THESIS FOR THE DEGREE OF LICENTIATE OF ENGINEERING

The People Dimension in Manufacturing Strategy:
Operators and Managers

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ABSTRACT

The manufacturing strategy (MS) field has largely focused on the MS content, and not so much on the people dimension of MS or on the process of bringing the MS out in organizations. Within companies, there is often a lack of a joint view of MS; different hierarchical levels view the strategy differently. There is a need to ensure a joint view within companies to assure strategic commitment. The MS falls short if the ideas it incorporates do not materialize into practice as intended. Therefore, this research originated in the idea that the people in manufacturing companies seldom have their voices heard in strategic discussions or in academic debate. In this thesis, individuals' perceptions of MS are the focus. Hence, the purpose is *to investigate operators' and managers' perceptions of MS in order to understand possibilities for a joint view of MS*.

This research was conducted through three studies. Two empirical studies collected data through interviews with operators and managers at Swedish metalworking small and medium-sized enterprises (SMEs). The third study was theoretical and included a literature review where MS literature was analyzed from a behavioral operations (BO) perspective.

The findings show that the people dimension in MS is not well developed. Theoretically, a gap exists between the view on people adopted in the BO field and the view on people in the MS literature. In the MS literature there are indicators of a deterministic view of human nature; individuals on the shop floor are viewed as manufacturing resources. Empirically, the findings show that operators' and managers' perceptions of MS are affected by many factors. These factors are, e.g., related to intra- versus inter-organizational MS dimensions, the operators as individuals, communication of MS, differences between CEOs and production managers, shift work, and mental distances between hierarchical levels.

This research contributes to the work with MS at manufacturing companies by categorizing factors that influence movement towards a joint view of MS. Further, this research contributes to a developed people dimension within the MS field. It offers a viewpoint that indicates the importance of addressing operators and managers as individuals and to viewing the connection between operators and managers a bilateral relationship rather than as a unilateral link. This implies that this thesis strives for a more subjectivist approach to human nature than what traditionally has been the case in MS literature.

Key words: Manufacturing strategy, Behavioral operations, People, Operators, Managers, Strategic consensus

List of appended papers

Paper 1

Edh, N., Winroth, M. and Säfsten, K. (2012) Production-related staff's perception of manufacturing strategy at a SMME, *Procedia CIRP*, Vol. 3, pp. 340-345.

Contribution: Edh and Winroth initiated the paper. Edh, and partly Winroth, collected the data. Edh wrote the paper. Winroth contributed by improving the structure and readability of the paper. An earlier version was presented by Edh at the 41st CIRP Conference on Manufacturing Systems, May 15-18, 2012, Athens, Greece.

Paper 2

Edh, N., Fredriksson, A. and Winroth, M. (2013) Strategic consensus in SMEs: Behavioral operations perspective on manufacturing strategy.

Paper accepted to the 22nd International Conference on Production Research, July 28-August 1, 2013, Iguassu Falls, Brazil.

Contribution: Edh initiated the paper and collected the data. Edh, together with Fredriksson, wrote the paper. Winroth contributed by improving the structure and readability of the paper.

Paper 3

Edh, N. and Halldórsson, Á. (2013) Manufacturing strategy in a behavioural operations perspective: The people dimension.

Paper accepted to the 20th EurOMA Conference: Operations management at the heart of the recovery, June 7-12, 2013, Dublin, Ireland.

Contribution: Edh initiated the paper. Edh, together with Halldórsson, wrote the paper.

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All my love,

Nina

Gothenburg, May 2013

Table of Contents

1 Introduction

In this chapter the background to the research problem is introduced. In addition, manufacturing strategy (MS) literature in relation to other fields is presented, the lack of a clearly defined people dimension within MS is elaborated upon, the purpose of this thesis and the research questions are described, and the scope is defined. Lastly, the thesis outline is presented.

1.1 Background: Manufacturing strategy

More than 40 years have passed since Skinner (1969, p. 110) identified manufacturing as the missing link in corporate strategy and proposed the concept of MS. A MS is essential for a manufacturing company to remain competitive (e.g., Skinner, 1969; Dangayach and Deshmukh, 2001). Traditionally, an MS is defined in terms of the creation of a fit between the market requirements and operational resources (Skinner, 1969; Slack & Lewis, 2011), and provides a link between manufacturing and the company's corporate strategy (e.g., Miltenburg, 2005; Skinner, 1969; Slack & Lewis, 2011). It further, aims to make manufacturing a support function to the company in order to achieve a "long-term advantage" (Miltenburg, 2005, p. 2). Marucheck et al. (1990, p. 104) offer the following definition:

> *"Manufacturing strategy is a collective pattern of coordinated decisions*
> *that act upon the formulation, reformulation and deployment of*
> *manufacturing resources and provide a competitive advantage in support of*
> *the overall strategic initiative of the firm."*

MS is commonly operationalized by a distinction of content, which comprises strategic decisions that are made with respect to competitive priorities and decision categories; and process, i.e., formulation and implementation (Dangayach & Deshmukh, 2001; Mills et al., 1995; Slack & Lewis, 2011). Despite the early call by Anderson et al. (1989) for the use of the term "operations strategy" (OS), it has not always been adopted. The term OS in addition to taking into account the concept if an MS in a manufacturing context, also includes strategies on operational levels within a service organization context. However, the vast majority of the papers published within the OS field in the *International Journal of Operations & Production Management* between the years 2004 and 2009 were concerned with MS (Taylor & Taylor, 2009). The focus of this thesis is on strategy in manufacturing settings and research therefore concentrates on MS literature. However, since the terms OS and MS have been used interchangeably over the years, a great deal of the literature focusing on manufacturing uses OS terminology. Consequently, the terms are used interchangeably in this thesis when necessary in relation to references. However, attention is drawn to the fact that the usage of the term OS does not imply a changed focus or context, and service contexts are not taken into consideration.

Within companies there is often a lack of a joint view of MS: different hierarchical levels view the strategy differently. Säfsten and Winroth (2011, p. 9) in their study of Swedish small and medium-sized manufacturing enterprises (SMMEs) concluded that "manufacturing

strategies mainly existed in the mind of the members of the management group" and that the MS needs to be understood by "all involved personnel". There is therefore a need to produce or create a joint view within companies to assure strategic commitment and long-term competitive advantage. The concept of strategic consensus is one possible way to reach such a joint view.

1.1.1 The manufacturing strategy's role in operations management literature

MS has become one of the most researched areas within operations management (OM) (Pilkington & Fitzgerald, 2006; Pilkington & Meredith, 2009; Taylor & Taylor, 2009). However, the MS field has also encountered some problems associated with the nature of the research and with its position within the OM domain. MS, and the MS process in particular, has received much less academic attention than corporate strategy (Barnes, 2002). Other fields within the OM domain have interacted with further fields and domains in order to explore "contemporary operations practice through alternative lenses and frameworks" (Taylor & Taylor, 2009, p. 1325), e.g., by using social capital theory, complexity theory, and stakeholder theory (Taylor & Taylor, 2009) and borrowing ideas from, for example, the resource-based view (RBV) (Pilkington & Meredith, 2009). Whereas MS literature has maintained close ties with other OM fields such as quality and flexibility, MS is the field within the OM domain that "lost the most interest" during the 2000s (Pilkington & Meredith, 2009, p. 194). Further, MS has also increasingly lost touch with "established concepts and theory developed in related disciplines such as business strategy, organization theory, and industrial organization economics" (Leong et al., 1990, p. 117). Brown and Blackmon (2005) followed the same line of reasoning, and stated that MS has lost touch with mainstream corporate and business strategy and needs to be realigned with strategic management literature. Furthermore, Pilkington and Fitzgerald (2006) argue that there is a need to integrate other specific practices, such as "case evidence/Japanisation" with MS. Barnes (2002, p. 1105) added a further dimension to the problem of an isolated MS field with the contention that MS process literature is "underdeveloped and particularly lacks empirical investigations into the formation of manufacturing strategy in practice." Further, Barnes (2002) calls for a broader analysis of the MS process in practice, which should include individual, cultural, and political factors in the analysis of the internal context of a company. Such a broadening of the analysis opens up for an introduction of new concepts and perspectives in MS.

Within the strategic management literature, and in particular the writings of Mintzberg, the strategy process has been viewed differently: realized strategies have to form and be formulated based on intended strategies (plans), as well as emergent strategies (patterns of actions, shaped along the way by step-by-step decisions) (Mintzberg et al., 2009). Mintzberg et al. (2003, p. xiii) clarified this further ". . . as in reality, formulation and implementation are intertwined as complex interactive processes in which politics, values, organizational culture and management styles determine or constrain particular strategic decisions." The decreased interest in MS research and its increased distance from strategic management literature calls for a changed perspective on MS. This is where the people dimension comes in and can make a contribution. In this thesis the people dimension refers to *operators and managers within the manufacturing function, their roles within the company's hierarchy, and their relation to the company's strategic work.*

1.2 Introducing an analytical scheme: the deterministic view

The position of traditional MS literature in the OM domain and the lack of a clearly defined and fully incorporated people dimension might be partly explained by researchers' views of human nature. Burrell and Morgan (1985) introduced an analytical scheme for studying social theories and assumptions in social studies where the central idea is that "all theories of organisation are based upon a philosophy of science and a theory of society" (1985, p. 1). The scheme is built on two sets of approaches, i.e., subjectivist and objectivist, which are defined along four basic sets of assumptions related to ontology, epistemology, human nature, and method. The central dimension in this thesis is the human nature dimension.

Human nature (Figure 1.1) concerns "the relationship between human beings and their environment" (Burrell & Morgan, 1985, p. 2) and can be viewed as a continuum between determinism and voluntarism. In the deterministic view, human beings and their experiences "are regarded as products of the environment" and as "being completely determined by the situation or the 'environment'" in which the human beings are located. In the voluntaristic view on the other hand "man is completely autonomous and free-willed" and has a creative role: "man is regarded as the creator of his environment, the controller as opposed to the controlled, the master rather than the marionette" (Burrell & Morgan, 1985, pp. 2, 6).
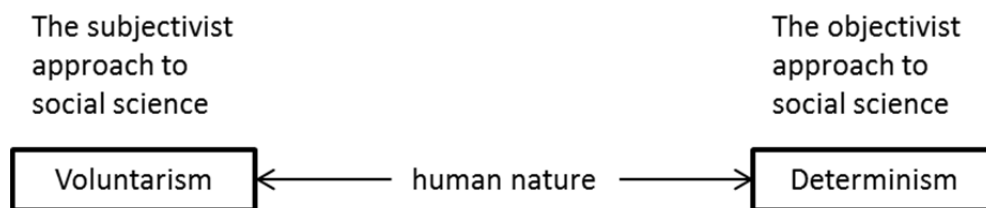
Figure 1.1 The human nature dimension of the analytical scheme for analyzing assumptions about the nature of social science (Burrell & Morgan, 1985, p. 3)

Applying this dimension of the scheme to the MS field clarifies the field's view of the people dimension. Further, it enables positioning of the view of human nature presented in this thesis in relation to traditional MS literature. Such positioning does not only clarify a standpoint, but also enables comparisons and clearer directions for further research.

1.3 The people dimension: different levels

By combining the two terms manufacturing and strategy, the MS field inherently captures a commitment to an interaction between two levels of the organization. On one level managerial decisions related to strategy and on the other level the operational processes within the manufacturing function. Lowendahl and Haanes (1997) refer to Itami's classification of human resources into two categories: (1) the labor part where labor input yields "a relatively fixed and easily measured yield in terms of output, costs or potential revenues", and (2) the problem solving or competence part where "individuals are not substitutable." The competence part has to some extent been researched within other fields in the OM domain. However, the focus in traditional MS literature has been on the labor part, and the competence part has only to a limited extent been captured. This research originated from the idea that the voices of the people in manufacturing companies, the ones working closest to the manufacturing processes, who strive to produce high-quality products and

transform resources into components or products, are seldom heard in strategic discussions or in academic debate. These people and their roles in the MS process are central to this research. Almost all individuals within a manufacturing function make operations decisions, it is therefore crucial for effective decision-making that "everyone have a shared understanding of the organization's operations strategy" (Boyer & McDermott, 1999), including the lower levels of the organization, i.e., the operators (Marucheck et al., 1990). Strategic knowledge enables strategic alignment and strategic commitment (Gagnon et al., 2008) to the strategic goals. Strategically committed individuals, who put their trust in the organization, show strategic-supportive behavior.

The people dimension has been studied in the MS literature to various extents. Concepts such as strategic alignment (Kathuria et al., 2007; Schraeder et al., 2006; Skinner, 1974), strategic commitment (Gagnon et al., 2008), and strategic resonance (Brown & Blackmon, 2005) somewhat address people within the manufacturing function. However, the majority of the writings barely touches upon the operating individuals and their roles in the MS process but rather see the operators as a resource among other resources. Hence, there are indicators of a deterministic view regarding the people in the manufacturing processes in MS literature. For example, in the traditional definition of OS by Slack et al. (2010, p. 62), OS concerns "the pattern of strategic decisions and actions which set the role, objectives and activities of the operation," i.e., it is not the roles, objectives, and activities of the operators that are set. This definition indicates a closeness to the deterministic view of human nature where people and their activities can be completely determined by the situation in which they are located — in this case, the operational setting on the shop floor.

In those studies where there is a clearer people dimension, it is often the managers as individuals and the management level itself that are in focus. Within the MS field emphasis is placed on the importance of incorporating operations managers' views with business level strategy formulation or other functional strategy formulations (see Figure 1.2) (Kathuria et al., 2007). That is, "the concept that manufacturing strategy can come about other than by the plans and intentions of senior managers is almost entirely absent in the manufacturing strategy literature" (Barnes, 2002, p. 1092). Indeed, the operator level, and the relationships between the operators and their managers, can be captured through the intra-functional level where both horizontal and vertical alignment are needed for the successful implementation (Figure 1.2) (Kathuria et al., 2007). Horizontal alignment concerns the exchange and cooperation between functional activities while vertical alignment concerns decisions aligned with strategic objectives (Kathuria et al., 2007).

The relationship between operators and managers has only previously been studied to a limited extent, e.g., through the concept of strategic consensus (Boyer & McDermott, 1999). Strategic consensus is defined as *"the level of agreement within an organization regarding the relative importance of cost, quality, delivery and flexibility to the organization's operational goals, as well as the relationships between these competitive priorities and operational policies"* (Boyer & McDermott, 1999, p. 290). Recently, some empirical studies have emphasized the people dimension in MS. For example, Kathuria et al. (2010) studied manufacturing leadership and its role in manufacturing performance by surveying

manufacturing managers, their subordinates, and their managers, while Gagnon et al. (2008, p. 426) examined "the role an individual's strategic knowledge and commitment play in subsequent engagement in strategy-supportive behavior."
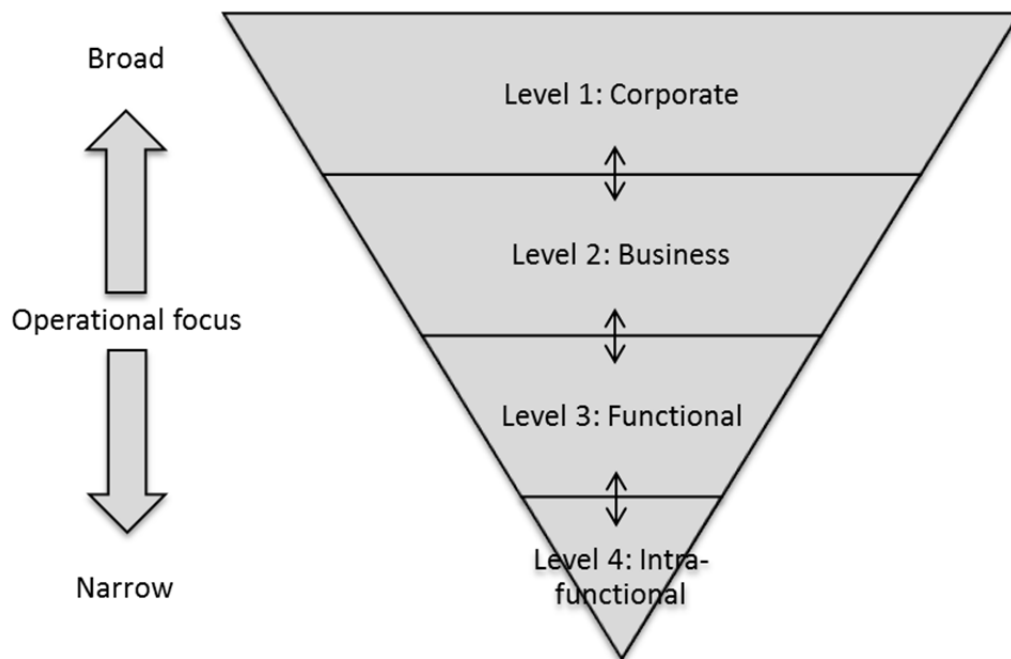
Figure 1.2 Hierarchy of alignment (Kathuria et al., 2007, p. 505)

The vague people dimension in MS literature is more clearly captured within the behavioral operations (BO) field (Bendoly et al., 2006; Croson et al., 2013) where the focus is on "potentially non-hyper-rational actors in operational contexts" (Croson et al., 2013, p. 1). The view of people in the operational context as actors, and more specifically as non-hyper-rational actors, indicates a more subjectivist standpoint than what has traditionally been seen in MS literature. A more voluntaristic view of these people reduces the risk of people in the organization not working towards the same goals. Hence, strategic consensus, which is essential for effective decision-making and strategic fit, is more likely to take place if people are seen as non-hyper-rational.

1.4 Purpose and research questions

Due to the indicators of a deterministic view of human nature in traditional MS literature the MS process becomes simplified and roles and objectives are imposed on the people at an operational level through strategic decisions at a higher hierarchical level. The left part of Figure 1.3 captures the current state of the MS field as it is viewed in this thesis. In traditional MS literature the relations between these strategic decisions and operational resources can be conceptualized as a unilateral link: intended plans are enforced top-down on the operational level. With such a view the risk is high that the people in the organization will not work toward the same goals, i.e., there is a lack of strategic consensus. One way to gain understanding about this link is to view it as a potential relationship between the strategic and operational levels. The right part of Figure 1.3 captures this relationship between the strategic level, i.e., the managers, and the operational level, i.e., the operators. The transfer from a more deterministic view, with a link (left in Figure 1.3), to a more voluntaristic view, with a

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relationship (right in Figure 1.3), can be helped by the application of a BO perspective. In BO, the people dimension is made visible through the view of people as non-hyper-rational actors.
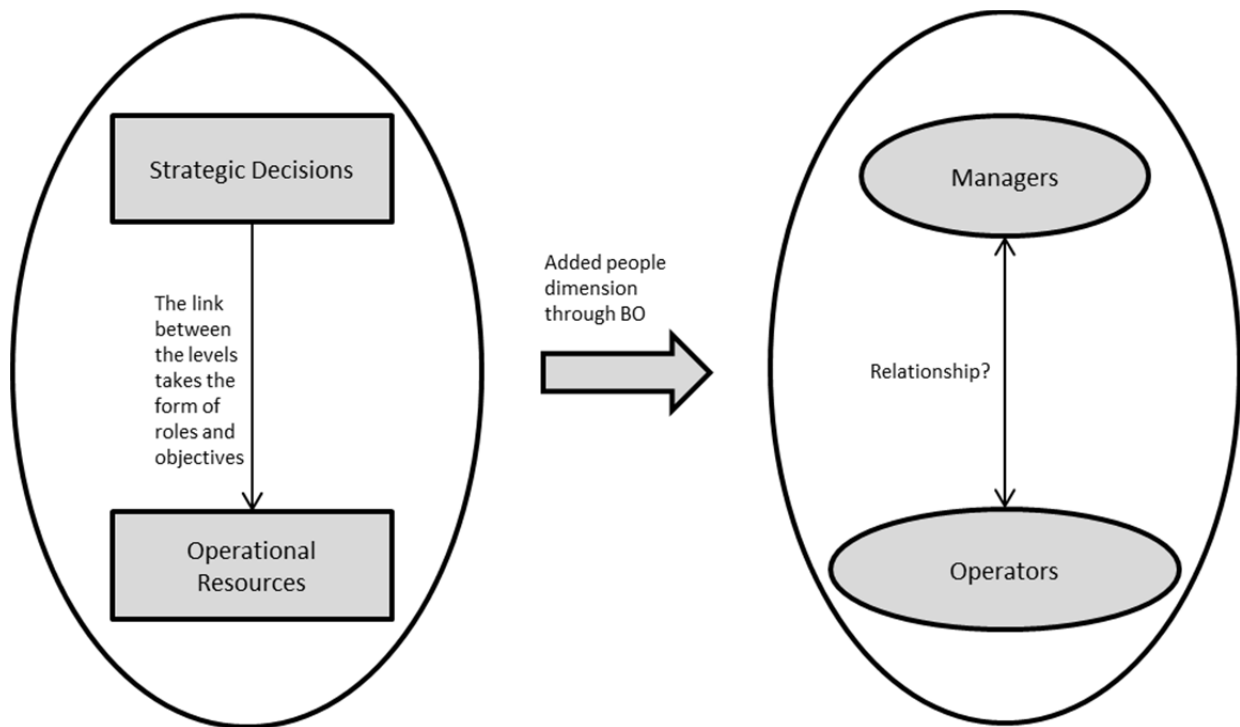
Figure 1.3 A behavioral operations perspective on manufacturing strategy

Figure 1.3 illustrates what happens with the traditional MS field when BO is added, i.e., the people are no longer decisions and resources but have changed into individuals. This is related to the categorization by Itami (Lowendahl & Haanes, 1997), presented in Section 1.3, of human resources into two parts: labor, and problem solving and competence. The operational resources described here can be seen as the labor part where labor is described as input to a given process. By adding a people dimension greater emphasis is put on the problem solving and competence part where individuals are not substitutable. These individuals are first and foremost people who take actions, even if they still have different roles and responsibilities within the MS process, which are dependent on their positions in the company's hierarchy. The relationships between the people at the strategic and operational levels can be seen from different viewpoints. In this thesis, the individuals' perceptions of MS are the focus (see Figure 1.4). Hence, the purpose is *to investigate operators' and managers' perceptions of MS in order to understand possibilities for a joint view of MS*. Operators are defined as the people on the shop floor or with close connections to the daily work on the shop floor. Managers are defined as chief executive officers (CEOs) and production managers, i.e., the people with responsibility for the strategic work and control of the execution of tasks.
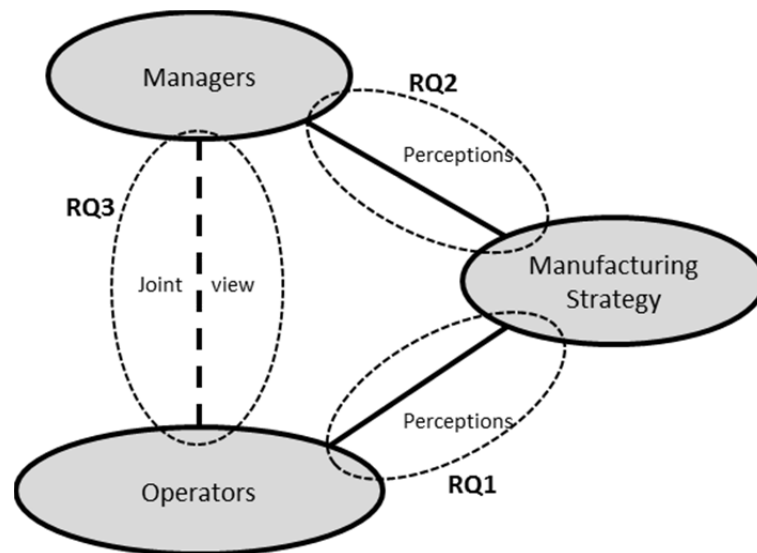
Figure 1.4 Individuals' perceptions of MS: dimensions captured in research questions

In order to address the relationship between operators and managers and their respective perceptions of MS, not only do their actual relationships need to be taken into consideration, but also their views of each other's levels and the context in which they are operating. This all adds to the complexity of the MS process. Operators and managers can be seen as two nodes in a system where the focus is on the relationship between them, but in order to understand this relationship, their nodes and perceptions of MS also need to be understood. In order to grasp this relationship, the nodes, and the context, three research questions (RQs) are formulated.

