products with low overhead costs	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We offer price same as or lower than our competitors	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We consider ourselves to be competitive	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8.3 Flexibility: Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We are able to rapidly change production volume	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are able to produce customised product features	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are able to produce broad product specifications within the same facility	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have the capability to make rapid product mix changes	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are able to react to change with minimal penalty in time, effort, cost or performance	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8.4 Dependability (delivery): Please indicate the extent to which you agree or disagree with the following statements.

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We are able to deliver the correct quantity of the right kind of products	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We provide on-time delivery to our customers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We continuously receive repeat orders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

from our customers					
We provide reliable delivery to our customers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We are trusted by our customers	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q8.5 Speed (time-based performance): Please indicate the extent to which you agree or disagree with the following statements

	Strongly Disagree	Disagree	Neither Agree nor Disagree	Agree	Strongly Agree
We introduce new products to the market quickly	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We provide a quicker response to customer needs than our competitors					
We are able to deliver products quickly or in short lead-times	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We have a short manufacturing lead-time		<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
We rapidly confirm customer orders	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Q9.1 Please feel free to list other capabilities in supply management you consider very relevant to your operations other than those captured by this study

Q9.2 How does your supply management capabilities compare with that of your competitors?

- Worst in industry
- Neither the best nor the worst in industry
- Better than the average in industry
- Among the best in industry
- Don't know

Q9.3 Please rate your level of confidence in your knowledge of the firm's operations to answer these questions appropriately

- Very confident
- Confident
- Less confident

Appendix C SPSS Tables

Appendix C1: KMO measures of scale items (SMC)

Scale Items	KMO Measures
Long lasting key supplier relationships	.671
Improve their quality in the long run	.645
Relationship as a long-term alliance	.714
Suppliers as an extension of our company	.650
Joint problem solving	.708
Relationship as mutually beneficial	.768
Sharing of sensitive information	.675
Provision of helpful information to suppliers	.773
Frequent exchange of information	.807
Keeping each other informed on changes	.744
Face-to-face planning/communication with suppliers	.712
Supplier appraisal and feedback to suppliers	.586
Reliance on few high quality suppliers	.759
Close relationships with a limited pool of suppliers	.784
Valued relationships with our suppliers	.601
Order consolidation for key components	.630
Adoption of single sourcing approach	.517
Good knowledge of the firm's strategic goals	.635
Purchasing performance measurement	.728
Purchasing professionals' development	.766
Integral role of purchasing	.697
Purchasing staff participation in strategic decisions	.632
Supply strategy from corporate strategy	.665
Direct computer-to-computer links	.596
Inter-organisational coordination	.731
ICT enabled transactions	.664
Electronic mailing capabilities	.689
Electronic transfers	.709
Advanced information systems	.631
E-sourcing	.643
Employ purchasing professionals	.619
Supply market/product skills	.844
Technical capabilities of purchasing	.784
Skills to improve total cost	.847
Other purchasing skills	.713

Appendix C2: KMO measures of scale items (OPD)

Scale Items	KMO Measures
High performance products	.813
Consistent quality products with low defects	.779
Highly reliable products	.856
High quality products	.864
Minimal or no product returns	.743
Low product cost	.792
Low inventory cost	.671
Low overhead cost	.771
Price same as or lower than our competitors	.792
Competitiveness	.834
Change in production volume	.921
Customised product features	.699
Broad product specification	.772
Rapid product mix changes	.745
Change with minimal penalty	.817
Correct quantity delivery	.942
On-time delivery	.766
Repeat orders	.833
Reliable delivery	.758
Trusted by customers	.742
New product to market	.948
Quick response to customers	.883
Delivery lead-times	.828
Manufacturing lead-times	.822
Rapid order confirmation	.783

Appendix C3: Test of multiple regression assumptions

No.	Regressions	Indep. Of Residuals (Durbin-Watson Test)	Outliers (Cook's distance)
1	SMC1 regressed on firm attributes	1.813	.150
2	SMC2 regressed on firm attributes	1.296	.217
3	SMC3 regressed on firm attributes	1.962	.062
4	SMC4 regressed on firm attributes	1.958	.216
5	SMC5 regressed on firm attributes	1.995	.092
6	SMC6 regressed on firm attributes	1.594	.111
7	OPD1 regressed on SMCs	2.093	.128
8	OPD2 regressed on SMCs	2.153	.145
9	OPD3 regressed on SMCs	1.807	.094
10	OPD4 regressed on SMCs	1.660	.081
11	OPD5 regressed on SMCs	1.771	.084