- RQ1: How do operators perceive MS?

RQ1 seeks to capture operators' perceptions of MS content and to some extent the MS process through which the operators are in contact with the strategy. The word "perceive" used here should be read as the combined meaning of understand, grasp and comprehend. The use of "perceive" aims to capture the elements of the company's MS that the operators have understood, grasped, and comprehended. It is not only about the information the operators have received, but also what they have done with this information, i.e., their internalization of the information. RQ1 does not aim to capture what the company's MS really is, nor does it capture how it was formulated or how and why the MS is the way it is.

- RQ2: How do managers perceive MS?

RQ2 is based on the same idea as RQ1, to focus on the individuals' perceptions of MS, but here it is the managers who are the focus. However, even if the word "perceive" has the same meaning here, i.e., how the managers understand, grasp, and comprehend the strategy, this has different implications when referring to individuals at managerial level. RQ2 to a greater extent (but implicitly) focuses on the formulation of the strategy and on how those who are actually responsible for the formulation of the MS perceive and use it. Further, from a manager level perspective, there is also a stronger focus on what communication and information channels are used and the reasons for their use.

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Provided that MS assumes interactions between operators and managers the third research question is formulated as follows:

- RQ3: Which factors other than those captured in traditional MS literature affect the possibilities of a joint view between operators and managers?

This research is primarily based on frameworks developed in traditional MS literature where a number of dimensions are given. As these dimensions do not incorporate a people dimension, the complexity associated with the MS process is not fully captured. There are factors other than the traditional ones which have an impact on the possibilities of a joint view between operators and managers. Therefore, RQ3 aims at addressing those factors which have emerged in the empirical papers, P1 and P2, and which are not explicitly addressed in the traditional MS frameworks.

Answering these RQs is the first step towards understanding the relationships between the strategic, i.e., managers, and operational, i.e., operators, levels of manufacturing companies and how these levels relate to the companies' MS. Identifying characteristics within the nodes by increased understanding of the different levels' perceptions of MS and the levels of strategic consensus, will facilitate MS communication and work with the MS so that all levels of organizations are involved in the MS process. This would be a contribution to the academic field of MS, which has to some extent missed out on the people in organizations by focusing almost exclusively on manufacturing resources. By studying the individuals who relate to the MS in their everyday work and by viewing them as non-hyper-rational actors, the research within the MS field might regain the lost connection to strategic management and other closely related fields. Further, this research—and especially its focus on the people dimension—contributes to practice, where the strategy is often communicated as the goal rather than the means to attain it. This contribution is achieved by emphasizing the need to see operators as individuals rather than a collective, and as non-hyper-rational actors rather than manufacturing resources.

1.5 Scope
This research focuses on the perception of MS at the operator level and the manager level of an organization's manufacturing function. Hence, the goal is not to understand why the MS has been formulated and looks the way it does, but rather the MS is taken for granted and the focus is on an understanding of the individuals' perceptions of it, no matter what the strategy actually looks like. This also means that no evaluation of the level of strategic maturity will be conducted.

The studies presented here are conducted in the organizational context of small and medium-sized enterprises (SMEs). The four companies studied are all subcontractors in the metalworking industry and are located in Jönköping County in Småland, Sweden. All four companies have similar situations: they do not have any own product development and they have one or two customers representing more than half of the production. Their production is organized into functional groups of 3–20 operators, with group leaders as the hierarchical

level between the operators and production managers. The studies were mainly conducted through interviews; hence, a qualitative research approach has been used.

Regarding the theoretical scope this research is positioned within the OM domain. Figure 1.5 illustrates the researcher's view of how the theoretical dimensions relate to one another. Studying the people dimension is done from within the OM domain through the BO perspective. Thus, concepts such as organizational behavior, organizational psychology, motivation theory, knowledge management, and communication theory, which very well could have been used to study the people dimension in MS, are outside the scope of this thesis. Further, due to the OM focus, general strategic management literature has been incorporated to a limited extent, primarily through the Mintzbergian viewpoint. Furthermore, strategic consensus literature, which is quite narrow, cannot explicitly be positioned within the MS literature but also relates to other literature domains outside the OM domain. These four theoretical fields will be further explained in Chapter 2.

Figure 1.5 The operations management field: how the theoretical fields relate

1.6 Outline of the thesis

This is a compilation thesis consisting of the main text and three appended papers. The main text is structured as follows:

Chapter 1 presents the background to the research, and introduces the purpose of the thesis and the three research questions.

Chapter 2 gives an overview of the frame of reference that has shaped the research. It starts by introducing the MS literature and continues by adding a Mintzbergian viewpoint. Thereafter

the central concepts of strategic consensus and BO are explained. The chapter ends with a concluding summary.

Chapter 3 describes the research design, i.e., what decisions were made, how they were made, and what the consequences were.

Chapter 4 summarizes each of the three appended papers by presenting their purposes, outlines, and main contributions.

Chapter 5 holds the answers to each of the three RQs by elaborating on the findings of each of the three papers. There is not a 1:1 relationship between the RQs and the papers.

Chapter 6 discusses the findings in relation to the purpose of the thesis and to the existing literature. Further, the chapter gives suggestions regarding directions for further research.

Chapter 7 presents the conclusions of the thesis.

2 Frame of reference

In this chapter, the theoretical fields upon which this research is based are presented. First, the foundation of the research, the MS literature, is defined, and the view of human nature in the traditional literature is elaborated on. Second, the Mintzbergian view on strategic management is described to position the MS literature in relation to strategic management. Third, the concept of strategic consensus and the BO perspective are defined and elaborated on. Last, the chapter is summarized. The summary presents the theoretical dimensions that are important for the continued discussion.

2.1 Manufacturing strategy definitions

This section introduces the theoretical underpinnings of traditional MS literature.

The concept of MS has had an important role in the operations management literature since Skinner (1969) identified the missing link between manufacturing and corporate strategy and stressed the importance of increasing the status of manufacturing decisions from an operational to a strategic level, suggesting a top-down approach where manufacturing policies stem from corporate strategy. In this notion Skinner (1969) emphasized the need for top management to take control of the manufacturing function by involving itself in manufacturing policy decisions, hence reclaiming the link between corporate strategy and manufacturing. In traditional MS literature definitions of MS involve linkage between the manufacturing function and the company's corporate strategy (e.g., Miltenburg, 2005; Skinner, 1969; Slack & Lewis, 2011); MS consists of a sequence of structural and infrastructural decisions made by manufacturing over a long period of time (Hayes & Wheelwright, 1984, p. 32; Miltenburg, 2005, p. 2) and MS aims at making manufacturing a supporting function for the company to "achieve a long-term advantage" (Miltenburg, 2005, p. 2). To achieve a "desired manufacturing structure, infrastructure, and set of specific capabilities" (Hayes & Wheelwright, 1984, p. 32), there is a need for a fit between market requirements and operations resources (Skinner, 1969; Slack & Lewis, 2011).

Since Skinner's seminal work, with emphasis put on manufacturing's role in strategy, the MS field has grown extensively (e.g., Dangayach & Deshmukh, 2001; Taylor & Taylor, 2009). However, development within the field has also been criticized; e.g., Barnes (2002, p. 1090) stated that "thinking about the process whereby manufacturing strategy is formed seems to have advanced little beyond Skinner's (1969) original prescriptive model" and that the MS literature often presents "the process as one that can seemingly take place regardless of the context and the key players involved" (p. 1105). Taken as a whole, this indicates an undeveloped people dimension in MS literature.

2.1.1 The lack of people within manufacturing strategy definitions

This section addresses the people dimension in traditional MS literature and gives a perspective on how human nature has, or has not, been viewed in this body of knowledge.

Skinner (1969) in his seminal article, put great emphasis on the managers' role in relation to MS. He pointed out that after making strategic decisions related to e.g., location, capacity,

outsourcing, equipment, and management organization, that management's next steps should be to work out "programs of implementation, controls, performance measures, and review procedures" (Skinner, 1969, p. 145). Hence, Skinner provided a view of MS as something that shall come from the top and be implemented through programs. In this definition, Skinner emphasized the use of control functions and placed the responsibility for those with the delegating managers, not with the operators who conduct the tasks. This implies a people dimension that is only viewed from one side. The operators are not mentioned; they appear neither as important for the actual decision-making, nor as participants in or receivers of these implementation programs.

Following Skinner's work, a number of definitions of what MS (and OS) encompass have been presented. Some of these definitions can be seen in Table 2.1.

Table 2.1 MS definitions

Reference	MS definition
Swamidass and Newell (1987, p. 509)	"Manufacturing strategy is viewed as the effective use of manufacturing strengths as a competitive weapon for the achievement of business and corporate goals."
Marucheck et al. (1990, p. 104)	"Manufacturing strategy is a collective pattern of coordinated decisions that act upon the formulation, reformulation and deployment of manufacturing resources and provide a competitive advantage in support of the overall strategic initiative of the firm."
Hill (1994, p. 12)	"Manufacturing needs to be involved throughout the whole of the corporate strategy debate to explain, in business terms, the implications of corporate marketing proposals and, as a result, be able to influence strategy decisions for the good of the business as a whole."
Miltenburg (2005, p. 2)	"The pattern underlying the sequence of decisions made by manufacturing over a long time period. . ."
Slack and Lewis (2011)	"The total pattern of decisions which shape the long-term capabilities of any type of operation and their contribution to overall strategy. . ."

The definition from Swamidass and Newell (1987) is one of the earliest and does not indicate any people or their roles. The definition from Marucheck et al. (1990) follows the same logic; indicating that the manufacturing function is important for the company's survival, and that a collective pattern of coordinated decisions is needed. However, there are no indications of who is part of this "collective" nor who is to make the "coordinated decisions." Hill (1994) discussed ways in which manufacturing can strengthen a company. However, in Hill's definition, it is "manufacturing" that will explain implications and influence strategy decisions; it is not explained which individuals or hierarchical positions are involved, indicating that this important part of strategic work can be successful independent of which people constitute the manufacturing function. More recent definitions use similar formulations, indicating a deterministic view of the human nature of the individuals associated with MS. For example in the definition by Miltenburg (2005), people are not defined as decision makers but the rather vague entity "manufacturing" is used as an actor. A similar definition of OS was given by Slack and Lewis (2011), implying a top-down approach where manufacturing acts as a supporting function for an organization.

The definition from Hill (1986, p. 11) indicates an increased (in comparison with the above mentioned references) amount of interaction between and within levels by referring to "coherent thrust within manufacturing and raising the level at which this is agreed and implemented" and a "co-ordinated approach which strives to achieve consistency between functional capabilities and policies and the agreed current and future competitive advantage necessary for success in the market place." However, despite the references to coherency, agreement, co-ordination, and consistency, this definition also fails to explicitly mention people.

To summarize, the traditional literature definitions of MS involve a linkage between the manufacturing function and the company's corporate strategy (e.g., Miltenburg, 2005; Skinner, 1969; Slack & Lewis, 2011). There are indications of a people dimension (e.g., Hill, 1986), but these are not explicated. What is missing in these traditional MS definitions is a clearer focus on the people: who the actors are and what tasks they should conduct to support the work with MS.

2.2 Content versus process: a common distinction in MS literature

In traditional MS literature, there is a distinction between content and process (see Figure 2.1) (e.g., Dangayach & Deshmukh, 2001; Leong et al., 1990; Mills et al., 1995; Slack et al., 2010). Content refers to the distinct competencies of the manufacturing function (Swamidass & Newell, 1987) and the strategic decisions that are made with respect to competitive priorities and decision categories and which set manufacturing's role, objectives, and activities to achieve competitive advantage (e.g., Dangayach & Deshmukh, 2001; Slack et al., 2010; Slack & Lewis, 2011; Swamidass & Newell, 1987). Process consists of the formulation and implementation of the MS (e.g., Dangayach & Deshmukh, 2001; Slack & Lewis, 2011; Swamidass & Newell, 1987) and is "the method that is used to make the specific 'content' decisions" (Slack et al., 2010, p. 62).
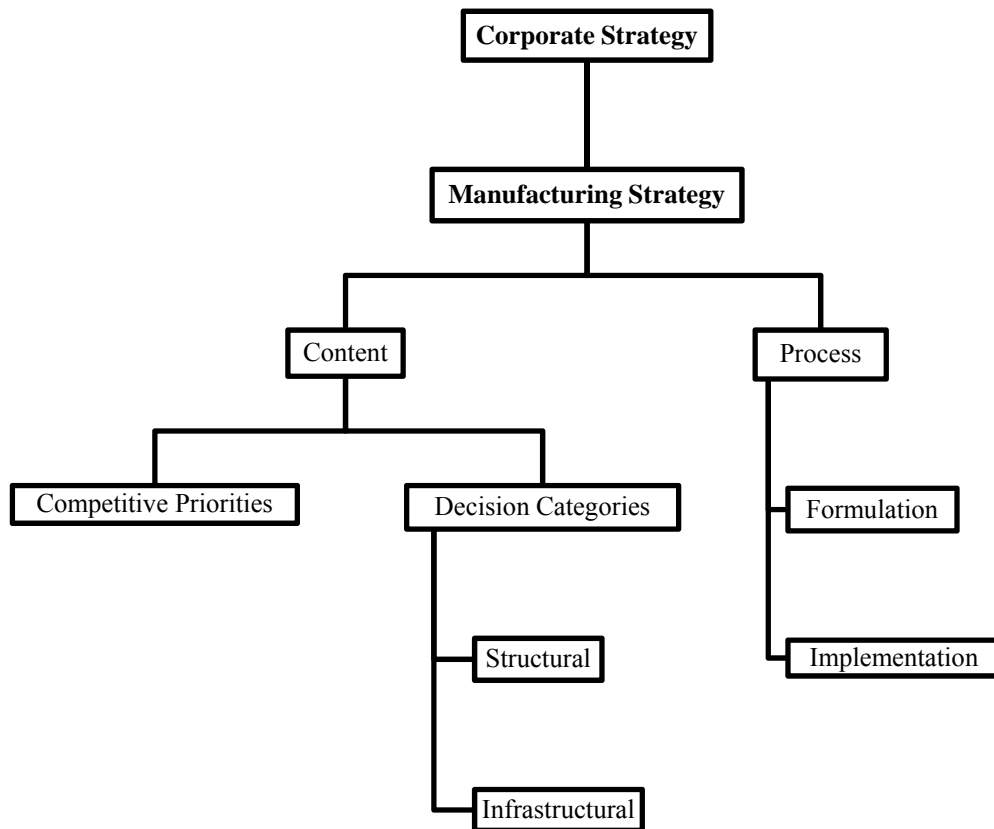
Figure 2.1 Manufacturing strategy: content and process

2.2.1 Manufacturing strategy content

The strategic decisions made, i.e., the content, are made in relation to the company's competitive priorities and decision categories (Dangayach & Deshmukh, 2001). The exact definition of the competitive priorities vary between sources (Dangayach & Deshmukh, 2001; Mills et al., 1995; Slack & Lewis, 2011), but they most often encompass cost, quality, delivery, and flexibility. In this thesis the focus is on these four traditional competitive priorities:

- *Cost* includes procurement costs, overhead costs (Acur et al., 2003), and production costs (Kathuria et al., 1999).
- *Quality* encompasses both specification quality, i.e., product quality and reliability; and conformance quality, i.e., reliable and consistent manufacturing (e.g., Acur et al., 2003; Slack & Lewis, 2011).
- *Delivery* is considered to be about both delivery dependability and delivery speed (e.g.,Dangayach & Deshmukh, 2001; Slack & Lewis, 2011) and includes production lead time, procurement lead time, and ability to meet delivery promises (e.g., Acur et al., 2003; Boyer & McDermott, 1999; Kathuria et al., 1999).
- *Flexibility*, refers to changes in product, product mix, product variety, and sequence (Boyer & McDermott, 1999; Dangayach & Deshmukh, 2001), along with volume flexibility (Acur et al., 2003), capacity adjustments, and variations in customer demands (Boyer & McDermott, 1999; Kathuria et al., 1999).

14

MS decision categories most often encompass structural and infrastructural decisions (Hayes et al., 2005, p. 41; Hayes & Wheelwright, 1984), which are subsystems of the production system (Miltenburg, 2005). *Structural decisions* refer to categories where the company's physical attributes are determined. Structural decisions often require a substantial capital investment and are difficult to alter (Hayes et al., 2005, p. 42). These structural decision categories are:

- *Capacity*, which includes amount, type, and timing (Hayes et al., 2005, p. 41; Hayes & Wheelwright, 1984, p. 31; Slack & Lewis, 2011), along with production planning and control (Miltenburg, 2005; Skinner, 1969, p. 141);
- *Sourcing and vertical integration*, including direction, extent, and balance (Hayes et al., 2005, p. 41; Hayes & Wheelwright, 1984, p. 31; Miltenburg, 2005), also called the supply network (Slack & Lewis, 2011);
- *Facilities,* which includes size, location, and specialization (Hayes et al., 2005, p. 41; Hayes & Wheelwright, 1984, p. 31; Miltenburg, 2005);
- *Information and process technology*, which refers to the degree of automation, interconnectedness, and lead versus follow (Hayes et al., 2005, p. 41), as well as technology (Hayes & Wheelwright, 1984, p. 31), process technology (Miltenburg, 2005; Slack & Lewis, 2011), and plant and equipment (Skinner, 1969, p. 141).

Infrastructural policies and systems refer to categories where more tactical activities are governed: "they are linked with specific operating aspects of the business; and they generally do not require highly visible capital investments" (Hayes & Wheelwright, 1984, p. 31). These categories are:

- *Resource allocation and capital budgeting systems* (Hayes & Wheelwright, 1984).
- *Human resource systems,* which includes selection, skills, compensation, and employment security (Hayes et al., 2005), and also has been referred to as work force (Hayes & Wheelwright, 1984), human resources (Miltenburg, 2005), and labor and staffing (Skinner, 1969);
- *Work planning and control systems,* including purchasing, aggregate planning, scheduling, control or inventories and/or waiting time backlog (Hayes et al., 2005), along with production planning/materials control (Hayes & Wheelwright, 1984);
- *Quality systems*, relating to defect prevention, monitoring, intervention, and elimination (Hayes et al., 2005; Hayes & Wheelwright, 1984);
- *Product and process development systems*, referring to leader or follower, and project team organization (Hayes et al., 2005);
- *Organization*, relating to centralized versus decentralized, which decisions to delegate, role of staff groups, and structure (Hayes et al., 2005), and which includes measurement and reward systems – measures, bonuses, promotion policies (Hayes et al., 2005) – and has also been referred to as development and organization (Slack & Lewis, 2011), organization and management (Skinner, 1969), organization structure and controls (Miltenburg, 2005).

Slack and Lewis (2011) used the OS matrix (see Figure 2.2) to illustrate MS content. This matrix captures the competitive priorities along the vertical axis and the decision categories along the horizontal axis. These authors have divided the competitive priority *delivery* into *speed* and *dependability*. Further, they have not separated the decision categories into as many categories as other authors have (e.g., Hayes et al., 2005); there is no separation into structural and infrastructural decision categories. In this model, which can be viewed as quite traditional within the MS field, it is difficult to see where a people dimension comes in. The only indicator of human nature and a people dimension is in the *development and organization* category. On the other hand, this category is, like the other categories, linked to the usage of resources. Hence, there is no clear indicator of people as individuals, nor as actors, but rather as resources that have to be used in the same manner as the resources in the *process technology* dimension, to reach competitiveness in the market.
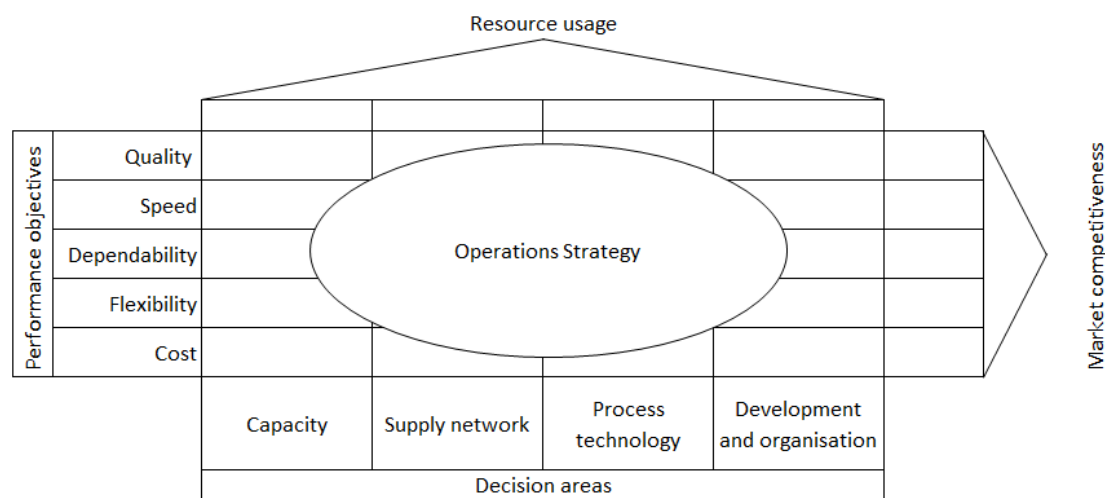
Figure 2.2 The operations strategy matrix (Slack & Lewis, 2011)

2.2.2 Manufacturing strategy process

The MS process consists of formulation and implementation (see Figure 2.1). The process of MS formulation is where the content of the strategy is set. This part of the process is often described as top management's efforts to link strategic decisions to different dimensions, as is the case with the OS matrix (Slack & Lewis, 2011) and with the framework developed by Miltenburg (2005). Despite the focus in MS literature on the importance of companies explicitly formulating their MS, the International Manufacturing Strategy Survey (IMSS) from 2001 showed that only 36% of Swedish companies in the survey had a written and formalized MS (Acur et al., 2003).

Implementation is the means by which the MS is put into practice (Marucheck et al., 1990); it includes "what must be done, why it must be done, how it will be done, when it will be done, and who will do it" (Miltenburg, 2005, p. 112). This is a process where it is essential to get the employees to accept and consent to the strategy and to build teamwork towards the same goals (Marucheck et al., 1990, p. 117; Miltenburg, 2005). Since the implementation is considered to be the most difficult phase of the MS process (Mills, Neely, Platts, Richards, et al., 1998, p. 153) charts and other types of pictorial methods can be useful in communicating the MS and making it understandable and communicable for manufacturing managers and

workforce members (Mills, Neely, Platts, & Gregory, 1998, p. 1081). Previous empirical research (e.g., Gagnon et al., 2008; Mills, Neely, Platts, & Gregory, 1998, p. 1081) has stressed the important role information sharing tools have for the communication and sharing of MS. Further, Marucheck et al. (1990) also stressed the impact of corporate culture, top management commitment, and managerial styles on MS implementation. There is a need for communicating strategy to employees where the MS process is a team effort, rather than solely a top-down approach (Marucheck et al., 1990). However, Mills et al. (1995, p. 43) noted that MS literature rarely discusses "methods for achieving a wide understanding of the logic of strategies". The MS process has received limited attention (Barnes, 2002, p. 1090) and has therefore become underdeveloped, lacking empirical studies with broader analysis of "individual, cultural, and political factors" (Barnes, 2002, p. 1105).

The elements introduced in this chapter, e.g., the competitive priority q*uality*, the decision category *information and process technology*, and the *implementation*, are in this thesis referred to as *MS dimensions*. These dimensions consist of different factors, e.g., product quality, factory layout, and usage of communication channels, and are referred to accordingly.

2.3 The Mintzbergian viewpoint

This section will elaborate on the viewpoint of strategy developed by Mintzberg through ten schools of thought. These schools are seen as a frame according to which the traditional view of MS, with indications of a deterministic view of human nature, can be positioned. This positioning takes place in Section 2.3.1. Observe that the Mintzbergian viewpoint addresses strategy in general, that is, it comes from outside the MS field.

Mintzberg (1978, p. 935) referred to the traditional definition of strategy as consisting of a "deliberate conscious set of guidelines that determines decisions into the future," where strategy is "(a) explicit, (b) developed consciously and purposefully, and (c) made in advance of the specific decisions to which it applies." Thus, a strategy is traditionally viewed as a plan created by managers (Mintzberg & Waters, 1985) where strategy formation has "tended to be treated as an analytic process for establishing long-range goals and action plans for an organization; that is, as one of formulation followed by implementation" (Mintzberg & Waters, 1985, p. 257).

This traditional definition is seen as "seriously limited" with a need for the strategy process to "be viewed from a wider perspective so that the variety of ways in which strategies actually take shape can be considered" (Mintzberg & Waters, 1985, p. 257). This view of strategy as intended – a priori guidelines (Mintzberg, 1978) – is complimented with a view of realized strategy – a posteriori consistencies in decisional behavior (Mintzberg, 1978). In this view, a strategy is considered to have formed when "a sequence of decisions in some area exhibits a consistency over time" (Mintzberg, 1978, p. 935). Mintzberg (1987) and Mintzberg et al. (2009) referred to strategies in terms of the deliberate and emergent. Intended strategies, plans, can either result in deliberate strategies, i.e., realized strategies, or unrealized strategies, but there is also a third case, the emergent strategy: a pattern is realized, hence leading to a realized strategy, without originally being intended.

Mintzberg divided the field of strategic management, as mentioned, into ten schools of thought (Table 2.2), showing that strategy does not have a common definition and is a difficult concept to define in a brief, standardized way (Mintzberg et al., 2009). Each of the ten schools are in some ways narrow and overstated, taking a unique perspective focusing on "one major aspect of the strategy-formation process" (Mintzberg et al., 2009, p. 4), and each school has been present in both literature and practice. The ten schools are divided into three groups.

The first group, with three schools, is the prescriptive group, "more concerned with how strategies *should* be formulated than with how they necessarily *do* form" (Mintzberg et al., 2009, p. 5). The next six schools make up the second group because all of them "consider specific aspects of the process of strategy formation" (Mintzberg et al., 2009, p. 6). These schools have been "concerned less with prescribing ideal strategic behavior than with *describing* how strategies do, in fact, get made" (Mintzberg et al., 2009, p. 6). The two first schools in this second group constitute a subgroup viewing strategy as entrepreneurial or cognitive, while the other four schools in this descriptive group have "tried to open up the process of strategy formation beyond the individual, to other forces and other actors" (Mintzberg et al., 2009, p. 6). The *configuration school* stands alone, being the only school that really combines the others. It is integrative: it clusters "the strategy-making process, the content of strategies, the structure of the organization and its context" into distinct stages, with a tendency to cut across schools, aiming at combining elements between them (Mintzberg et al., 2009, p. 6). Mintzberg et al. (2009, p. 381) concluded that "every strategy process has to combine various aspects of the different schools." This cross-fertilization between the different perspectives "expresses a certain welcome eclecticism, a broadening of perspectives" (Mintzberg & Lampel, 1999, p. 22).

Table 2.2 Ten schools of thought (based on Mintzberg et al., 2009; Mintzberg & Lampel, 1999, pp. 23-24)

School	View of the strategy formation process	Sources	Brief description
The Design School	Process of conception	Selznick, Andrews	Most influential view. Seeks a match between internal capabilities and external possibilities, affected by managerial values and social responsibility; SWOT analysis. Basis for developments in other schools. Separating formulation from implementation.
The Planning School	Formal process	Ansoff	Formalizes the process. Different strategic planning models, build on SWOT-analysis with checklists and techniques. Hierarchical partitioning in implementation; control. Major setbacks, limited influence today.
The Positioning School	Analytical process	Porter, Purdue University: Schendel, Hatten	Focus on strategy content added to the preceding schools. Only desirable strategies are those that positions the organization to defend itself against competitors. Created categories of strategies, to be matched to generic conditions of the company. Three waves: military, consulting imperatives, empirical propositions.
The Entrepreneurial School	Visionary process	Schumpeter, Cole, others in economics	Builds on the formal leadership in the Design School; focuses the formation process around a single leader's vision. Both deliberate and emergent.
The Cognitive School	Mental process	Simon and March	Focuses the mind of the strategist to understand strategic vision and how it forms strategies. Two wings: *positivistic*, objective vision, cognition as re-creation of the world; and *interpretive*, subjective view, cognition creates the world.
The Learning School	Emergent process	Lindblom, Cyert and March, Weick, Quinn, Prahalad and Hamel	Descriptive; how do strategies actually form? Emergent; strategies emerge when people, individually, but more often collectively, learn about a situation and the organization's capability to handle it, converge on patterns of behavior that work. A messy process, dealing with a complex world. Traditional strategy formulation is a fantasy. Knowledge creation
The Power School	Process of negotiation	Allison, Pfeffer and Salancik, Astley	Exercise of influence; use of power and politics to negotiate strategies. Two branches: *micro*, politics within the organization, *macro*, use of power by the organization. Emergent strategies, focused on positions and ploys.
The Cultural School	Collective process	Rhenman and Normann (Sweden)	Mirrors the Power School; strategy formation as rooted in social force of culture, a process of social interaction, organizational culture as collective cognition. Two wings: *objective*, outsider's perspective on social and economic relationships; and *subjective*, the native inside considers the process of interpretation. Resource-based theory; focus on internal capabilities.
The Environmental School	Reactive process	Hannan and Freeman, Pugh	The environment as the actor in the strategy making process; a passive organization that reacts to an agenda set by the environment. Rooted in contingency theory.
The Configuration School	Process of transfor-mation	Chandler, Miles and Snow McGill University: Mintzberg, Miller	Reconciliation; integrate the messages of the other schools. Two main sides: configurations of states and transformation of the strategy-making process; transformation as a consequence of configuration. The key to strategic management is to sustain stability most of the time, while periodically performing major transformations. The schools of thought need to refer to their own time and context; representing particular configurations.

19

This elucidation of the ten schools of thought provides an overview of the strategic management literature and allows for a comparison between different schools and a possibility of identifying theoretical streams that have had, or may have, influence on the MS literature.

2.3.1 MS from a Mintzbergian viewpoint

Based on this thesis' focus on the people dimension and based on the presentation of traditional MS literature in Sections 2.1 and 2.2, this section suggests a positioning of MS literature according to the ten schools. Further, some of the schools show indications of a people dimension. These indications are explicated in order to show which aspects of strategic literature outside the OM domain and the MS field it could be beneficial to expand in order to develop the people dimension in MS literature. Figure 2.3 aims at showing the connections between, on one side, the OM domain and the MS field, and on the other side, the ten schools of thought. Key words have been identified for each of the ten schools. A solid line indicates a clear connection, a dashed line indicates partial connection. These connections will be further elaborated.
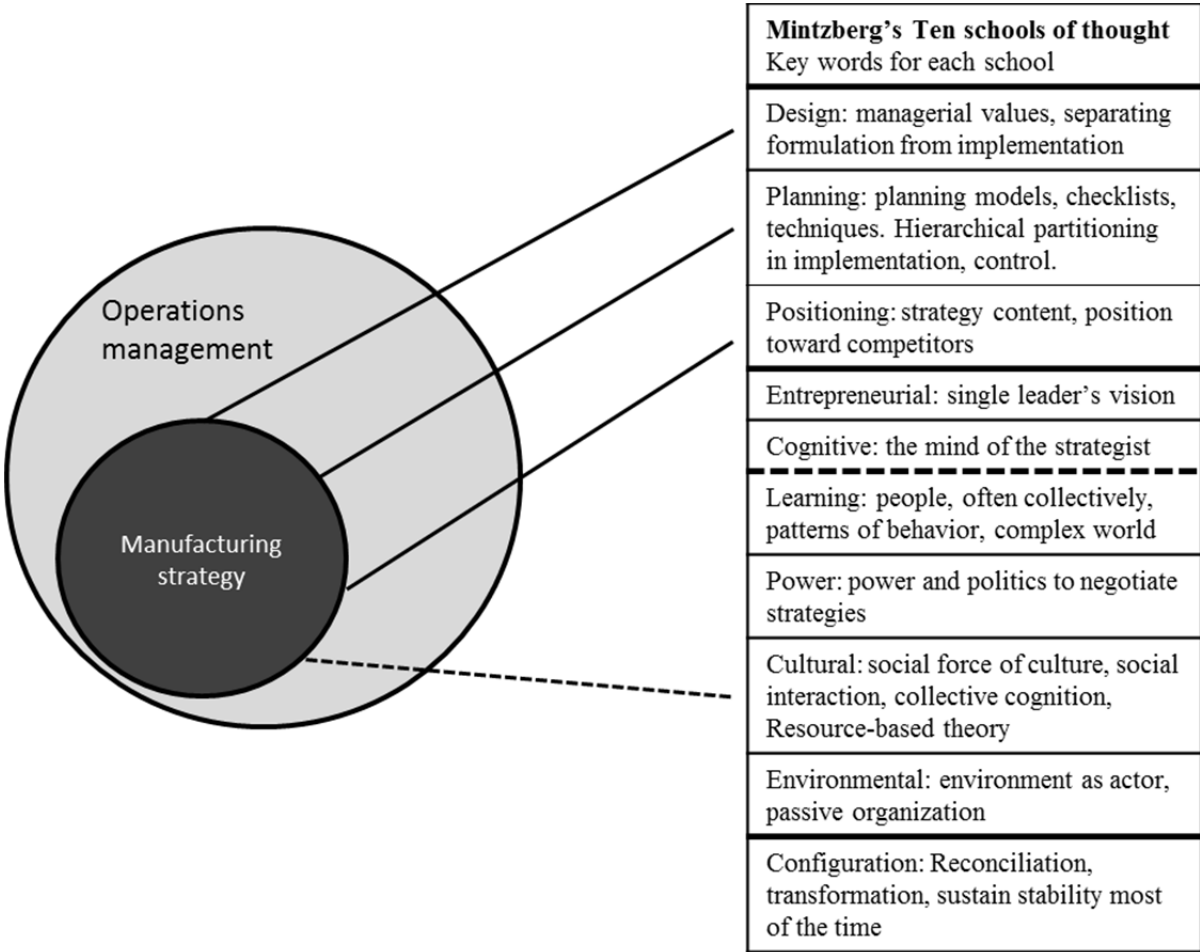
Figure 2.3 Manufacturing strategy's connection to the ten schools of thought

The traditional MS literature can be positioned within the first group of schools; the prescriptive schools (see Figure 2.3). There are clear connections between MS and all three schools: from the *design school* comes the separation between formulation and

implementation; from the *planning school* comes the hierarchical partitioning and the planning models with checklists and techniques; and from the *positioning school* comes the strong focus on strategy content. It seems as if the setbacks in strategic management literature (e.g., in the *planning school*) have not been as predominant in MS literature. Planning models and formal processes still have a profound role in MS.

During the past decade MS literature has to some extent embraced the resource-based view (RBV), which can be positioned within the *cultural school* (Mintzberg et al., 2009). RBV has also received a great deal of consideration within OM literature in general (e.g., Pilkington & Meredith, 2009; Taylor & Taylor, 2009) and has developed to become an important body of research within strategic management (Barney, 1991; Barney et al., 2001; Conner, 1991; Priem & Butler, 2001). RBV is developing into a theory of generating and sustaining competitive advantage (Kor & Mahoney, 2004) while it aims at clarifying the link between resources and competitive advantage (Santos & Eisenhardt, 2005). RBV concerns the long-term competitiveness of a company and how companies develop based on differences in performance (Conner, 1991; Rangone, 1999); it may "help explain why some firms consistently outperform other firms" (Barney, 2001, p. 649). What can be noted here is that even though RBV adds an additional perspective to the OM domain and to the MS field, it remains closely linked to traditional MS literature, viewing people as organizational or human resources.

Even if a people dimension is not made explicit in the Mintzbergian viewpoint, there are indications of such in several schools. Both the *entrepreneurial school* and the *cognitive school* focus on individuals; however, their focuses are on one strong leader, as a formal leader or a strategist. In the subsequent schools greater emphasize is placed on the individuals, but at a group level. The *learning school* focuses on strategies emerging from collective learning; the *power school* focuses on the exercise of influence as a means to negotiate strategies; the *cultural school* focuses on social interaction and collective cognition. The *environmental school* views external forces as actors; hence, the focus is not on the individuals within an organization, but rather on the ones outside.

There is not an explicit chronological order in the development of the different schools. Despite this, the layout in the table in Figure 2.3 indicates a progression where it is evident that traditional MS literature has fallen behind the development in general strategic management literature. Identifying key words and main focuses of each school, as has been done in this section, helps define aspects from the schools that could influence MS research to develop the people dimension in MS.

2.4 Strategic consensus

In this section the concept of strategic consensus is elaborated. It is seen in this thesis as useful to capture individuals' perceptions and to develop the people dimension of MS, as it focuses on agreement within an organization.

Boyer and McDermott (1999, p. 292) defined strategy as a compass that provides a "general framework for employees at all levels of the organization to make operating decisions." One

of the core components of this strategic compass is the development of strategic consensus. Boyer and McDermott (1999, p. 290) define strategic consensus as, "the level of agreement within an organization regarding the relative importance of cost, quality, delivery and flexibility to the organization's operational goals, as well as the relationships between these competitive priorities and operational policies." This definition not only incorporates the core of what defines MS, but also implicitly emphasizes the need to involve all levels of an organization. It relates to MS content by including competitive priorities, and it relates to MS process because the development of strategic consensus requires an active ongoing process of mutual consent and information sharing. Hence, one could conclude that the concept of strategic consensus incorporates the MS dimensions and those dimensions' connections to operational function. The most important part of the definition, for this research, is "agreement within an organization," which implicitly indicates an aim for all individuals working in an organization who come into contact with "operational goals" and "operational policies" to have a joint view of MS.

Similar reasoning can be found in the work of Gagnon et al. (2008) where it is emphasized that organizations should strive for having strategically aligned individuals who "possess a global understanding of their organization's strategy that is similar to those who created the strategy" (Gagnon et al., 2008, p. 429) and whose "behaviors correspond with their organization's strategy" (Gagnon et al., 2008, p. 426). A number of other studies, implicitly or explicitly, address strategic consensus at different hierarchical levels within organizations. While Boyer and McDermott (1999) focused on the differences in perception of the strategy between operators and managers, others have focused on the managerial level, e.g., Kathuria et al. (1999) studied the differences in perception of competitive priorities between two managerial levels and the characteristics (demographic factors and organizational variables) of the lower level managers.

2.5 Behavioral operations

This section presents the behavioral operations (BO) perspective. This perspective is believed to help support a development of the people dimension in MS literature through its explicit focus on individuals as the unit of analysis.

The foundation of BO is that "almost all contexts studied within operations management contain people" (Croson et al., 2013, p. 1) and that these people are a "critical component of the system" (Gino & Pisano, 2008, p. 676). Croson et al. (2013, p. 1) defined BO as "the study of potentially non-hyper-rational actors in operational context." Gino and Pisano (2008, p. 679) offered a slightly more detailed definition: "the study of human behavior and cognition and their impacts on operating systems and processes." This view of operators and managers is an important perspective to adapt to be able to develop a people dimension in the MS field.

As early as 1989, Anderson et al. (1989, p. 145) called for a people dimension in OS: "While there is profuse literature in Human Resources and Organizational Behavior, infrastructure decisions generally and the workforce dimension specifically, are not normally thought of as strategic." These authors explained that "developing these solutions requires the attention of

the operations management field, as well as the organization behavior and human resources fields" (p. 145). This call for collaboration between fields was addressed by Boudreau et al. (2003); a framework was presented where OM and Human Resource Management (HRM) are connected and where the HRM dimensions to a great extent resembles the infrastructural decision categories in Section 2.2.1. Hence, the people dimension can be incorporated within MS through a connection between OM and HRM.

The focus on people in an operational context offered in BO has to a large extent been left out of OM literature (Bendoly et al., 2006; Gino & Pisano, 2008) due to the domain's rather "mechanistic view" of people in organizations (Croson et al., 2013). Loch and Wu (2007, p. 2) explained that despite similarities with the organizational behavior field, the purpose of BO is not to join the organizational behavior field. Neither does a BO perspective imply "throwing out of the window"[1] already existing theories within the OM domain, but rather incorporating additional considerations to provide stronger results (Loch & Wu, 2007). BO and OM share the same "intellectual goal" but while traditional OM literature has either ignored human behavior or treated it as a "second-order effect", BO has human behavior as the research focus and views it as a first-order effect: "human behavior as a core part of the functioning and performance of operating systems" (Gino & Pisano, 2008, p. 680).

The notion of non-hyper-rational actors comes from the argument that most OM literature views people as hyper-rational (Croson et al., 2013). Loch and Wu (2007, p. 9) stated that "most OM studies implicitly assume that people can be integrated into manufacturing or service systems like machines." Croson et al. (2013, p. 2) defined hyper-rational actors by presenting three criteria: "(A) they are mostly motivated by self-interest, usually expressed in monetary terms; (B) they act in a conscious, deliberate manner; and (C) they behave optimally for a specified objective function." For research to be classified as BO it has to deviate from at least one of these criteria (Croson et al., 2013), e.g., deviating from (A) by seeing behavior as being motivated by social preferences; deviating from (B) by seeing emotions as key triggers of behavior; and deviating from (C) by seeing decision makers' behavior as non-optimal. Further, BO research has to exist in an operational context and have a micro-level unit of analysis, i.e., individuals or small groups of individuals (Croson et al., 2013).

Bendoly et al. (2006) made a connection between the perceived difficulties in applying OM techniques and theories in practice and the domain's understanding of the people. The authors explained that "when it comes to implementation, the success of operations management tools and techniques, and the accuracy of its theories, relies heavily on our understanding of human behavior" (Bendoly et al., 2006, p. 737). This calls for an incorporation of the BO perspective also in the MS literature, to make use of the tools and techniques already developed by focusing on the individuals' perceptions of the MS dimensions.

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[1] Reference to Gary Becker, Nobel laureate economist, in (Loch & Wu, 2007, p. 6)

2.6 Summary

This section aims at summarizing the frame of reference and pointing out the main aspects needed for the continuation of the thesis. As was pointed out in Section 1.5, this thesis is positioned within the OM domain. The purpose of this frame of reference has been to address those theoretical fields, concepts, and perspectives that are believed to be relevant for developing a people dimension within the MS field. Figure 2.4 shows the positioning of the research presented in this thesis in relation to the theoretical fields presented in this chapter.
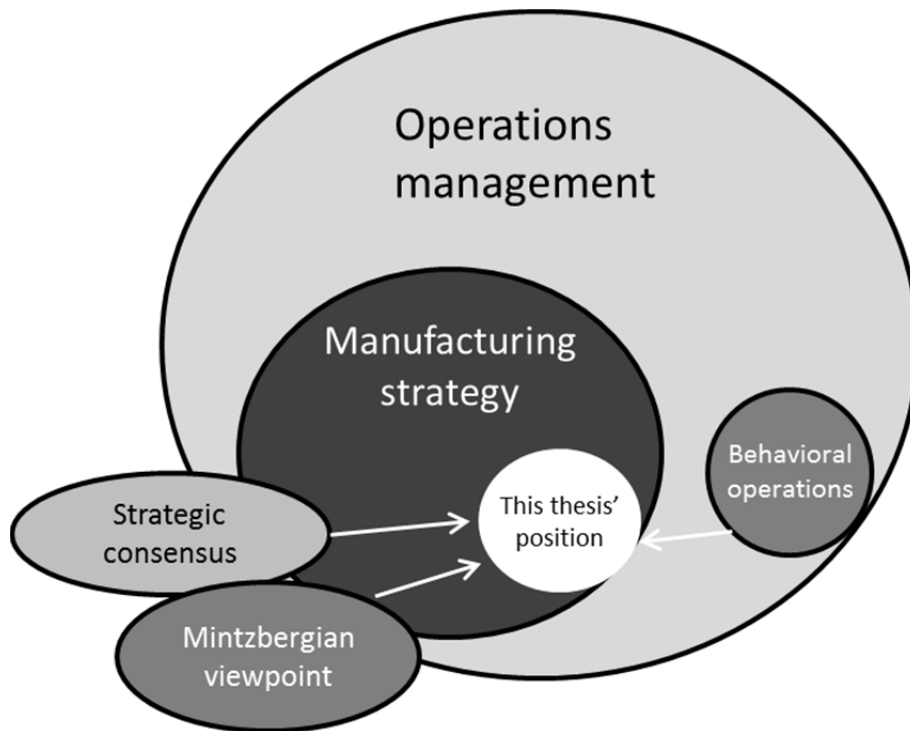
Figure 2.4 This thesis position in relation to the theoretical fields

This chapter started with an introduction to the traditional MS literature and a problematization of how people are addressed in this body of knowledge. It continued with a distinction between MS content and MS process. In the MS content literature, the competitive priorities and decision categories offer a well-structured break down of MS dimensions into factors. These MS dimensions and their factors will play a central part in capturing the individuals' perceptions. The MS process literature especially focuses on problems related to MS implementation, and the importance of creating a joint view and organizational commitment are emphasized.

The introduction of the Mintzbergian viewpoint aims at broadening the theoretical frame and positioning the traditional MS literature within a general strategic management framework. By doing so it becomes evident that there are many streams already existing within the strategic management literature, from which researchers within MS could draw inspiration. In particular, the *learning school* focuses on the collective within organizations; hence, there are indications of a people dimension.

The concept of strategic consensus adds a further aspect to the people dimension in MS by emphasizing the need for a joint view through agreement within an organization. The BO literature offers a perspective on how to study this potential joint view in manufacturing organizations. The BO perspective primarily emphasizes the need to study operational contexts from the standpoint that the human behavior of non-hyper-rational actors affects this context. The position taken in this thesis is that simply viewing people as hyper-rational machines leads to an over-simplification of reality. This makes it difficult for the techniques and tools developed in academia to reach their full potential when adapted in practice.

It can be concluded that the view of people as non-hyper-rational actors, i.e., the BO perspective, has not reached traditional MS literature. Further, the BO perspective seems to be useful to operationalize the concept of strategic consensus, and to look into operators' and managers' perceptions of MS.

3 Methodology

This chapter describes the research design, what decisions were made, how they were made, and what the implications of those decisions were. The chapter thus outlines the chosen methods and how they were used in the three studies.

Table 3.1 demonstrates the fit between the three research questions, the data needed, and the research method chosen.

Table 3.1 The fit between research questions and research methods

Research question	Data needed	Research method
RQ1: How do operators perceive MS?	Operators' perceptions of MS dimensions Theoretical	Interview Observation Literature review
RQ2: How do managers perceive MS?	Managers' perceptions of MS dimensions Theoretical	Interview Observation Literature review
RQ3: Which factors other than those captured in traditional MS literature affect the possibilities of a joint view between the operators and managers?	Operators' and managers' perceptions of MS Theoretical	Interview Observation Literature review

Figure 3.1 illustrates how the three appended papers, P1, P2, and P3, are related to the three studies, S1, S2, and S3, and to the research questions (RQs). In this chapter, the mode of presentation follows that of the three studies, which have 1:1 relationships with the papers. The connections between the papers and the RQs are explained and elaborated upon in Chapter 5 (Analysis).
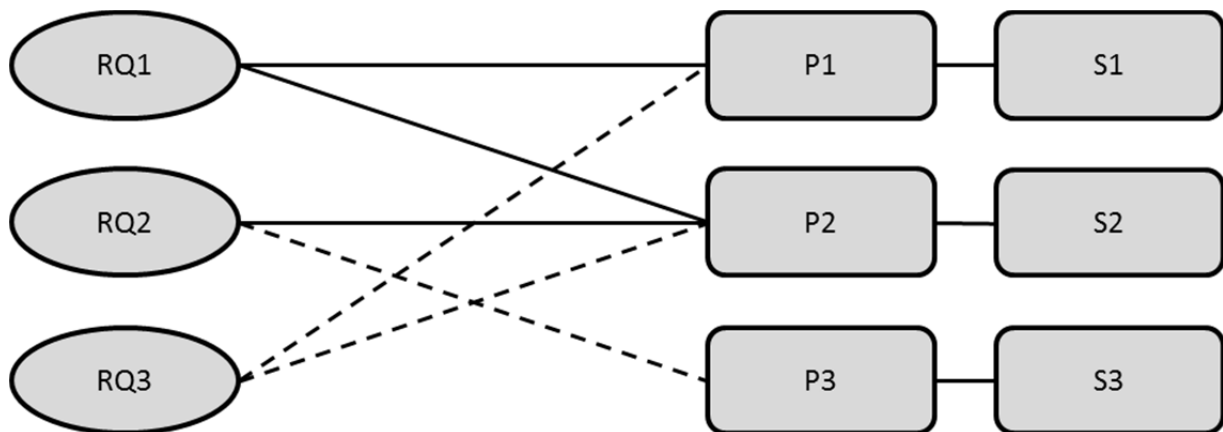
Figure 3.1 Relationships between the RQs, the papers, and the studies (a solid line indicates complete coverage, a dashed line partial coverage)

3.1 A call for a qualitative research approach

The need to focus on the people dimension of MS and the perspective of people as non-hyper-rational actors, i.e., BO, indicates the need for a research approach where ontological considerations are closer to nominalism than to realism, thus more adherent to a view wherein "reality" is the product of individual cognition and where the social world cannot exist "independently of an individual's appreciation of it" (Burrell & Morgan, 1985, p. 4). This viewpoint is important if it is sought to understand the complex social systems related to the MS process within companies. Qualitative research primarily distinguish itself from quantitative research through its emphasis on words rather than numbers (Bryman & Bell, 2011; Maxwell, 2005); qualitative research focuses on specific situations or people (Maxwell, 2005), and is not based on a unified theoretical and methodological concept (Flick, 2009, p. 16). This research studied a complex social system wherein focus was on individuals, their perceptions of MS, and to some extent the relationships between these individuals were explored. In such a context it is important to be detailed but, at the same time, to retain a holistic view of the MS process. In terms of epistemology, the research sought to obtain a view of a social world that "can only be understood from the point of view of the individuals who are directly involved in the activities which are to be studied" (Burrell & Morgan, 1985, p. 5). That is, it was sought to study individuals' perceptions of MS; the individuals' point of view was the focus. Hence, on a continuum between positivism and anti-positivism, this research aimed at position itself one step closer to anti-positivism than what is often the case in traditional MS research.

3.2 Research design and data collection

The nature of the traditional MS literature renders it necessary to draw upon both prior theory and other separate bodies of literature, in an effort to understand the phenomenon of interest. What was set out to be a deductive study of the MS implementation process at Swedish SMEs turned into an iterative research process whereby empirical data were combined with input from existing literature. The need for iteration in the process was evident when the findings of the first empirical study, S1, were examined; it became evident that a gap existed in the traditional MS literature related to the individuals' roles in the MS process. Therefore, fields closely related to MS had to be reviewed, resulting in construction of the frame of reference presented in Chapter 2.

Maxwell (2005) reasons that, as qualitative research always includes reflexive work conducted in the context of simultaneous ongoing activities, each of which influences all others, the research can never be structured in the form of a plan or protocol, but should rather be viewed through an interactive model (Figure 3.2). The model consists of five parts; these are goals, a conceptual framework, research questions, methods, and validity. The model is adapted to the research presented in this thesis and each of the five parts is briefly discussed below. Figure 3.2 indicates reading instructions for longer discussions on each part.

- *Goals.* The goals part may be broadly defined to include "motives, desires, and purposes – anything that leads you to do the study or that you want to accomplish by doing it" (Maxwell, 2005, p. 15). In this research the goal is the purpose and hence is formulated as: *to investigate operators' and managers' perceptions of MS in order to understand possibilities for a joint view of MS*. This purpose is elaborated further in Section 1.4.

- *Conceptual framework.* The conceptual framework part is defined by Maxwell (2005, p. 33) as "the system of concepts, assumptions, expectations, beliefs, and theories that supports and informs your research". In this research the conceptual framework is described in Chapter 2, and is presented as a frame of reference that contains the MS literature, the Mintzbergian viewpoint, the concept of strategic consensus, and the BO perspective. The research is framed within the OM domain. In this iterative research process these fields have served both as the theoretical base of the studies, and as a source of comparisons between empirical data and prior research findings. Especially, RQ3 is grounded in the iterative process. It was necessary to consider both what was seen in practice, and what was, to some extent, missing in the MS literature.

- *Research questions.* Related to the research questions, Maxwell (2005, p. 65) stresses that they are at the heart of the research design and defines "what you specifically want to understand by doing your study". Answers to the three research questions posed in this study yield an understanding of operators' and managers' perceptions of MS, and, to some extent, other factors affecting the perceptions of individuals that to some degree have been outside the scope of traditional MS literature. Hence, the research questions were formulated by reference to the purpose of the research. The RQs are further explained in Section 1.4.

- *Methods.* The methods part refers to what will actually be done; this is not limited to qualitative data collection but also includes "establishing research relationships with those you study, selecting sites and participants, and analyzing the data that you collect" (Maxwell, 2005, p. 79). This research has used interviews as the principal method of data collection. The research methods and procedures are described in detail in Section 3.2.

- *Validity:* The validity part of the model refers to "the correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account" (Maxwell, 2005, p. 106). In this research the validity is discussed in relation to the concept of trustworthiness, see Section 3.4 for further details.
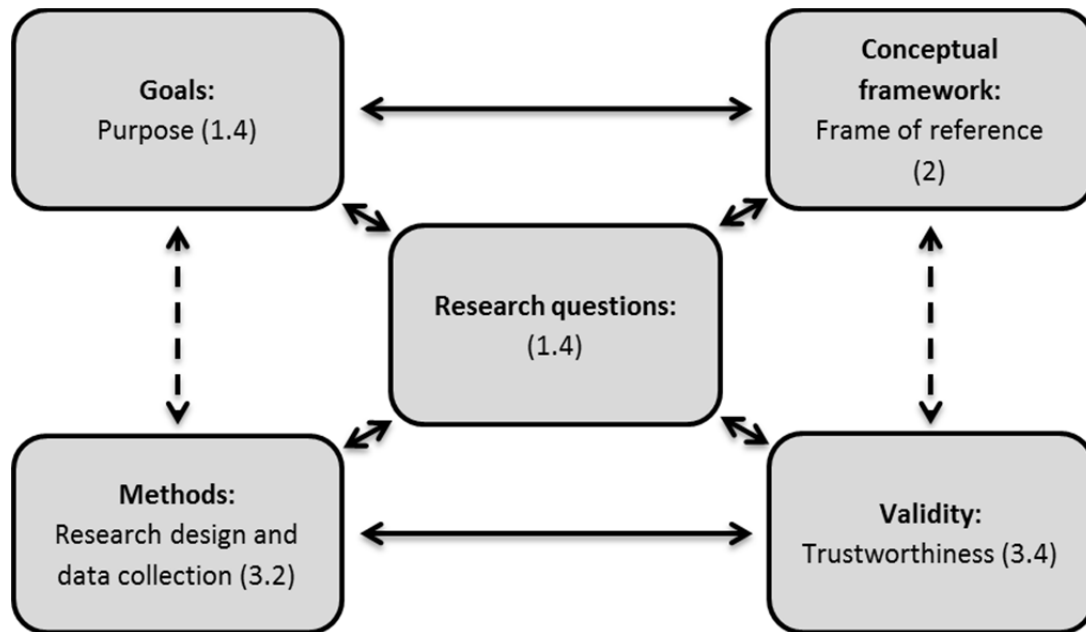
Figure 3.2 Maxwell's Interactive Model of Research Design (Maxwell, 2005, p. 5)

In the model the five parts create two triangles. It is important that the upper triangle of the model is a closely integrated unit; clear links should exist between the goals, the conceptual framework, and the research questions (Maxwell, 2005). Further, integration between the components of the bottom triangle should be explicit (Maxwell, 2005). Such emphasis on close links between research questions, methods, and validity relates to the discussion on quality criteria for qualitative research by Halldórsson and Aastrup (2003), see further discussion of this topic in Section 3.4.

3.2.1 The research process

The research was initiated during the fall of 2010 and involved three independent, but closely related, studies (Figure 3.3). A first appreciation of the OM field, with focus on the traditional MS literature and on methodological considerations, took place, along with an introduction to the Stratego project. The main purpose of the project was to develop a tool that makes it easier for SMMEs to work with their manufacturing strategies to reach competitive advantage. The Stratego project involved five SMEs that were in the process of formulating their MS on a management level. The first study, S1, was partly part of this research project and was conducted at two occasions (here shown as S1a and S1b). S1a resembled a pilot case study (Yin, 2009) and featured three interviews, whereas S1b included five additional interviews and two follow-up sessions, each with half of the interviewees. During these follow up sessions, a summary of answers was presented and each dimension was discussed. S1 resulted in a paper, P1. The initial stages of study 3 (S3), a structured literature review, started shortly after S1 ended. It had become evident that the people dimension of traditional MS literature was vague and that a structured literature review was needed to deal with this problem. A combination of S1 findings and preliminary data from S3 made it clear that additional empirical data were required, and study 2 (S2) was therefore initiated. S2 involved three companies and resulted in a second paper, P2. S2 was conducted in parallel with S3.
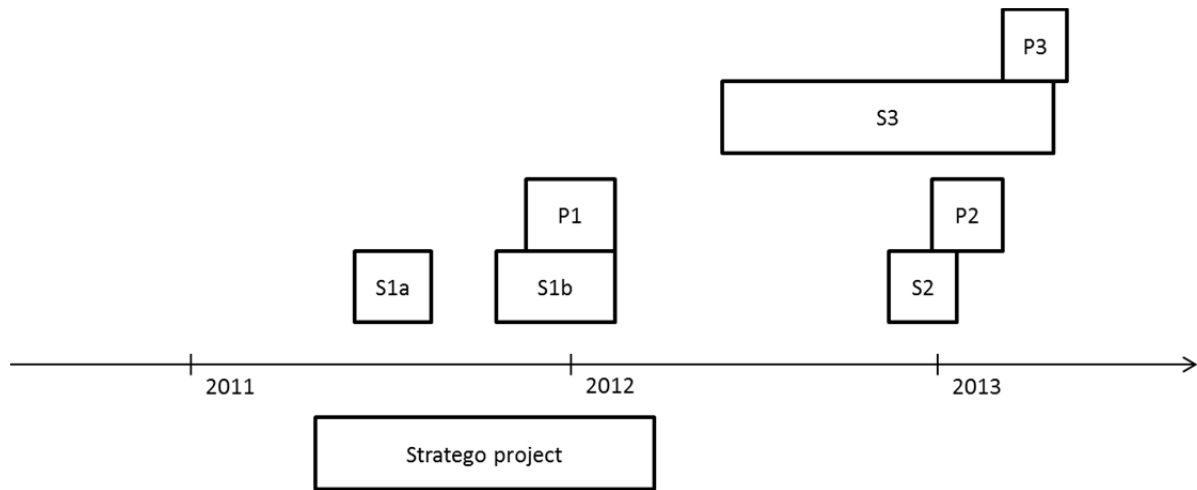
Figure 3.3 Research timeline

3.2.2 Empirical context: Small and medium-sized manufacturing enterprises

The research presented in this thesis is positioned within the context of small and medium-sized enterprises (SMEs) with a focus on subcontractors. This choice of organizational context was made because (1) it was believed that study of small companies would make the connections between operator level and manager level clearer due to shorter distances between "top" and "bottom", and, (2) it was believed that study of subcontractors would ensure that MS was a focus within the company, because other functional strategies are either non-existent or play much less prominent roles in such environments.

Several characteristics distinguish SMEs from larger companies; the most fundamental distinctions are company size and its relation to other companies. To be considered an SME a company shall have less than 250 employees and an annual turnover of less than €50 million (see Table 3.2). Also, SMEs can be subdivided into those that are autonomous, partners, or companies linked with other companies (European Commission, 2005). Further, structural and cultural differences have been identified, together with aspects of the organizational and competitive environments, and management practices, to distinguish SMEs from other companies (Hudson Smith & Smith, 2007). SMEs are characterized by their flexibility and closeness to markets, presence of a reactive, fire-fighting mentality, flat and flexible organizations featuring personalized management, poverty of resources, and low levels of employee involvement (Cagliano & Spina, 2002, p. 1383; Dangayach & Deshmukh, 2001; Löfving, 2009, p. 27).

Table 3.2 The new thresholds (adopted from European Commission, 2005, p. 14)

Enterprise category	Staff headcount	Annual turnover	Annual balance sheet
Medium-sized	< 250	≤ €50 million	≤ €43 million
Small	< 50	≤ €10 million	≤ €10 million
Micro	< 10	≤ €2 million	≤ €2 million

3.2.3 Methodological considerations

A decision on what qualitative research methods are most appropriate depends on the issues and the specific context in which those issues are studied (Maxwell, 2005). As emphasized by Flick (2009, p. 16) "qualitative research is not based on a unified theoretical and methodological concept", and it is therefore important to be aware of the data collection opportunities available for the conduct of qualitative research and to structure the methodological decisions accordingly. It is common to adopt a mixed-methods approach where several methods are combined in different ways (Bryman & Bell, 2011). This is the path chosen in this research. Bryman and Bell (2011) describe five principal qualitative research methods, whereas Yin (2009) lays out six sources of evidence most commonly used in case studies, and Flick (2009) divides the data into verbal data, observations, and mediated data (see Table 3.3). Table 3.3 outlines these methodological options; the methodological choices made for this research are listed in column 4.

Table 3.3 Qualitative research methods

Bryman and Bell (2011, p. 389)	Yin (2009, p. 101)	Flick (2009, pp. 212-213, 284-285)	Methods selected for this research
Ethnography/participant observations	Direct observations Participant-observation	Observation and Ethnography: • Non-participant observation • Participant observation • Ethnography	Non-participant observations (see further details on S1 in section 3.2.4 and on S2 in section 3.2.5).
Qualitative interviewing	Interviews	Interviews: • Focused interview • Semi-standardized interview • Problem-centered interview • Expert interview • Ethnographic interview	Semi-structured interviews in S1 and S2 (see sections 3.2.4 and 3.2.5).
Focus groups		Group procedures: • Group discussion • Focus groups • Joint narratives	Group discussions were used to confirm the findings of S1.
Collection and qualitative analysis of texts and documents	Documentation	Mediated Data: • Using documents • Qualitative online research	Structured literature review in S3 (see section 3.2.6).
	Archival records		Not applicable; the interest of the research was not a study of what an actual MS contained, but rather the individuals' perceptions thereof.
Language-based approaches to collection of qualitative data			Not applicable, language has not been a research topic but rather a medium used to communicate with interviewees.

		Physical artifacts		Have to some extent been part of the observations; especially the boards and instruction sheets used by management to communicate with operators.
		Visual Data Methods: • Use of photos • Film analysis • Video analysis		Not applicable, could have been used in an ethnographic type of study to capture details of communication during, for example meetings.
		Narratives as data: • Narrative interview • Episodic interview		Not applicable.

Table 3.3 shows that this research used primarily interviews to gather data. Interviews were believed to be the type of data collection which corresponded in the best way with how to answer the research questions. To capture individuals' perceptions, it is important to ensure that interviewees are comfortable and trust the interviewer. Also, interviewees must have enough time and possibility to think about their answers. It was thought that surveys would not adequately capture the complexity of individuals' perceptions of a phenomenon (MS) that is relatively complex. To capture differences in perceptions, it is important to ensure that all answers are individual and given to comparable questions. Therefore, the interview guides were relatively highly structured, although both the interviewer and the interviewees were allowed to elaborate on topics that arose during interviews. In both S1 and S2, the interviewees natural setting (Yin, 2009) was visited through plant tours. In S1 these tours were complemented with non-participant observations at the interviewees' work stations.

3.2.4 Study 1: Operators' perceptions of MS

S1, which yielded P1, explored how employees at a Swedish SME subcontractor within the metal working industry perceived the MS content, and to some extent the MS process. The company was selected partly out of convenience; the company was among the five companies participating in the Stratego research project. The company was chosen based on size and its willingness to participate in the study. Also, the company had ISO/TS 16949 certification and management had recently sought to focus on MS in a structured manner; a certain level of strategic maturity was thus evident. The focus of the interviews was not on the MS per se, nor on the management's view of MS, but rather on the operators' perceptions. In this study, the term "production-related staff" was used as a wider term than "operators" to define the staff with direct connection to everyday production work. Such staff may be operators, team leaders, production technicians, or warehouse personnel.

The study started with a pilot case study/pretest (Yin, 2009, p. 92) in June 2011 (S1a); three interviews were held. The most important reasons for conduct of a pilot case study are to refine the data collection plan in terms of "the content of the data and the procedures to be followed" (Yin, 2009, p. 92). A pretest is a formal test of the final plan (Yin, 2009). In this initial study it was something in between the two; the questions were retained, but the manner

in which they were posed the observation procedures used were changed to give clearer structure to the data collection. S1a was followed up by conduct of S1b in October 2011; 5 further interviews were held. In March 2012, two follow-up sessions were conducted; the interviewees were divided into two smaller groups to enhance the depth of discussion. Not all interviewees were able to attend.

S1a and S1b were very similar; each study was divided into three main parts: a plant tour, non-participant observations, and semi-structured interviews. In addition, two weekly group meetings and a weekly production meeting were attended to grasp the bigger picture and to understand the organizational information channels to which interviewees made reference. It is important, in the study context, to understand the perceptions of MS held by production-related staff; the plant tour and the non-participant observations were necessary to obtain an overview of the organizational environment of these staff, and also to be able to relate to, e.g., shop floor layout and machinery mentioned in subsequent interviews. Again, adoption of an interview approach ensured that the interviewees' perceptions were captured.

The plant tour lasted for about two hours and was hosted by a team leader of one group. All parts of the factory were visited, so that the researcher could understand the layout and the organization of work groups. The tour also introduced operators to the researcher and allowed the researcher to introduce the purpose of the research. The second part of the study involved observations of interviewees' work stations. Over approximately one hour, interviewees were given the opportunity to explain their work and showcase their stations. They also talked about their groups and work in general. It became evident that the absence of contact on the shop floor, as was true of one interviewee, negatively affected later establishment of an interviewer-interviewee connection.

The third part of the study consisted of individual interviews; the aim was to aquire a deeper understanding of the production-related staff's perception of MS. The interview guide (see Appendix 1) consisted of a standardized set of questions based on the MS content as presented in the OS matrix (Slack & Lewis, 2011). The matrix allowed interviewees' perceptions to be structured along different dimensions and permitted the perceptions of different individuals to be compared. S1a featured three interviewees, of whom two were observed at their work stations. The interviewees were selected by the production manager. Bryman and Bell (2011, p. 408) observe that "the people who are interviewed in qualitative research are not meant to be representative of a population [...] the findings of qualitative research are to generalize to theory rather than to populations". However, it was decided, based on these three interviews, that it would be useful to conduct interviews to permit valid comparisons to be made. Particularly, the influence of length of service and organizational belonging required further study. Therefore, S1b featured five further interviews. The interviewees were selected in cooperation with the production manager and the HR manager; the aim was to obtain representative profile of the interviewees. Interview duration ranged from 50 minutes to one-and-a-half hours. The first three interviews were conducted by the principal researcher in the presence of a further researcher from the Stratego project. All interviews were recorded and transcribed by the principal researcher.

3.2.5 Study 2: Strategic consensus between operators and managers

S1 revealed certain complexities, and it became clear that an understanding of conditions on the shop floor and the operators' involvement in MS required not only study of the operators but also of the managers, and the relationships between these two nodes. The concept of strategic consensus (as defined by Boyer & McDermott, 1999) and the BO perspective (as defined by Croson et al., 2013) were discovered during the work of S3, which paralleled the preparations for this study. These concepts were believed to capture the complexities identified in S1, and enable a comparison of the differences in views of the MS between the two levels. The purpose of S2 therefore became to empirically examine the link between managers' and operators' perceptions of MS, i.e., vertical and horizontal strategic consensus within the operations function, from a behavioral operations perspective.

For S2 the participating companies were selected via sampling. The organizational context of S1, SME subcontractors, was retained. Also, it was decided to remain within the metal working industry. These boundaries were set because: (1) SMEs permit easy overview not only of production processes (the organizational context) but also of organizational hierarchies; it is thus possible to understand how individuals are connected; (2) subcontractors do not make independent products and the numbers of functional strategies is thus few; manufacturing has the most prominent role; and (3) the researcher was familiar with the metal working industry and hence had a background understanding of the production systems in which the interviewees operated. Further, it was decided to choose Swedish SMEs in Jönköping County, a region well-known for entrepreneurial spirit, industrial districts (e.g., Gnosjö and Vetlanda), and the presence of many subcontractors supplying Sweden's large international corporations. The Swedish database Affärsdata was used to identify relevant companies based on size and Swedish Standard Industrial Classification (SNI) code. It was believed that very small companies would not employ enough individuals to allow the MS process to be studied, and the search was thus narrowed to include only companies with 20–250 employees. The code C-25 (Manufacture of fabricated metal products, except machinery and equipment) and the sub-code C-25620 (Machining) were used in this effort. These codes were identical to those of the company that participated in S1. The search yielded 47 companies. From this point the sampling process may be defined as purposeful selection (Maxwell, 2005, p. 88); particular settings, companies, and individuals were deliberately selected in the expectation that they might provide the information needed to answer the research questions. First, the companies' financial status was evaluated based on information in Affärsdata and, second, the companies' websites were browsed. Companies in solid financial circumstances and who had websites that featured employees; and/or strategic work, improvement work, or possession of different certificates, were given the highest priority. An email was sent to the companies with the highest priority. The email contained a brief description of the purpose of the study and the estimated time needed at the company site. The email was followed up by a phone call. Some companies declined to participate because of a heavy workload and the imminence of a Holiday season; others simply were not interested in participation. Since the study to a large extent depended on the individuals' willingness to participate it was essential that the companies were positive to the study. The three companies

which were selected offered: (1) management which was positive to the study, (2) access to the production facilities, (3) interviews with operators.

To collect the data, plant visits were combined with structured interviews at two organizational levels: operators and managers. Each company was visited over a single day, starting with the plant tour in the morning, followed by two interviews with managers and three with operators. The tours were guided by either the CEO or the production manager. Selection of operator interviewees was left to CEOs and production managers because the researcher had no previous contact with the companies. Managers were asked to choose operators who were maximally diverse in terms of gender, age, work experience, work tasks, and personality. Notably, not all individuals chosen for interviews had work tasks resembling what the researcher would describe as typical for operators. The interviewees handled as diverse tasks as production planning, material supply, group leadership, and tooling.

An analytical framework was created to structure the core MS dimensions seen as important to fulfill the purpose; the key performance objectives were essential as analytical dimensions. For each dimension in the analytical framework questions were formulated in two separate interview guides. These were used when interviewing operators and managers, respectively (see Appendices 2 and 3). The interview questions were based on a number of earlier studies and frameworks. A 7-point Likert scale was used to allow interviewees to rate the importance of particular MS dimensions and associated factors. In addition, interviewees elaborated on what certain factors meant. The interviews were conducted as semi-structured interviews (Bryman & Bell, 2011) but, again, the interviewees were allowed to elaborate on answers. However, the interview guide was followed more carefully than was the case in S1. Each interview lasted for about one hour and was recorded and transcribed by the researcher.

3.2.6 Study 3: The people dimension in MS literature

The third study was conceptual. The findings of S1 called for the conduct of a more structured literature review than had been formerly performed. The core findings of S3 are found in P3. The aim of this paper was to provide an understanding of the importance and role of "people" in manufacturing strategy, with particular attention to two levels in the organization: the operators and managers.

Throughout S3, many different search terms, databases, and search methods were used in an effort to capture the essence of MS literature in relation to a people dimension. At the beginning, the focus was on the core literature reviews already conducted in the field (e.g., Anderson et al., 1989); special attention was paid to the most recent review by Dangayach and Deshmukh (2001). References cited in this review were consulted to grasp the principal thoughts of experts in the field. Thereafter, several structured searches were conducted to capture various dimensions of MS (see Appendix 4). A trusted sources approach was used; high-ranked journals including the *Journal of Operations Management*, the *International Journal of Operations & Production Management*, *Production and Operations Management*, *Academy of Management*, and *Decision Sciences* were browsed to reveal patterns of MS publications and special issues. As the research continued new dimensions and important concepts appeared, both from empirical studies and from the searches and from snowballing

from different references. It became evident that a narrower structured search was necessary to define the existence, or indeed non-existence, of a people dimension within the MS field.

During spring 2013 searches became more focused and incorporated different dimensions of the BO perspective; "manufacturing strategy" was used as a search term in combination with different wordings for the people who are present in an operational context. This work is described in P3 (see Appendix 4 for detailed search terms). The searches focused on academic articles in the two databases ABI/INFORM and Science Direct and captured the extent to which the people dimension was represented in the MS literature.

3.3 Data analysis

The analysis of qualitative data encounters difficulties due to the large amount of data that has to be handled (Bryman & Bell, 2011); this was true of this research. It was problematic to ensure that all important aspects of the interviews and observations were captured at the same time as the data had to be sufficiently sparse to enable an overview. One solution to this problem involves the use of computer software (Bryman & Bell, 2011). This research did not employ such a tool. It was considered essential that the researcher should examine the data manually, and "play" with it (Yin, 2009).

3.3.1 Empirical studies: Study 1 and Study 2

Preliminary analyses (Flick, 2009) of the data from both S1 and S2 started while the recorded interviews were being transcribed. During transcription, notes were taken and patterns began to appear in the interviewees' answers. In both S1 and S2 the data were to a great extent structured in terms of the interview guides. This can be viewed as a simple type of coding (Bryman & Bell, 2011). Further, the analysis was influenced by thematic coding (Flick, 2009); this is used to detect group-specific perceptions. In the first stage of analysis of S1 data, the transcribed records were organized into tables according to performance objectives and decision areas (see the OS matrix in Figure 2.2). This allowed rapid overview of the results and enabled second-stage analysis; answers to the same topic were examined and the perspectives of individual interviewees were framed to create an overall view of the perceptions of production-related staff. Data from S2 were explored using the analytical framework (see Figure 4.1). A table (see appended in P2) was created wherein each individual's answers related to each MS dimension were summarized. This table was then condensed by two of the authors of P2; the focus was on how to encompass the core of each statement while permitting a comprehensive overview of the large amount of data to be constructed. When interviewees at the same level disagreed, the answers were presented separately. The table was then used to determine the level of strategic consensus both within each company and between the companies.

For communication purposes all data was gathered in Swedish but translated into English by the principal researcher. The translations do not always retain the precise wordings but rather capture the essence of the interviewees' answers.

3.3.2 Theoretical study: Study 3

Articles identified via the structured literature searches were analyzed with reference to the three key dimensions of BO; an operational context that is behavioral in nature (indicating a view that people are non-hyper-rational actors) with the unit of analysis being individuals or a group of individuals (thus not organizations or organizational structure). A 4-point scale was used to rank the papers; grade 3 indicated high relevance, that is, people at both organizational levels (i.e., operators and managers) were mentioned, and grade 0 indicated no relevance at all.

3.4 The quality of the research: the concept of trustworthiness

Research quality can be evaluated in a number of ways, the most common being a positivistic approach using conventional quality criteria such as validity, reliability and objectivity. Due to the more subjectivist nature of this research incorporating a more voluntaristic view of the human nature, other quality criteria are often recommended. The research is therefore evaluated in terms of the concept of trustworthiness, developed by Lincoln and Guba, which consists of four aspects: credibility, transferability, dependability, and confirmability (Bryman & Bell, 2011; Halldórsson & Aastrup, 2003). Use of these criteria enables better assessment of the research; a subjectivist research approach does not have to employ criteria based on objectivity. Rather, the focus is on the fit between research questions, research design, and validity.

3.4.1 Credibility (how believable are the findings?)

Reality exists only in the minds of the interviewees; the credibility aspect of trustworthiness therefore aims to capture how well the research results match the interviewees' constructs of reality.

The research focused on the interviewees' perceptions of quite complex constructs (MS is not always explicated at the companies, and the concept is rather abstract). It was important to achieve as close a match as possible between what was written down and what the interviewees actually had in mind. This problem was addressed in a number of ways. In S1 the company was visited on five occasions, and even though the same people were not interviewed, these repeated visits enhanced the understanding of the organizational context and enabled closer relationships to be developed with the interviewees. Such trust-building, and the follow-up sessions, increased the possibility of actually capturing the true perceptions of interviewees. In S2 this did not occur; each company was visited only once. However, in S2, the researcher was now more familiar with the organizational setting and therefore bonded with the interviewees faster than was the case in S1.

Initially, the intention was to conduct observations similar to participant-observations to obtain a deeper understanding of people and the context of their work. However, time issues and project constraints made this option un-feasible. Such work, with a clearer ethnographic influence and a focus on social relations, might have increased credibility further, and might also be appropriate for further studies on individuals' perceptions of MS.

3.4.2 Transferability (do the findings apply to other contexts?)

The transferability aspect of trustworthiness relates to the extent to which research findings can make general claims about the world.

This research was conducted within a very specific context: SME subcontractors in a narrow geographical area. This may limit the transferability of findings. However, the study has revealed that a theoretical gap exists in terms of the people dimension in the MS field. This gap is not dependent on the organizational context in which it may be studied. Further, the findings show that differences in individuals' perceptions of MS can be explained along five main categories. These categories may well be applicable for other organizational contexts. As they are more dependent on the individual than on the organizational context of which that individual is a part. Hence, it may be that the same factors influence the perception of MS of an operator working at a multi-national corporation in the USA and those of an operator at a small company in Småland.

3.4.3 Dependability (are the findings likely to apply at other times?)

Dependability refers to the stability of the data over time and relates to the logic of process and method decisions.

Because the focus was on individuals' perceptions it is unlikely that one would get the same answers if the same questions were asked again of to the same people. This is mainly attributable to the process triggered in the minds of interviewees by the questions posed. Interviewees have stated that the questions made them aware of dimensions that they had not previously consciously considered. Hence, the mere posing of questions automatically influences the organizational context. However, by thoroughly documenting the research process, and the progress made, for example, by recording and transcribing the interviews, the dependability is achieved by allowing others to take part of the actual data.

3.4.4 Confirmability (has the investigator allowed for his or her values to intrude to a high degree?)

The confirmability aspect of trustworthiness addresses researcher bias.

In many aspects it is impossible for a researcher who studies people's perception to not affect an interviewee. As explained above, the mere posing of questions changes values held by interviewees. However, the researcher sought, as far as possible, to remain neutral, both in the manner in which questions were posed, and in reacting to answers. Further, it is suggested that substantial knowledge of production processes, and the way in which people normally communicate in such a context, decreased the gap between researcher and interviewee. Hence, measures were taken to reduce exposure of researcher values and beliefs. Further, the transparency of the data collection and choice of methods enables reviewers to examine the logic from data, to analysis, to conclusions. Moreover, the interactive model of Maxwell (2005) illustrates a methodological fit; this further enhances the trustworthiness of the research.

4   Summary of appended papers

Three papers are appended to this thesis. The papers are the results of the three studies, with a 1:1 relationship. The papers are summarized in this chapter.

4.1   Paper 1: Production-related staff's perception of manufacturing strategy at a SMME

The paper is based on S1, it was the first paper produced in the research process and aims to answer RQ1. At this early stage of the research the focus was primarily on the operator node. In this paper the operator node was defined as production-related staff: staff with direct connection to everyday production work, e.g., operators, team leaders, production technicians, and warehouse personnel.

4.1.1   Purpose and outline

The paper aims to capture the operators' perceptions of the MS and how it affects their daily work. The purpose of the paper was to focus on an area within the MS implementation process which is quite unexplored within the literature: how the employees perceive the MS content.

The paper begins with a brief introduction to the problems associated with the MS implementation. It continues with a frame of reference that primarily is based on the OS matrix by Slack and Lewis (2011). In this context, learning in organizations and references such as Fang and Wang (2006), Gagnon et al. (2008), and Nonaka (1994) are also included to add the learning perspective to the traditional MS literature. The paper continues with a discussion of the research methodology that is followed by the empirical findings from eight interviews at a SME subcontractor. The findings are outlined along the OS matrix dimensions. The paper ends with a discussion and conclusions that sum up the paper.

4.1.2   Main contribution from the paper

The main contribution of the paper is the focus on the operator level, which has only been addressed to a limited extent by earlier studies. This focus on operators' perceptions of the MS opens up a new perspective on the MS process. The paper indicates that there are a number of factors that influence the way operators perceive the MS, as well as to what extent they perceive different MS dimensions. These factors are related to organizational belonging, length of service, and communication, and they will be further elaborated below.

The paper shows that operators understand their own work context, i.e., they are aware of their group's work and how it is organized. However, they do not seem to be able to relate to their role within the company nor do they appear able to see or understand managements' long-term planning. Hence, they have difficulty perceiving the company's MS. Further, *development and organization* (i.e., one of the decision areas in the OS-matrix) is the MS dimension where the interviewees had the most to say and where dissatisfaction was highest. When it comes to educational programs, information sharing, long-term plans, and improvement work, a gap exists between what the management focuses on and what the employees actually perceive. Problems with this type of deviation between different levels'

views of the MS ultimately affects the company's ability to remain competitive; thinking and acting must be aligned on all levels (Senge, 1990).

The paper indicates that some factors have greater influence than others on the operators' perceptions. It is evident that the perception varies depending on which group the interviewees belong to and their length of service. It seems as if the perceived knowledge is communicated by management to a quite small extent, but is primarily gained based on personal interest and commitment to various employee groups (see the appended P1 for further explanations). Further, there are indications that knowledge and knowledge sharing decreases when there is no job rotation. There are significant differences in perceptions of the MS dimensions depending on if the operators have very repetitive tasks, i.e., if they work at a station where the products are made to stock (MTS), or if they have more alternating tasks, i.e., if they work at a station where small batches are made to order (MTO).

At the studied company, problems with transferring knowledge are evident both for tacit and explicit knowledge. There are closed communication loops where operators only talk to their group leaders, and the information, therefore, goes through many hierarchical levels. Despite the use of newsletters and weekly meetings, i.e., both written and oral forms of communication (Gagnon et al., 2008), the operators do not see a clear link between their own work and the company's MS. The tools used are not utilized in full. For example, graphs are not clearly explained, and the group leaders do not use visual boards to monitor the information, even though pictorial presentation is important to firm understanding (Mills, Neely, Platts, & Gregory, 1998). The information is to a large extent communicated through financial measures, which are not only difficult to grasp, but also very clearly direct the operations to short-term actions. This short-term thinking is also evident when it comes to the lack of clearly presented educational programs and to the fire-fighting actions taken for quality and maintenance work, which several interviewees talk about.

Therefore, the company needs to focus on their strategic time orientation while simultaneously focusing both on short-term and long-term time frames (Voss & Blackmon, 1998). Further, the studied company has a learning process typical for SMEs, learning by doing (Cagliano & Spina, 2002). The paper shows that factors related to communication, knowledge sharing, empowerment, and learning in organizations are important for enabling a successful MS process where strategic commitment and alignment are reached. Companies need to have a clear focus on the learning process within the organization to create organizational knowledge and to build a strong corporate culture (Fang & Wang, 2006) that focuses on team work (Marucheck et al., 1990) where a common body of strategic knowledge (Gagnon et al., 2008) can be created (Nonaka & Takeuchi, 1995). Nonaka's (1994) view of the individual within the organization as the prime mover of knowledge needs to be acknowledged.

4.2 Paper 2: Strategic consensus in SMEs: Behavioral operations perspective on manufacturing strategy

The second paper is based on S2, it was the second paper produced in the research process and aims to answer RQ1 and RQ2. At this stage in the research the focus was expanded to also include the manager node.

4.2.1 Purpose and outline

This paper focused on the level of strategic consensus between the operators and managers at three different companies. The purpose of the research was to empirically examine the relationship between managers' and operators' perceptions of MS, i.e., vertical and horizontal strategic consensus within the operations function, from a BO perspective. The added focus on individuals as non-hyper-rational actors, i.e., the BO perspective, also added a dimension that was only implicitly present in S1.

The paper starts with an introduction to the problem and the purpose of the research. Thereafter the theoretical framework is introduced, which results in an analytical framework (see Figure 4.1). This analytical framework captures a number of MS dimensions for further analysis. In this paper, the concept of strategic consensus was used to study the joint view of MS between operators and managers. The BO perspective was used as a lens through which to examine MS. The methodology is briefly described and included structured interviews at three companies in the metalworking industry in Sweden. The results from the 15 interviews are captured in a table (see P2 for further details) where the ratings made by the interviewees on a Likert scale, as well as their most important answers, can be seen. These results are analyzed along the MS dimensions: *delivery, flexibility, quality, cost, competitive factors, information and process technology, human resource systems, organization,* and *implementation*. This is an extension from the dimensions noted in P1, which were based on the OS matrix. Further, the strategic consensus between operators and managers are captured. Lastly, discussion and conclusions capture the core findings of the paper, as well as avenues for future studies.

ANALYTICAL FRAMEWORK			
Behavioral operations			
Strategic consensus			
Content			Process
Competitive priorities	Decision categories		Implementation
Delivery	Structural	Infrastructural	
Flexibility	*Information and process technology* (layout)	*Human resource systems* (work enlargement)	*Information sharing tools*
Quality		*Organization* (relations between operators and managers, long-term plans, participation in change work)	
Cost			

Figure 4.1 Analytical framework: capturing dimensions

4.2.2 Main contribution from the paper

The main contribution of this paper is its attempt to incorporate the perspective of people in an operational context as non-hyper-rational actors, i.e., BO, into the field of MS. This is accomplished by addressing the level of strategic consensus between operators and managers at three Swedish subcontractor SMEs. The main finding is that strategic consensus is not equal to strategic commitment.

The paper indicates that strategic consensus seems to be in place to a much larger extent than what is implied by, for example, Boyer and McDermott (1999); operators and managers do have a joint view of what their MS looks like to some extent. Operators perceive the MS dimensions differently depending on how close to their own work tasks and organizational groups the dimension is. This means that they have a large awareness and are able to make detailed statements related to the MS dimensions that are handled at group level: *quality, information and process technology,* and *implementation*. Regarding *quality*, all interviewees show awareness about their customers' product requirements. Further, all three companies have consensus that they produce high-quality products and what constitutes such products. However, regarding who has the responsibility for the quality it seems as if the operators consider the managers to be the most responsible, while the managers place the responsibility with the operators. Company 2 is an exception; at both levels, they discuss shared responsibility. Related to the MS dimension *information and process technology*, all companies have consensus regarding the structure of their production process and its layout. Regarding the MS dimension *implementation*, it is evident that all companies use about the same type of information sharing tools and that there is an awareness of what those tools are and how they are being used. This implies that there are information channels in place to facilitate information sharing and strategic consensus creation.

For the MS dimensions *delivery, flexibility,* and *competitive factors* there is a more evident lack of strategic consensus. Regarding *delivery*, the operators who are late in the production flow at Company 1 and at Company 2 view the internal delivery reliability as worse than what the majority of the interviewees do. Regarding buffer usage, perceptions differ both between and within the hierarchical levels. Concerning customer delivery demands, none of the operators have a clear view of what the customers' demands imply. Regarding the MS dimension *flexibility*, there is a lack of consensus between operators and managers at all companies regarding the factor associated with the size of the product portfolio. This might be because at all three companies, only a minority of products among thousands are produced regularly. Further, operators only seem to have limited knowledge about products that they themselves do not operate on. Regarding the factor flexibility of delivery date, there is lack of consensus at two of the companies. Concerning the factor flexibility of delivery quantity, the two hierarchical levels deviate; operators consider their companies to be more flexible than managers do. This could be explained by the operators' focus on their own organization; hence, some operators do not share the same level of awareness for the MS dimensions related to customers and suppliers. Regarding the MS dimension *competitive factors*, two of the companies' managers describe high technical knowledge as their main competitive advantage. Meanwhile, all operators at all three companies mention delivery precision as the main competitive advantage, something only implicitly mentioned by the managers at one of the companies.

For the MS dimensions *cost, human resource systems,* and *organization* there is not only a lack of consensus, but the operators' awareness of these dimensions is also low. Regarding *cost*, even though some operators witness regular information, none could relate to or explain their company's costs and investments. Surprisingly, neither could one of the production managers. However, the ratings on the Likert scale show consensus within all three companies regarding the importance of cost reduction. Regarding the MS dimension *human resource systems* and the factor related to possibilities to learn more, the operators disagree both among themselves and with the managers at two of the companies. Further, there is a lack of consensus also at management level. Concerning the MS dimension *organization*, one of the companies, which recently changed both management and owners, shows lower levels of consensus regarding contact and relations between the hierarchical levels. The other two companies show consensus regarding having flat organizations, with good contact possibilities between levels. However, no clear patterns can be seen regarding the operators' participation in work change. However, at one of the companies, the agreement is higher than at the other two.

Even if the operators and the managers have consensus regarding their ratings on the Likert scale, which shows strategic consensus, differences exist in the understanding of underlying reasons for the prioritizations. This is interesting, as all three companies have information sharing channels in place. For example, Mills, Neely, Platts, and Gregory (1998) stress the importance of pictorial methods for strategy communication and here, this seems to not be enough. Either the quality of the information is poor, or the ability to grasp the information varies among the operators. Hence, even if strategic consensus for several MS dimensions is

reached, the organization still does not work towards the same goals. Therefore, there is a need to further develop the concept of strategic consensus.

4.3 Paper 3: Manufacturing strategy in a behavioral operations perspective: The *people* dimension

The third paper is based on S3 which paralleled S2. This third paper is conceptual and analyzes a number of articles relevant for the development of a people dimension in the MS field.

4.3.1 Purpose and outline

The purpose of the third paper was to provide an understanding of the importance and role of "people" in manufacturing strategy, with particular attention to two levels in the organization: the operators and managers.

The paper starts with an introduction to the research, positioning the study and defining the purpose. It continues with a brief description of the research methodology, describing how the literature searches and analysis were conducted. Further, the theoretical background is presented before the findings are elaborated upon; four categories of the MS literature are defined. Lastly, the results are discussed before drawing conclusions.

4.3.2 Main contribution from the paper

As with the two empirical papers, the main contribution of this paper is the focus on the people dimension in MS. In this paper, the focus was on how people, in particular operators and managers, have been addressed in the current MS literature.

The paper identifies 46 articles relevant to addressing how operators and managers are viewed in the MS literature. The earliest article dates back to 1985, and the rate of publication seems to have declined in the early 2000s, with the bulk of the publications presented during a period of 15 years. Further, this subject is somewhat dispersed over a variety of academic disciplines (31 different academic journals). This suggests that the people dimension of MS does not have any settled "home"; most of the notable contributions were published more than a decade ago without managing to penetrate the predominant discussion of the content and process of MS. Further, the emergence of the BO field has yet to be developed into the field of MS.

Three categories of articles are defined in the paper:

1. articles with a strong profile in MS that are within the manufacturing function and in some way refer to "people",
   a. conceptual nature of the evidence
   b. empirical nature of the evidence
2. articles that relate to the role of managers vis-à-vis manufacturing, e.g., interaction and alignment with business strategy and other functional areas, and
3. articles that are ranked as those that present the most advanced view regarding the people dimension.

Articles in category 1a present frameworks where words such as monitoring and control are used and where hierarchical levels are to be "utilized"; a view in which "people" are referred to as human resources or a workforce. Management sets strategic priorities, and managers receive greater attention than operators. However, managers as individuals are not elaborated upon, and elements of what we today know as the BO are not identified.

Category 1b consists of articles that are based upon empirical evidence that use, e.g., interviews and direct observation as data collection methods. The evidence is primarily collected from only one hierarchical level of an organization, the manager level. Further, the focus of the articles is on the managerial level of the organization, e.g., it is the managers who organize improvement efforts, while operators only take part at the detailed task formulation stage. Two of the papers indicate a BO perspective, discussing pride in work, morale, commitment, and learning in relation to best practice (Morita & Flynn, 1997), linking MS with education and training, and focusing on the importance of involvement at all levels (Staughton et al., 1992).

Category 2 has a more evident people dimension, addressing the role of manufacturing and managers. A large number of the reviewed articles fall into this category. The articles imply a quest for a more inclusive approach to MS by first, pointing out the relevance of multiple levels in the organization, and by second, implying iteration between such levels. The multiple levels in the organization are addressed by studying seniority of manufacturing personnel and their involvement in strategic decisions, by studying the role of corporate, business, and functional managers in the MS development, and by studying the need for consensus between managers at different levels and functions. Some articles focus on managers as individuals and the need for a knowledge-based view. The iteration between levels is addressed through a more dynamic and integrative vocabulary, with terms such as alignment, vertical hierarchies, and managers' mental models. However, the unit of analysis was at the plant level, and the respondents were managers. Overall, this category implies a more evident role for people than the first category does by referring to different hierarchical layers of "people". Yet the predominant perspective seems to be the one of managers rather than workers in manufacturing.

Category 3 represents the most developed perspective regarding the people dimension in MS, as derived from the literature review. Only five papers fall into this category; they were published between 1987 and 2000. Although they were published before the BO was presented in the OM literature, they captured elements of the people dimension in MS to a greater extent than articles in the previous categories; all five articles stress the importance of operators (workers and employees). The articles address employee role behavior and employees' mindset, the importance of open communication between employees and managers, the need for employee acceptance of strategy, and the influence of non-technical factors on MS. However, none of the articles have included operators as a "data source", nor do they depict operators as individuals or establish the hierarchical level as the unit of analysis.

All three categories confirm a bias towards focusing on managers and their organizational roles and actions, both with regard to the content and the process of MS. This implies that MS as a subset of OM is dominated by the logic and perspective of "management" rather than "operations". Two propositions are suggested:

1. *The predominant focus on managers as key actors of MS must be complemented by including the role and viewpoints of operators.*
2. *Difficulties of implementation and further advancement of MS are constrained by key assumptions about human beings. BO offers a perspective and vocabulary to question these assumptions.*

The unit of analysis should no longer be multinational corporations or individual plants, but instead it should necessarily refer to a micro level in which a part of an organization is studied. This also implies a quest for the use of qualitative field studies in which individuals and events are studied in a particular context. A number of articles reviewed in the paper discuss the impact that strategy has on employees. When examining the method, this input data often comes from top management or manufacturing managers. To assess the situation for the employees, the employees need to be the unit of analysis.

The decline in studies since the early 2000s leaves the impression that researchers interested in the people dimension have focused on other branches of OM. MS has, in turn, not undergone any major changes. It came as a surprise that concepts such as strategic resonance and strategic consensus did not appear more evidently in the literature search, despite having clear indications of relating individual perceptions at different hierarchical levels to each other by analysis of small groups in a manufacturing setting. The paper contributes to a redefinition of the process of MS by incorporating a people dimension. People cannot be viewed as a manufacturing resource with an optimized behavior but instead must be regarded as non-hyper-rational human beings. Greater attention to operators requires the conceptual development of this dimension into MS.

5 Analysis

This chapter will provide answers to the research questions. How the RQs are connected to the three appended papers can be seen in Figure 5.1. The slight change of research focus during the process, where the operators' perceptions from the beginning had a more prominent role than the managers' perceptions, e.g., in S1 only the operator node is captured, led to more data collection as related to RQ1. Therefore, RQ1 has been given more room in this chapter.
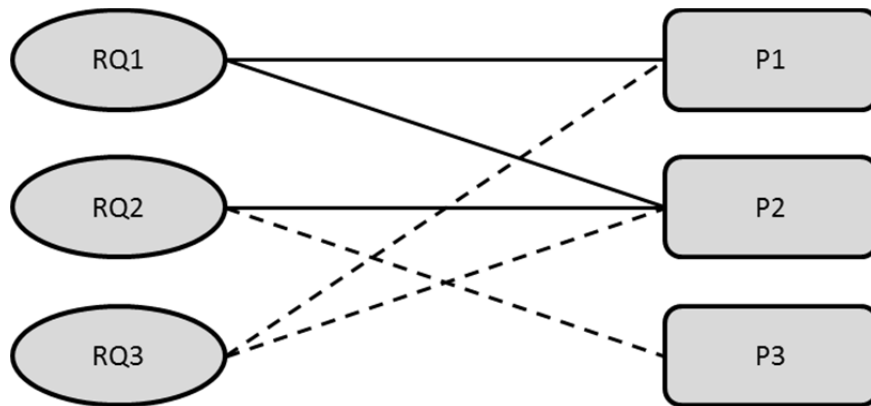
Figure 5.1 The connections between the RQs and the papers (a solid line indicates complete coverage, a dashed line partial coverage)

The MS dimensions put forward in this analysis are based on a variety of frameworks within the traditional MS literature. In P1 the analysis was based on the OS matrix (Slack & Lewis, 2011) and in P2 the analysis was based on an analytical framework developed in that paper (see Figure 4.1). In this combined analysis, a pattern has emerged where the MS dimensions can be structured according to three organizational levels: intra-organizational at the group level, intra-organizational at the organization's upper level, and inter-organizational level (Table 5.1). The organizational levels relate to the closeness of the MS dimension to the operators' work tasks and organizational groups.

Table 5.1 Organizational levels and the MS dimensions

Organizational level	MS dimension
Intra-organizational at the group level	Quality Information and process technology Implementation
Intra-organizational at the organization's upper level	Cost Human resource systems Organization
Inter-organizational level	Delivery Flexibility Competitive factors

The intra-organizational at the group level refers to the MS dimensions that the operators come into daily contact with. The intra-organizational at the organization's upper level of the organization refers to the MS dimensions that relate to strategic decisions on an organizational level that is higher than the group level. The inter-organizational level refers to the MS

49

dimensions that, from the operators' perspective, involve contacts with customers and suppliers.

5.1 RQ1: How do operators perceive MS?

Operators' perceptions can be explained along three main categories: (1) intra- versus inter-organizational MS dimensions, (2) the operators as individuals, and (3) communication of MS.

5.1.1 Intra- versus inter-organizational dimensions

Based on the data presented in P1 and P2, it can be seen that the operators perceive the MS dimensions differently depending on how close the dimension is to their own work tasks and organizational groups

Operators have a large awareness and are able to make detailed statements related to the intra-organizational MS dimensions at the group level; *quality, information and process technology,* and *implementation*. These dimensions are handled within their own organizational group, and to some extent between groups, on a regular, and often daily, basis. For example, as related to the *quality* dimension, the operators are able to explicate factors such as customers' requirements for products in a detailed manner, defining tolerances and surface requirements. Concerning the *information and process technology* dimension the focus in this research has been on the production process and the layout. Regarding these factors, the operators are able to explain their role within the internal production flow, as well as how they relate to individuals before and after them in the internal production flow. Related to the *implementation* dimension, the focus in this research has primarily referred to the usage of information sharing tools. Despite large differences in the perception of the messages are conveyed through those tools, most operators seem to be aware of when, how, and by which means information is given/provided to them.

The dimensions *cost, human resource systems,* and *organization*, are in P2 defined as being on the upper intra-organizational level. This distinction is not made explicitly in P1. However, the findings in P1 relate to the MS dimensions used there. *Cost* and *development and organization* follow the same reasoning. Therefore, they can therefore be grouped according to the same structure as in P2. These intra-organizational MS dimensions at the organization's upper level are dimensions that the operators do not encounter daily. Instead, managers handle them at a higher hierarchical level. With respect to these dimensions, two aspects affect operators' perceptions. First, the operators' awareness is low; i.e., many of the operators are unable to provide answers related to these dimensions. Second, due to their lack of awareness, there is also a lack of consensus among the operators. For example, concerning the Cost dimension, most, if not all, operators are make guesses regarding their company's production costs. Since they are guessing, these deviate significantly among the operators.

The last organizational level identified in this research is the inter-organizational level, constituting the MS dimensions *delivery, flexibility,* and *competitive factors*. These MS dimensions hold, similar to the dimensions at the intra-organizational group level, a connection to the operators' organizational groups and are handled regularly. However, what distinguishes this inter-organizational level is its clear connection to the external environment,

explicitly to the company's customers and suppliers. Regarding these dimensions, P2, and P1 to some extent, shows that the operators' perceptions are lower than their perceptions for the intra-organizational group level. However, they are higher than for the upper intra-organizational level. This seems to be primarily related to the intensity of the operators' contact with these dimensions. Therefore, there are also differences in perceptions among operators, and hence, a lack of strategic consensus. For example, P1 shows that operators working with make-to-order (MTO) of small batches have closer contact with the end customers. Therefore, they seem to have a greater awareness of the *delivery* dimension, for example, than operators who work with make-to-stock (MTS) of large batches. This indicates that there is no joint view among operators of what these dimensions incorporate or imply for the organization's daily work.

The division of MS dimensions into three main organizational levels indicates that it is easier for the operators to perceive competitive priorities and decision categories that are associated with their own group, i.e., the intra-organizational MS dimensions at the group level. By presenting data identifying these dimensions and how operators are related to them, this research helps to structure work with MS at manufacturing companies. This research contributes to the insight that operators more naturally associate their work with factors such as product quality and factory layout than with factors related to production costs and education possibilities.

5.1.2 The operators as individuals

This section aims to elaborate on the second main category to explain operators' perceptions, the operators as individuals. This term refers to characteristics that concern the individual operator and not the operators as a collective, as is often the case in the traditional MS literature. Based on the findings in P1 and P2 three sub-categories are identified:

- Organizational belonging
- Length of service
- Personal interest and willingness to learn

Organizational belonging refers to where in the production process an operator works. As could be seen at the inter-organizational level, the findings in P1 indicate a relationship between what type of order the operator is working on and the perception of the MS dimensions. Operators working with MTO of small batches seem to have a greater understanding of the MS process and the fundamental ideas behind it than operators who work with MTS of large batches. This distinction, however, cannot be supported by the findings in P2. This primarily relates to the fact that the companies in P2 did not have such clear distinction among the work tasks of different groups. However, what can be concluded from both P1 and P2 is that the group identity and the work tasks within the group affect the operators' perceptions of the MS. Related to this is also the issue of job rotation. If an operator identifies himself/herself with more than one production group and with more than one work task, the width of the organizational belonging increases. As a result, the awareness of the activities and decisions at the company also increases.

Regarding length of service, both P1 and P2 show that operators who have been at the same company for a long period often have had a number of different work tasks, belonged to different groups, and in many cases received more responsibility. This responsibility can relate to the production work, i.e., shift leader or "expert" at some tasks within the group. It can also relate to other dimensions of the organization, i.e., being a representative for the labor union or being an internal auditor. Such responsibilities seem to allow for operators to relate more than operators without responsibilities to the intra-organizational MS dimensions at the organization's upper level.

The operators' personal interests and willingness to learn will always be a factor that influences how operators perceive the company's MS. Both P1 and P2 show that there are differences in perceptions among operators, even if they belong to the same group and have worked at the company for a long time. This indicates that operators cannot be seen as a homogenous group to which management "push" the same information. P2 shows that there are larger differences among the operators within a company than there are differences between the "operator groups" at different companies. This indicates that the perception of MS is more closely related to the individuals than to the organizational context. The problem seems to be twofold. There are operators who desire to learn more but are not pushed or helped in doing so. Additionally, operators exist who do not want to learn and who, therefore, are not receptive to the information presented. This research suggests that these individuals must be addressed differently to understand what the MS incorporates. Even if some operators always will be willing to learn more and make sure to know more, there should be a minimum level of awareness throughout the shop floor. However, how this can or should be accomplished is beyond the scope of this research.

5.1.3 Communication of MS

P1 shows that communication, despite management's attempts to use a variety of communication channels, i.e., weekly group meetings and information boards, is the main obstacle for operators' awareness of the MS dimensions. This finding is also supported by P2. Further support for the importance of communication of MS can be found in P3 where open communication between operators and managers is regarded as important for company success. Almost all interviewees in both empirical studies witnessed infrequent use of these communication channels, making it difficult for them to follow the different activities and decisions at their companies. It is also evident, especially in P1, that not all interviewees are aware of all the communication channels; therefore, their perceptions differ. All four companies studied in this research used weekly group meetings as their main communication channel. However, these meetings were often very focused on short-term information at the company, i.e., incoming orders and backlog. In particular, P1 also shows that in a small company, where work with the MS is not obvious to the operators, there is a risk of the operators perceiving the management's decisions as short-term solutions, indicating a fire-fighting mentality where there is no long-term planning. In such organizational settings, it is difficult to try to communicate a strategy.

The literature review in P3 shows that the people dimension in existing MS literature does not capture the operators' perceptions in relation to the MS dimensions in the same manner as the empirical studies in P1 and P2 do.

5.2 RQ2: How do managers perceive MS?

P3 indicates that the people dimension in the MS literature largely has focused on the management level. It has primarily focused on the "link" between top managers and production managers, but also on production managers' relations to other functional managers. The findings in P3 emphasize the importance of including the manufacturing function in the strategic decision-making. This focus is similar to the focus taken in P2, where the perceptions of MS with respect to CEOs and the production managers are investigated. The managers' perceptions can be explained along two main categories: (1) intra- versus inter-organizational MS dimensions, and (2) differences in perceptions between CEOs and production managers.

5.2.1 Intra- versus inter-organizational MS dimensions

Based on the data presented in P2 as well as to remain with a comparative structure for the operators' perceptions, the managers' perceptions of the MS dimensions are here also treated along the organizational levels: intra-organizational at the group level, intra-organizational at the organization's upper level, and inter-organizational. The findings in P2 indicate that managers in general have a great awareness of most of the MS dimensions. This is natural since all managers in the research are part of the management group, and hence, they belong to the hierarchical level, which in the traditional MS literature is referred to as top management and is most obviously responsible for the work with the company's MS. However, none of the studied companies had an outspoken formulated MS which was written down. This allows managers to include their own personal ideas in their interpretations of the MS. Such interpretations can be seen in the findings of P2; managers do not always have a joint view of the MS dimensions.

Related to the intra-organizational MS dimensions at the group level; *quality, information and process technology,* and *implementation,* the managers elaborate on customer requirements, the production flow, and the information sharing tools they are using to communicate with the operators. At one of the companies the managers refer to the TS[2] requirements. There seems to be strategic consensus between the managers at all three companies.

The MS dimensions *cost, human resource systems,* and *organization* are in P2 defined as being on the upper intra-organizational level. Related to these dimensions, the managers' awareness remains high, but there are some deviations between the answers, indicating that there is not strategic consensus. In relation to the *human resource systems* dimension, the managers at one of the companies do not agree on the factor related to possibilities for work enlargement for the operators. Related to the *organization* dimension there are also deviations in awareness, e.g., the factor of long-term plans is addressed differently among the managers.

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[2] ISO technical specification for automotive-related products

It became obvious that some of the managers have a short long-term perspective of less than one year.

Regarding the inter-organizational level and the MS dimensions *delivery, flexibility,* and *competitive factors*, the managers show awareness of what the dimensions encompass. However, there seems to be disagreements/deviations in the importance given to some of the factors. For example, regarding the *delivery* dimension and the factor related to buffer usage, the managers at one of the companies do not have a joint view. Further, regarding the *flexibility* dimension and the factor associated with changes in delivery date, the managers' perceptions at one company deviated. While one suggested that they have a policy of never changing, the other indicated that it is never impossible to change. Regarding the *competitive factors* dimension, the managers seem to agree across the companies that what is important for their customers and what makes them competitive is high technical knowledge, expertise in their production techniques, and high quality. At two of the companies, the price is also mentioned as a competitive factor.

5.2.2   Differences in perceptions between CEOs and production managers

The findings in P2 show, as can be seen in section 5.2.1, that the two levels of managers (CEOs and production managers) disagree on a number of dimensions, e.g., factors related to delivery flexibility and operators' possibilities for work enlargement. This is surprising since these are dimensions where it could be assumed that the CEO and production manager should agree. This not only indicates a lack of strategic consensus between individuals, but also a lack of vertical alignment between the corporate strategy and the manufacturing strategy (Skinner, 1974). Similar mismatches have also been found in the literature review in P3. P2 shows that these differences in perceptions seem to be dependent on three factors:

- Organizational belonging
- Presence on the shop floor
- Length of service

Organizational belonging refers to where in the organization the manager is working. The findings in P2 show that not all production managers are as aware of the strategic dimensions as are the CEOs. At one of the companies studied, the production manager holds a role that is more operational in nature, where the responsibility for the daily work and planning is large. However, the responsibility for the strategic work and long-term planning for this company is left to the CEO. Similarly, the production managers at the other two companies are located in close proximity to the shop floor and attend to the shop floor on a daily basis. This can partly be explained by the flat organizations that often characterize SMEs. The smaller the company is and the closer the hierarchical levels are to one another, the greater is the span of responsibility for each individual. In such cases, the role of the CEO often also becomes the role of a salesperson, involving close collaborations with customers. On the other hand, the flat organizations at small companies should also be able to enhance greater awareness of strategic considerations since there are shorter distances between hierarchical levels. However, such logical connections cannot be supported by the findings in P2. In the company where the deviation between the CEO and the production manager is most prominent, there

are also family ties involved, which seem to affect the level of consensus between the two managers.

Regarding presence on the shop floor, the findings in P2 show that the answers of some CEOs indicate a disconnection from the manufacturing "reality". They do not seem to be aware fully of the problems occurring on the shop floor with respect to the MS. Some operators, who claim that the managers do not know what is going on, also state this. At the family-owned company, the CEO is present on the shop floor daily. Hence, the distances between hierarchical levels are short.

P2 also shows that the briefer time that the individual has held a position, the more their perceptions deviates from that of the majority. At one of the companies, both the CEO and the production manager are new, and they are the set of managers that disagree most. This indicates that factors such as length of service and organizational belonging affect the perception of the MS even on the managerial level.

5.3 RQ3: Which factors other than those captured in traditional MS literature affect the possibilities of a joint view between operators and managers?

The findings related to this RQ are based on the findings in S1 and S2 which are not explicitly stated in P1 or P2. This is because both papers are based on traditional MS frameworks. P1 is entirely based on the OS matrix, and even if P2 aimed to incorporate a people dimension into the analytical framework, its main structure is based on traditional MS dimensions. RQ3 aims to capture those dimensions that are not found in the frameworks but that are believed to be important for the creation of a joint view of MS. Four dimensions outside MS are identified:

- Shift work
- The role of the labor union
- Leisure time group identity
- Mental distances between hierarchical levels

5.3.1 Shift work

It is evident from the studies that operators who do not work during normal office hours have greater difficulties perceiving MS. Operators who work alternating shifts (i.e., afternoon every other week) have limited contacts both with their closest manager and with other managers during the week they work the afternoon shift. This causes an imbalance in the information flow during those weeks. However, the situation for operators working the night shift seems even more critical; they can work for several weeks with very limited contact with the management level. Due to the time-frames and design of this research, none of the interviewees was working steadily at night. However, both operators who had been working at night and some of the managers indicate that the operators who work the night shift do not participate in the company in the same way as do the rest.

5.3.2 The role of the labor union

Several of the interviewees have been or are associated with the labor union. At the company in P1, there were no union representatives, but the employees were organized in union-like

groups that had influence over, e.g., salary and other union-related issues. Being part of these groups seems to increase the operators' perception of MS. It seems as if their scope is expanded from their own group, to incorporate at least the entire company. To some extent, they even incorporate the inter-organizational MS dimensions. However, it shall also be noted that one of the main goals of the labor union is to keep operators equal to one another and emphasize the collective before the individual. Such a collective viewpoint might work against the findings in RQ1; that more emphasis needs to be put on the individuals and their perceptions. For example, the introduction of directed communication where different operators receive different types of information might contradict the purpose of a labor union. However, this problematization, the collective versus the individual, cannot be supported nor rejected with these current data. What can be concluded is that the labor union might be an external force affecting the possibility to direct information differently to various individuals.

5.3.3 Leisure time group identity

At some of the companies, ethnicity and cultural background seem to be factors that influence how information is perceived and how the operators identify themselves and their roles within the company. The amount of operators with different cultural backgrounds varies between the companies. However, in companies where many operators belong to the same cultural background, there are indications that this sense of ethnic group belonging exceeds the sense of belonging to the organizational group. There are no indications in the studies that some cultural backgrounds have greater awareness than others regarding the MS dimensions. Though, it seems as if ethnic group identity might affect how operators relate to the management level and how operators of different cultural background relate to one another. At the companies studied, the most notable group identity was cultural background.

5.3.4 Mental distances between hierarchical levels

In general, there are preconditions due to the flat organizations at all four companies studied that should enable good communication of MS. However, despite this structure, long mental distances existed at some companies between levels. A mental distance is defined as the perceived distance between individuals or groups and does not necessarily have to correspond to the actual distances, which can be both physical and hierarchical. Some operators describe a feeling where they do not feel a connection at all to the manager level. For example, one operator indicates that he/she does not feel as if the managers even notice him/her when they meet on the shop floor. Not being able to connect to the people who are supposed to share the MS might cause operators to stop listening, hence influencing how the MS is perceived. This can decrease the level of agreement within an organization and work against a joint view of MS.

6 Discussion

This chapter discusses the findings presented in Chapter 5 and relates them to the frame of reference in Chapter 2. First, the chapter discusses operators' and managers' perceptions of MS. Second, it discusses the implications of developing the people dimension in the MS field. Third, the organizational context in which this research has been conducted is elaborated upon. Lastly, implications for further research are described.

6.1 Operators' and managers' perceptions of MS

The research in this thesis aims *to investigate operators' and managers' perceptions of MS in order to understand possibilities for a joint view of MS*. This purpose was addressed by answering three RQs.

Boyer and McDermott (1999) elaborate on the concept of strategic consensus by comparing managers' and operators' perceptions of MS. In relation to their findings, this thesis adds further empirical evidence to the concept of strategic consensus. Studying the level of strategic consensus concerning MS dimensions within a company seems to be a good first step to understanding what helps create a joint view of MS. However, this research identifies limitations to the concept of strategic consensus; it does not seem to be enough to capture the entire complexity of creating a joint view of MS within organizations.

6.1.1 Consensus – yes; common reasons – no

In a company that has strategic consensus, the individuals perceive a particular MS dimension in a similar way and assign it equal importance for the company. Hence, there is agreement within the organization (Boyer & McDermott, 1999). The findings in this thesis indicate that even when there is strategic consensus, the understanding of the underlying reasons for the prioritization are not shared. Hence, the concept of strategic consensus does not capture the complexities associated with the individuals' underlying understanding of the MS dimension. For example, at one of the case companies, all interviewees agreed that it is important for the company to reduce production costs. However, the managers state that it is only possible to a certain extent and that it is important to release capital for investments. Meanwhile, one of the operators states that it is important to reduce the production costs for the owners to earn more money. The same operator later indicates that there is no information about long-term plans for the company. At first, it might seem as if the company has reached strategic consensus at this MS dimension; the individuals within the organization agree. However, when looking at the underlying ways of reasoning, greater complexity is indicated. If an operator believes that all the money that he/she saves by controlling the costs goes straight to the owners, while simultaneously feeling that he/she does not know what will happen to the company in the next month, it is likely that the operator does not feel committed to reducing costs. If the operator, on the other hand, knew that the plan for the money he/she saves is to be reinvested in better machinery so that the company can remain competitive with high-quality products, it is more likely that he/she will struggle to monitor his/her impact on production costs.

6.1.2 Organizational levels

The findings show that the individuals' perceptions, especially operators' perceptions but to some extent managers' perceptions also, can be associated with what organizational level is addressed by the MS dimensions. The MS dimensions were categorized on three levels: intra-organizational at the group level, intra-organizational at the organization's upper level, and an inter-organizational level. The closer the MS dimension is to the operator's daily work tasks, i.e., intra-organizational at the group level, the easier it is for the operator to perceive it. These findings are not surprising, as most, or all, people find it easier to perceive what is close to them than what is far away from them; that is the nature of humans. Instead, this finding is interesting because it introduces a much more complex view of the reality of implementation than what can be seen in the traditional MS literature. The traditional MS often adheres to the implementation as a quick-fix final step that is addressed by introducing the strategy to the employees. For example, Skinner (1969) refers to the implementation as the introduction of programs, indicating a view on strategies as intended (Mintzberg et al., 2009); as plans created by managers. Indeed, there is the MS process literature that address the difficulties associated with the implementation phase (e.g., Marucheck et al., 1990; Mills, Neely, Platts, Richards, et al., 1998). However, they focus to a great extent on the tools to use to communicate the MS, and the importance of organizational culture and team work. They do not explicitly address which MS dimensions might be more or less difficult for operators to perceive or how to go about communicating them differently so that everyone has a joint view of them.

Furthermore, the findings related to operators and managers as individuals indicate that how operators, and to some extent managers, perceive the MS dimensions to a great degree is dependent on three factors: (1) organizational belonging, (2) length of service, and (3) personal interest and willingness to learn. These three categories indicate a developed people dimension and a view of operators and managers as non-hyper-rational actors (Croson et al., 2013), representing an introduction of the BO perspective into the MS field.

6.2 Developing the people dimension in the MS field

This research originated in a view of MS that resembles the one present in the traditional MS literature: the distinction between content and process, the focus on content and different frameworks used to capture the MS dimensions, the simplification of the MS process into a linear procedure of formulation (most often conducted by managers) and implementation (communication to the employees of the strategic goals). In this view, people are very seldom mentioned, and when they are, they are often referred to as hyper-rational actors that can be placed into a production system, in a similar manner to the way in which machines are placed, with optimized behavior based on monetary incentives. This research has developed this view, incorporating the people dimension into the MS field. The main contribution is the focus on operators and managers as individuals. The people dimension has by this focus moved from addressing these individuals at an aggregated group level to addressing them on an individual level where their unique characteristics becomes an important factor to address to reach a joint view of MS within organizations. Further, the people dimension can be related

to two aspects of the traditional MS literature, the link between operators and managers, as well as the objective nature of the traditional literature.

6.2.1 The link versus the relationship

The connection between the operator node and the manager node can be visualized and conceptualized by the use of the word "link" (see Figure 1.3), which is a common way to describe it in the MS literature (relate back to the "missing link" in Skinner, 1969). However, by adding a people dimension to this view and by identifying factors that relate to the operators and managers as individuals, we are led one step closer to understanding the connection between the two nodes and to possibly view this connection as a relationship. In such a relationship, there is not just a link between two nodes, but also personal relationships between the individuals that constitute the nodes. With such a perspective, it is difficult to view some of these individuals as equal to machines. With such a perspective, it is also difficult to not take their opinions and experiences into consideration when developing the company's MS. Hence, the developed people dimension opens up for a view of MS where strategies not only are being planned at the top and pushed down, but also emerge through a realized pattern of strategic decisions (Mintzberg et al., 2009). Incorporating a people dimension into MS would position MS closer to the *learning school* (Mintzberg et al., 2009) than to the current position in the group of prescriptive schools.

6.2.2 The objective nature of the traditional manufacturing strategy literature

The scheme developed by Burrell and Morgan (1985) can be used to illustrate the gap between the traditional MS literature and the research in this thesis in relation to human nature (see Figure 6.1). Human nature concerns "the relationship between human beings and their environment" (Burrell & Morgan, 1985, p. 2). This thesis has addressed indications in the traditional MS literature of a deterministic view of human beings. The traditional distinction of MS into content and process to some extent hinders the incorporation of a people dimension, and by itself, indicates a deterministic view of human nature within the field. In turn, this prevents the view of people as non-hyper-rational actors. Meanwhile, this research aims at taking a more voluntaristic view, where "man is completely autonomous and free-willed" (Burrell & Morgan, 1985, p. 6). Additionally it suggests that man has a creative role; "man is regarded as the creator of his environment, the controller as opposed to the controlled, the master rather than the marionette" (Burrell & Morgan, 1985, p. 2).
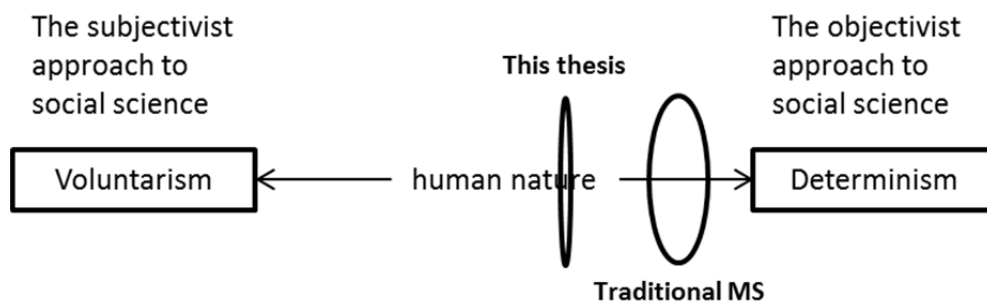
Figure 6.1 A scheme for analyzing assumptions about the nature of social science (Burrell & Morgan, 1985, p. 3)

Addressing this set of assumptions makes it clear that the standpoint taken in this thesis does not completely correlate with the one taken in the traditional MS literature. On the continuum between subjectivist and objectivist, a gap between the standpoints can be illustrated as the traditional view being close to the right-hand side (the objectivist) while this research aims at a position more to the left (the subjectivist). This research is framed within the OM domain and the MS field and was based on presumption within those bodies of knowledge. The strong emphasis in the traditional MS literature on prescriptive models and frameworks led to this research taking on a more objectivist approach than what a people dimension might suggest. Further integration of concepts, including strategic consensus and the BO perspective into the MS field, "pull" the field further to the left. Such a move is in this research believed to enhance the work with the MS in companies, to create a joint view and agreement regarding MS dimensions.

6.3 The organizational context: generalization and implications for practice

This research is positioned in a subcontractor SME context. The four case companies are operating in the same industry, machining, and are located relatively close to one another in Jönköping County, Sweden. Despite this, it cannot be said that the findings presented here are specific to these companies. On the contrary, the researcher believes that the size of the company does not have much of an impact when investigating individuals' perceptions of MS. Indeed, a multi-national corporation has a more complicated strategy process and a more complex manufacturing context to relate to. However, the individuals, regardless of whether the company has 100 employees or 15,000, relates to their own immediate surroundings. They primarily perceive the intra-organizational dimensions at the group level. It is, therefore, in these smaller groups, independent of the size of the company, where the work with the MS and the struggle to reach strategic consensus and a joint view of the company's MS must start.

Related to the companies' role as subcontractors, there are some implications for the applicability of the findings. The initial idea to study subcontractors to gain a clearer overview of the companies' MS is in some ways limiting since not having their own products decreases the company's control of the long-term planning. Hence, to some extent, the MS becomes very dependent on the large customers' strategies and planning. This indicates that the position in the supply chain affects the role the MS has in the organization. On the other hand, that type of context, with fast changes and strong interdependencies, seem to require even more coherence and a joint view among individuals at the subcontractor company.

By presenting empirical evidence that identifies MS dimensions along organizational levels, and how operators relate to them, this research helps to structure the work with MS at manufacturing companies. By realizing that operators naturally find it easier to perceive factors such as product quality and factory layout than factors related to production costs and education possibilities, the manufacturing companies might want to change the way they develop and communicate their MS. By making such a distinction between different MS dimensions, it might be easier for a company to identify potential relationships between these dimensions. This would also allow for a clearer distinction of which dimensions are more important for certain individuals or groups of individuals to take part in and understand to

enhance the joint view. This research calls for managers to direct their communication differently depending on which MS dimension is addressed and which individuals need to perceive the information. It might be that since most operators seem to have a clear picture of the MS dimensions that are close to them, group meetings and monthly meetings should focus more on showing "the bigger picture" and how the individual efforts on the shop floor have consequences for the whole company's competitiveness.

6.4 Implications for further research

The findings made in this thesis need to be elaborated upon further. For the MS field to advance, it is essential to further develop the people dimension and the incorporation of the BO perspective. This has been done at the manager level in earlier research to some extent. However, further attention also needs to be given to the operator level. This implies more in-depth studies concerning how individual characteristics (organizational belonging, length of service, and personal interest) influence not only the operators' perceptions of the MS, but also how they influence the inter-relationships within their own node. That is, do different operators take on different roles in relation to the work with the MS? Can these roles be distinguished? If so, what characterizes them and how do they facilitate the joint view of MS? Further, to grasp the people dimension in MS fully, it is important to focus not only on the nodes, operators, and managers, but also to pay attention to what characterizes the inter-relationship between the two levels.

To study this and remain true to the BO perspective, it is important to keep the unit of analysis at the micro level. The unit of analysis in MS studies aiming to address the people dimension should no longer be multi-national corporations or individual plants, but instead refer to the micro level in which a part of an organization, or individuals, is studied (Croson et al., 2013). In terms of research design, this implies a quest for the use of qualitative field studies in which individuals and events are studied in a manufacturing context and where methods such as in-depth interviews and direct observations allow the researcher to be sensitive to changes in context and to the viewpoints of the individuals who work in that particular context.

Furthermore, the connection between the company's MS and external actors should be investigated. This research has captured the MS dimensions' connection to customers and supplier to some extent, but it has been from the viewpoint of one's own company. However, if the upper organizational level primarily refers to external actors and their strategies, what implications will that have for a joint view? Is it then enough to have a joint view within one's own company, or does it also have to incorporate other members of the supply chain? If a company's MS is central for competiveness, what is the influence from external actors?

7 Conclusions

The purpose of this thesis was to address the development of the people dimension in MS by *investigating operators' and managers' perceptions of MS in order to understand possibilities for a joint view of MS*.

In the MS literature there are indicators of a deterministic view of the human nature, due to this, individuals on the shop floor are viewed as manufacturing resources. To address this, and further develop the existing people dimension within MS, this thesis has incorporated the concept of strategic consensus and the BO perspective into the traditional MS literature. Further, by analyzing the traditional MS literature from the Mintzbergian viewpoint the traditional MS literature has been positioned within a general strategic management framework. This positioning shows that there are many streams already existing within the strategic management literature, from which researchers within MS could draw inspiration.

Three RQs were used to capture the purpose of this thesis. The answers to those RQs reveal that the operators' and managers' perceptions of MS dimensions are affected by a multitude of factors.

The operators' perceptions are explained along three main categories: (1) intra- versus inter-organizational MS dimensions, (2) the operators as individuals, and (3) communication of MS. The first category refers to differences in operators' perceptions in relation to the organizational level the MS dimension is in. Operators have a large awareness of the MS dimensions that are handled within their own group regularly. The second category concerns the operators' organizational belonging, their length of service, and their personal interest and willingness to learn. The third category refers to the impact the use of communication channels has on the operators' perceptions of the MS dimensions.

The managers' perceptions are explained along two main categories: (1) intra- versus inter-organizational dimensions, and (2) the differences between CEOs and production managers. The first category refers, as for the operators, to differences in perceptions depending on the MS dimensions' organizational level. Managers' awareness is broader than that of the operators', even if there are indications that not all managers' awareness is as high as would be expected for members of the top management level. The second category refers to the managers' organizational belonging, presence on the shop floor, and length of service. At some companies the production managers have a more operational role, leaving strategic decisions to the CEOs.

In addition to these categories, striving for a joint view of MS is also impacted by factors outside the traditional MS literature and that cannot be explained by reference to the MS dimensions or implementation techniques such as communication. Four such factors have been identified: (1) shift work, (2) the role of the labor union, (3) leisure time group identity, and (4) mental distances between hierarchical levels.

The principal method of data collection was semi-structured interviews. The relatively short time spent with the interviewees might have been a drawback for capturing the operators' and

managers' perceptions of MS. To use in-depth interviews and direct observations would have captured more of the individuals' perceptions, and are suggested as data collection methods for further research.

By presenting empirical evidence that identifies the MS dimensions along organizational levels and how operators relate to them, this research helps to structure the work with the MS at manufacturing companies. By further adding factors that are not captured in the traditional MS literature, this research adds to the complexity of MS, but it also allows for clarification of the factors important to companies in addressing how to reach a joint view and agreement of the MS.

Further, this research contributes to a developed people dimension within the MS field. It offers a viewpoint that indicates the importance of addressing individuals as non-hyper-rational actors and that the connection between operators and managers should be seen as a bilateral relationship rather than a unilateral link. This implies that the research presented in this thesis strives for a more subjectivist approach to human nature than traditionally has been the case in MS literature.

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Appendices

Intervjuer 2011

Under observationerna

- Be att få förklarat hur produktionen ser ut, vad som är innan och vad som kommer efter.
- Vad det är för typ av produkt, vad den används till.
- Hur organisationen ser ut, vem som kommunicerar med vem.
- Om det uppstår problem, vem pratar man med då?
- Vet man vad de andra på företaget gör.

Bakgrundsfrågor

- Vilken är din nuvarande befattning?
- Vilken avdelning, grupp tillhör du?
- Hur länge har du varit anställd i företaget?
- Utbildning?
- Tidigare yrkeserfarenhet?

Konkurrensfaktorer

- Kvalitet
    - Vilka krav finns det på den här produkten?
    - Vem är slutkund? (Extern kund)
    - Hur pålitlig är den här maskinen, blir det ofta fel? (Conformance quality)
- Snabbhet
    - Vet du hur lång tid det tar för er att göra en produkt?
        - Från kundbehov till leverans
        - Från start produktion till färdig produkt
    - Hur lång tid tar det för dig att göra en produkt?
- Pålitlighet
    - Vet du vad ni har för leveranslöften?
        - Är de långa eller korta?
        - Håller ni dem ofta?
    - Har era kunder några särskilda krav på leveranstider? Vet du vad de kraven är?
    - Den som är efter dig i kedjan, vad har den för krav på leveranstid?
        - Har ni en buffert emellan er?

    - Ställer du några särskilda krav på den som är innan dig?
- Flexibilitet

- - Hur många olika produkter kan du göra här?
    - Hur många olika metoder kan du använda?
  - Hur lätt är det för dig att byta mellan olika metoder/produkter?
    - Går det fort?
    - Klarar du det själv?
  - Vet du hur ofta ni ändrar era produkter, eller tar fram nya?
  - Hur många olika varianter har ni?
    - Hur många olika varianter kan du göra?
  - Hur lätt är det för er att ändra batchstorlek/produktionsmängden?
  - Hur flexibla är ni i att ändra ett leveransdatum?
    - Om det är planerat?
    - Om produktion har börjat?
- Kostnad
  - Vad vet du om era kostnader?
    - För personal
    - För fastigheterna
    - För el, uppvärmning mm
    - För maskiner
    - För råmaterial
    - Företagets lån och finansiella situation

Beslutskategorier

- ”Capacity”
  - Hur ofta jobbar du över?
    - Vad beror det på?
  - Hur ofta får du göra andra arbetsuppgifter?
  - Händer det att ni har för lite att göra?
- ”Supply network”
  - Vart tar produkten vägen när du är klar med den? (Intern kund)
  - Går produkten till ett lager eller direkt till kund?
  - Vem är före dig i kedjan; vem får du material ifrån?
  - Får du rätt saker?
    - I rätt tid och med rätt kvalitet?
- ”Process technology”
  - Vet du hur den här maskinen fungerar?
    - Vet du hur andra maskiner fungerar här?
  - Vet du vem som har byggt maskinen?
  - Vem är det som sköter underhållet?
    - Kan du göra visst underhåll själv?
  - Utnyttjar ni all utrustning till max, eller kan man öka prestandan?
- ”Development and organization”
  - Hur länge har du arbetat här?

- - Har du någon formell utbildning?
  - Finns det något "utbildningsprogram"?
    - Går ni kurser ibland?
- *Sociala faktorer och trivsel (HR)*
  - Hur trivs du här?
  - Har ni sociala aktiviteter tillsammans?
    - På fritiden?
    - Organiserade av företaget?
- *Information från ledning (Organisation)*
  - Hur får du information om vad som sker på företaget?
  - Har du daglig kontakt med arbetsledare/chef?
  - Vad vet du om långsiktiga planer för företaget?
- *Förslagsverksamhet (Organisation)*
  - Om du vill förändra något hur går du då tillväga?
    - Vem pratar du med?
  - Hur bemöts den informationen?

72

Intervjuguide – Operatörsnivå

Interview guide		
Category	**Operator**	**Svar**
1. Context		
	Namn	
	Ålder	
	Kön	
	Vilken avdelning, grupp tillhör du?	
	Vilken är din nuvarande befattning?	
	Vad har du för tidigare yrkeserfarenhet?	
	Hur länge har du varit anställd i företaget?	
	Har du haft andra jobb tidigare? Har det varit internt eller externt?	
	Vad har du för utbildning?	
	Hur ser ägandet av företaget ut? Familjeföretag?	
	Omsättningshastighet på ledningsgrupp? Ledningsgruppens storlek, positioner?	
	Har ni sociala aktiviteter tillsammans? - På fritiden? - Organiserade av företaget?	
	Har du några förtroendeuppdrag? (deltagande i facket, ledningsgrupp, friskvård mm)	
2. Manufacturing Strategy		
2.1 Background/General		
Layout (cellular, job shop, dedicated lines)	Vad för typ av layout har ni? Hur är produktionen organiserad?	
Process (batches, one of a kind, mass production)	Vad för typ av produktionsprocess har ni?	
Customer	Vem är slutkund (extern kund)?	
Plans	Vad vet du om långsiktiga planer för företaget?	
Competition	Vilka är era största konkurrenter?	
	På vilka faktorer är det ni konkurrerar?	
2.2 Information sharing, management, and development		
	Hur ofta har du kontakt med din arbetsledare/chef?	* Flera ggr/dag * 1 gång/dag * Några ggr/vecka * Mer sällan
	Hur ser relationerna mellan anställda och ledning ut?	
	Hur får du information om vad som sker på företaget?	
	I vilken utsträckning finns det möjligheter för dig att lära dig fler arbetsuppgifter?	* Inte alls 1-7

73

		* Goda möjligheter/så mycket som önskas
	Hur lär du dig nya arbetsuppgifter? - Går ni kurser? (Internt eller externt)	
	I vilken utsträckning uppmuntrar företaget dig att ta större ansvar för inspektioner och kvalitet?	* Inte alls 1-7 * I hög grad
	Vilka möjligheter finns det för dig att styra detaljplaneringen?	* Inte alls 1-7 * I hög grad
	Om du har möjlighet, hur gör du? Vilka faktorer tar du hänsyn till?	
	I vilken utsträckning är du delaktig i förändringsarbete kopplat till produktion?	* Inte alls 1-7 * I hög grad
	Om du vill förändra något, hur går du då tillväga? - Vem pratar du med? - Hur bemöts den informationen?	
	I vilken utsträckning arbetar ert företag med teamarbete för att lösa problem?	* Inte alls 1-7 * I hög grad
	I vilken utsträckning är du delaktig i teamen?	* Inte alls 1-7 * I hög grad
	I vilken utsträckning leder förändringsarbete till förbättringar?	* Inte alls 1-7 * I hög grad
	Har ni något belöningssystem?	
2.3 **Delivery/Speed/Dependability**		
(quality conformance)	Vem är före dig i kedjan; vem får du material ifrån?	
(quality conformance)	Ställer du några särskilda krav på den som är före dig?	
Intern kund (quality conformance)	Vart tar produkten/detaljen vägen när du är klar med den?	
(quality conformance)	Ställer den som är efter dig några särskilda krav på dig?	
	Hur ofta får du rätt saker i rätt tid?	* Aldrig 1-7 * Alltid
	I vilken utsträckning använder ni er av buffertar mellan arbetsstationer?	* Inte alls 1-7 * I hög grad
Cykeltid	Hur lång tid tar det för dig att göra en produkt/artikel?	
Leveranstid/orderledtid	Hur lång orderledtid/leveranstid har ni? (tiden det tar från kundbehov till leverans)	
Produktionsledtid	Hur lång produktionsledtid har ni? (tiden det tar från start produktion till färdig produkt)	
Produktionsledtid	Hur viktigt är det för er att kunna minska produktionsledtiden?	* Inte alls 1-7 * I hög grad

74

Leveransledtid	Vad har era kunder för krav på leveranstider?	
	Hur upplever du era leveranstider?	* Väldigt korta 1-7 * Väldigt långa
	Hur upplever du säljavdelningens leveranslöften?	* Väldigt korta 1-7 * Väldigt långa
	I vilken utsträckning håller ni era leveranstider?	* Aldrig 1-7 * Alltid
	Går produkten till ett lager eller direkt till kund?	
2.2 Flexibility		
	Hur stor andel av de arbetsuppgifter som finns i produktion kan du utföra?	*Enbart en arbetsuppgift 1-7 *Alla
	Hur mycket av underhållet kan du göra själv?	*Inget 1-7 *Allt
	Om inte du gör underhållet, vem gör det då?	
	Hur mycket av ställarbetet kan du göra själv?	*Inget 1-7 *Allt
	Hur lång tid tar det att utföra ställarbetet?	
	Hur många olika produkter har ni? Har ni produktsegment?	
	Hur ofta återkommer samma produkter i produktionen?	* Aldrig 1-7 I hög grad
	Hur viktigt är det för er att kunna producera många olika sorters produkter?	* Inte alls 1-7 * I hög grad
	Hur viktigt är det för er att vara flexibla?	* Inte alls 1-7 * I hög grad
	Hur flexibla är ni med att ändra ett leveransdatum?	* Inte alls 1-7 * I hög grad
	Hur flexibla är ni med att ändra orderstorleken/ produktionsmängden/volymen?	* Inte alls 1-7 * I hög grad
	Hur viktigt är det för ert företag att kunna minska lagret?	* Inte alls 1-7 * I hög grad
	Hur ser er utnyttjandegrad ut?	
	Hur ofta jobbar du över?	* Varje dag * Varje vecka * Varje månad * Varje halvår * Mer sällan
	Vad beror övertiden på?	
	Hur ofta händer det att ni har för lite att göra?	* Varje dag * Varje vecka

75

		* Varje månad
		* Varje halvår
		* Mer sällan
	Vad beror det på?	
2.4 Quality		
	Vilka krav finns det på era produkter?	
	Hur ofta når du upp till dem?	* Aldrig
		1-7
		* Alltid
	Hur viktigt är det för ert företag att kunna följa ritningarna?	* Inte alls
		1-7
		* I hög grad
	Hur viktigt är det för ert företag att kunna erbjuda konsekvent, pålitlig kvalitet?	* Inte alls
		1-7
		* I hög grad
Conformance quality	Hur pålitlig är den här maskinen, blir det ofta fel på detaljerna?	* Aldrig
		1-7
		* Alltid
	Hur ofta får du rätt saker med rätt kvalitet?	* Aldrig
		1-7
		* Alltid
	I vilken utsträckning accepterar cheferna/arbetsledarna ansvaret för kvalitet?	* Inte alls
		1-7
		* I hög grad
2.5 Costs (Investments)		
Investments	Hur stora investeringar har ert företag i produktionsutrustning och stödsystem?	
Production costs	Hur ser era produktionskostnader ut?	
	* För personal	
	* För fastigheterna	
	* För el, uppvärmning mm	
	* För maskiner	
	* För råmaterial	
	* För avskrivningar	
	Hur viktigt är det för ert företag att kunna minska produktionskostnaderna?	* Inte alls
		1-7
		* I hög grad
Profitability	Hur lönsamma är ni?	

76

Intervjuguide – Ledningsnivå

Interview guide		
Category	**Manager**	**Svar**
1. Context		
	Namn	
	Ålder	
	Kön	
	Vilken avdelning, grupp tillhör du?	
	Vilken är din nuvarande befattning?	
	Vad har du för tidigare yrkeserfarenhet?	
	Hur länge har du varit anställd i företaget?	
	Har du haft andra jobb tidigare? Har det varit internt eller externt?	
	Vad har du för utbildning?	
	Hur ser ägandet av företaget ut? Familjeföretag?	
	Omsättningshastighet på ledningsgrupp? Ledningsgruppens storlek, positioner?	
	Har ni sociala aktiviteter tillsammans? - På fritiden? - Organiserade av företaget?	
	Har du några förtroendeuppdrag? (deltagande i facket, ledningsgrupp, friskvård mm)	
2. Manufacturing Strategy		
2.1 Background/ General		
Layout (cellular, job shop, dedicated lines)	Vad för typ av layout har ni? Hur är produktionen organiserad?	
Process (batches, one of a kind, mass production)	Vad för typ av produktionsprocess har ni?	
Customer	Vem är slutkund (extern kund)?	
Plans	Hur ser de långsiktiga planerna för företaget ut?	
Competition	Vilka är era största konkurrenter?	
	På vilka faktorer är det ni konkurrerar?	
2.2 Information sharing, management, and development		
	Hur ofta har operatörerna kontakt med sin arbetsledare/chef ?	* Flera ggr/dag * 1 gång/dag * Några ggr/vecka * Mer sällan
	Hur ser relationerna mellan anställda och ledning ut?	
	Hur informerar ni operatörerna om vad som sker på företaget?	
	I vilken utsträckning finns det möjligheter för operatörerna att lära sig fler arbetsuppgifter?	* Inte alls 1-7 * Goda möjligheter/så mycket som önskas

	Hur lär sig operatörerna nya arbetsuppgifter? - Går de kurser? (Internt eller externt)	
	I vilken utsträckning uppmuntrar företaget operatörerna att ta större ansvar för inspektioner och kvalitet?	* Inte alls 1-7 * I hög grad
	Vilka möjligheter finns det för operatörerna att styra detaljplaneringen?	* Inte alls 1-7 * I hög grad
	Om möjlighet ges, vilka faktorer tas då i beaktande?	
	I vilken utsträckning är operatörerna delaktiga i förändringsarbete kopplat till produktion?	* Inte alls 1-7 * I hög grad
	Om en operatör vill förändra något, hur går han/hon då tillväga? - Vem pratar han/hon med? - Hur bemöts den informationen?	
	I vilken utsträckning arbetar ert företag med teamarbete för att lösa problem?	* Inte alls 1-7 * I hög grad
	Är alla operatörer delaktiga i teamen?	* Inte alls 1-7 * I hög grad
	I vilken utsträckning leder förändringsarbete till förbättringar?	* Inte alls 1-7 * I hög grad
	Har ni något belöningssystem?	
2.3 Delivery/Speed/Dependability		
(quality conformance)	Hur ser den interna "supply chain" ut? Är den tydlig för de som arbetar i den? Vem är den interna kunden?	
(quality conformance)	Finns det något sekvensberoende? (Ställs det särskilda krav på föregående och efterföljande operation?)	
	Hur ofta får operatörerna rätt saker i rätt tid?	* Aldrig 1-7 * Alltid
	I vilken utsträckning använder ni er av buffertar mellan arbetsstationer?	* Inte alls 1-7 * I hög grad
Cykeltid	Hur lång tid tar det för en operatör att göra en produkt/artikel?	
Leveranstid/orderledtid	Hur lång orderledtid/leveranstid har ni? (tiden det tar från kundbehov till leverans)	
Produktionsledtid	Hur lång produktionsledtid har ni? (tiden det tar från start produktion till färdig produkt)	
Produktionsledtid	Hur viktigt är det för er att kunna minska produktionsledtiden?	* Inte alls 1-7 * I hög grad
Leveransledtid	Vad har era kunder för krav på leveranstider?	
	Hur upplever du era leveranstider?	* Väldigt korta 1-7 * Väldigt långa
	Hur upplever du säljavdelningens leveranslöften?	* Väldigt korta 1-7

		* Väldigt långa
	I vilken utsträckning håller ni era leveranstider?	* Aldrig 1-7 * Alltid
	Går produkten till ett lager eller direkt till kund?	
2.2 Flexibility		
	Hur stor andel av de arbetsuppgifter som finns i produktion kan varje operatör utföra?	*Enbart en arbetsuppgift 1-7 *Alla
	Hur mycket av underhållet kan operatörerna göra själva?	*Inget 1-7 *Allt
	Om inte operatören gör underhållet, vem gör det då?	
	Hur mycket av ställarbetet kan operatörerna göra själva?	*Inget 1-7 *Allt
	Hur lång tid tar det att utföra ställarbetet?	
	Hur många olika produkter har ni? Har ni produktsegment?	
	Hur ofta återkommer samma produkter i produktionen?	* Aldrig 1-7 * I hög grad
	Hur viktigt är det för er att kunna producera många olika sorters produkter?	* Inte alls 1-7 * I hög grad
	Hur viktigt är det för er att vara flexibla?	* Inte alls 1-7 * I hög grad
	Hur flexibla är ni med att ändra ett leveransdatum?	* Inte alls 1-7 * I hög grad
	Hur flexibla är ni med att ändra orderstorleken/ produktionsmängden/volymen?	* Inte alls 1-7 * I hög grad
	Hur viktigt är det för ert företag att kunna minska lagret?	* Inte alls 1-7 * I hög grad
	Hur ser er utnyttjandegrad ut?	
	Hur ofta jobbar operatörerna över?	* Varje dag * Varje vecka * Varje månad * Varje halvår * Mer sällan
	Vad beror övertiden på?	
	Hur ofta händer det att ni har för lite att göra?	* Varje dag * Varje vecka * Varje månad * Varje halvår * Mer sällan
	Vad beror det på?	
2.4 Quality		
	Vilka krav finns det på era produkter?	

79

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	Hur ofta når ni upp till dem?	* Aldrig 1-7 * Alltid
	Hur viktigt är det för ert företag att kunna följa ritningarna?	* Inte alls 1-7 * I hög grad
	Hur viktigt är det för ert företag att kunna erbjuda konsekvent, pålitlig kvalitet?	* Inte alls 1-7 * I hög grad
Conformance quality	Hur pålitliga är era maskiner/utrustning, blir det ofta fel på detaljerna?	* Aldrig 1-7 * Alltid
	Hur ofta får operatörerna rätt saker med rätt kvalitet?	* Aldrig 1-7 * Alltid
	I vilken utsträckning accepterar cheferna/arbetsledarna ansvaret för kvalitet?	* Inte alls 1-7 * I hög grad
2.5 Costs (Investments)		
Investments	Hur stora investeringar har ert företag i produktionsutrustning och stödsystem?	
Production costs	Hur ser era produktionskostnader ut? * För personal * För fastigheterna * För el, uppvärmning mm * För maskiner * För råmaterial * För avskrivningar	
	Hur viktigt är det för ert företag att kunna minska produktionskostnaderna?	* Inte alls 1-7 * I hög grad
Profitability	Hur lönsamma är ni?	

80

Appendix 4: Literature searches in S3

Date	Database	Search criteria	Hits
2012-06-04	Emerald	Content = Journals Searchterm: people OR individ* OR actor* in all except full text AND "manufacturing strategy" in all except full text	17
2012-06-04	Scopus	Searchterm: people OR individ* OR actor* AND "manufacturing strategy" in article title, abstract, keywords in Social Sciences and Humanities	56, when limit to articles: 40
2012-08-31	Google Scholar	Going through articles which have cited Boyer & McDermott, 1999	94
2012-10-16	Science Direct	"personality test" AND "operations management" in all fields	9
2013-03	Emerald	"manufacturing strategy" in All fields AND "behavioral operations" in All fields	2
2013-03	Science Direct	"manufacturing strategy" AND "behavioral operations"	7
2013-03	Google Scholar	"manufacturing strategy" "behavioral operations"	8 (after taken away books and citations)
2013-03	ABI/INFORM Global	"manufacturing strategy" AND "behavioral operations"	3
2013-03	Science Direct	TITLE-ABSTR-KEY("manufacturing strategy") and TITLE-ABSTR-KEY(people OR individual* OR actor*)	20
2013-03	Science Direct	TITLE-ABSTR-KEY("manufacturing strategy") and TITLE-ABSTR-KEY("human*")	20
2013-03	Science Direct	TITLE-ABSTR-KEY("behavioral operations")	21
2013-03	Science Direct	TITLE("manufacturing strateg*") and TITLE-ABSTR-KEY(people* OR individual* OR actor* OR human* OR operator* OR manager*)	20
2013-03	ABI/INFORM Global	ti("manufacturing strateg*") AND ab(people* OR individual* OR actor* OR human OR operator* OR manager*) Full text: Full text included Source type: Scholarly Journals Document type: Article	38

Paper 1

Production-related staff's perception of manufacturing strategy at a SMME

Edh, N., Winroth, M. and Säfsten, K. (2012)

45th CIRP Conference on Manufacturing Systems 2012

Production-related Staff's Perception of Manufacturing Strategy at a SMME

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Abstract

Today's global competitiveness urges SMMEs to pay attention to their MS process. The purpose of this case study at a Swedish SMME, mainly conducted through interviews with production-related staff: staff with direct connection to everyday production work, is to explore their perception of the MS content. The study shows that communication is the main obstacle for production-related staff's perception of the MS. Their perception is diverse and based on a multitude of factors, such as employment period, organizational belonging, and the employees' own interest. Several problem areas are identified and need to be investigated further.

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Keywords: Manufacturing strategy; SMME; Case study; Organizational learning; Staff perception

1. Introduction

During the last few decades the situation for manufacturing companies has changed dramatically due to increased global competitiveness. Swedish Small and Medium-sized Manufacturing Enterprises (SMMEs) have a significant impact on the country's economy [1-2] while facing strong competition from developing countries. Therefore, there is a need for these companies to develop their strategic capabilities.

The need for companies to focus on manufacturing from a strategic perspective is emphasized in the seminal work by Skinner [3]. This focus on Manufacturing Strategy (MS) is essential for manufacturing companies to remain competitive [4]. However, the MS literature is underdeveloped, limited, and under considerable debate [4-5]. Further, 91% of the research publications between the years 1969 and 2001 were focused on the content aspects [4] hence, a very small part is concerned with the MS process. The process consists of formulation and implementation [6], where implementation is 'less structured and more behaviorally oriented' [7, p. 121].

Barnes [5] calls for a broader analysis including considerations on both the internal and the external contexts, stressing the individual, cultural, and political factors.

Research on the relevance of MS to SMMEs has been limited [4], [8] and needs to be focused further due to these companies' importance for the economy. Findings from research on larger companies are not always applicable to SMMEs' special characteristics: closeness between management and employees due to fewer hierarchical levels [4], [8]; a reactive fire-fighting mentality [8]; and concentration and low formalization of the decision processes where decisions often are based on intuition and personal experience [9]. Typical learning processes within small firms are mainly based on learning by doing [9].

The people within the organization have an important role when it comes to implementation; lower levels of the organization need to be involved [7]. People, who execute the decisions that are formulated in the MS, are in this paper referred to as production-related staff: staff with direct connection to everyday production work, e.g. operators, team leaders, production technicians, and

warehouse personnel. Focusing on implementation implies a need to look into how people perceive MS, and how it affects their daily work. The purpose of this case study is therefore to focus on an area within the MS implementation process which is quite unexplored within the literature: how the employees perceive the MS content.

To address this it would be beneficial to incorporate other fields, such as the ones related to learning organizations and knowledge management, within the frame of the MS literature. We assume that learning organizations are enablers for bringing the MS out in the organization.

2. Frame of reference

2.1. Manufacturing strategy

Manufacturing strategy is the link between corporate strategy and the manufacturing function [3]; it formulates how to make manufacturing decisions which helps the company to achieve long-term competitive advantage [10]. MS is often referred to as being about creating a fit between market opportunities and operations resources [3], [6], and it is divided into content and process area [4], [11]. Content refers to the strategic decisions that are being made with respect to competitive priorities and decision categories, while process consists of the formulation and implementation of the strategy [4], [6].

Within the field of MS there are many models and ideas on how to organize, formulate, and implement strategies. However, many of these, e.g. Miltenburg's model [10], have a complexity level that might be too high for SMMEs [12]. In this paper the Operations Strategy (OS) matrix (Figure 1) [6], is used as a framework to grasp the content of the strategy.
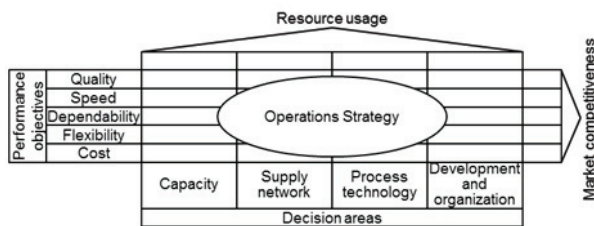

Figure 1 The operations strategy matrix [6, p. 26]

Due to its simplicity, OS matrix is believed to capture the important parts of the content. The matrix emphasizes the intersections between the performance objectives and the decision areas; hence, what is required by the operations function and what choices to make to deal with those requirements [6]. The performance objectives most often encompass cost, quality, delivery, and flexibility [4], [11]. The decision

areas can for example contain: plant and equipment, production planning and control, labor and staffing, product design/engineering, and organization and management [3]. Slack and Lewis [6] identify five performance objectives and four decision areas (see Figure 1).

Manufacturing strategy process: formulation and implementation

Formulation of MS is a planning mechanism [7] while the implementation is 'the means by which manufacturing strategy is put into practice' [10, p. 112] and a process where it is essential to get the employees' consent [7]. Implementation of MS in organizations 'can be the most difficult phase of the strategy process' [13, p. 153].

However, the operationalization of the MS is weakly defined; it is missing implementation characteristics and there is a need for a communicating strategy to employees as opposed to the wide-spread top-down approach [7]. Further, there is a need for involvement of lower levels of the organization, employee acceptance, and teamwork building in the formulation and implementation process. Factors effecting the MS implementation are: the effects of corporate culture on strategic development; management consistency in implementation; top management commitment; and managerial styles [7].

To handle this difficult process and get the employees to consent charts can be useful as communication means [13]. Pictorial methods are useful for identification and communication of the content of MS; 'representing manufacturing strategy as a pattern of actions appears to make 'strategy' an understandable and communicable concept for manufacturing managers and workforce' [14, p. 1081].

2.2. Learning in organizations

For manufacturing companies to remain competitive they need to focus on: organizational knowledge creation [15], [16]; shared visions where thinking and acting are integrated at all levels [17]; and corporate cultures of continuous learning [18]. Further, the strategic time orientation [19] needs to be addressed; short-term and long-term time frames need to be focused simultaneously.

In knowledge creation there is a distinction between tacit and explicit knowledge [16]. Tacit knowledge is personal, context-specific, and gathered through hands-on experience; hence, hard to formalize and communicate. Explicit knowledge on the other hand is transmittable in 'formal, systematic language' [16, p. 59]. In the organizational knowledge creation process, the individual is seen as the prime mover; the initiation

of the process takes place by enlargement of an individual's knowledge within an organization' [15 p. 22]. Therefore, routine tasks are believed to decrease creative thinking and new knowledge formation.

Strategic knowledge enables strategic alignment and strategic commitment [20] to the strategic goals; it is important that also lower levels in an organization share a common body of strategic knowledge and behave in a contributory manner. Strategically committed individuals, with trust for the organization, show strategic-supportive behavior. Strategic commitment can be improved through communication in both oral and written forms and by establishing training programs and communication plans [20].

3. Methodology

The company was chosen due to its willingness to participate in the study; its ISO/TS 16949 certificate; its suitable size; and its recently initiated work with MS formulation. The study was initialized by a two hour plant visit which enabled an initial overview of the operations and a first contact with the interviewees in their natural setting [21]. In addition to interviews, weekly group meetings and a weekly production meeting were attended to experience the organizational information channels which the interviewees were referring to.

One of the eight interviewees was white collar conducting tasks closely linked to the shop floor, the rest were blue collars working at the shop floor. The interviewees had between six months and 25 years of work experience at the company. The interviews ranged between 50 minutes and one and a half hour and were semi-structured [21], [22]. To be able to structure and compare the interviewees' perceptions along different dimensions the questions were based on the OS matrix. The interview guide was followed to a great extent, but the interviewees were allowed to elaborate, and the interviewer asked follow-up questions.

The analysis was conducted step-wise to handle the difficult task [23] of analyzing a large amount of qualitative data; to keep the data volume low while not missing out on important aspects. Initially, the transcribed records were organized in tables according to Performance objectives and Decision areas; enhancing easy overview. Thereafter, thematic coding [24] was adopted to detect group specific perceptions; answers related to the same topic were analyzed and the individual interviewee's perception was framed to create an overall view of the perception of the production-related staff.

4. Empirical findings

The company, founded in the 1940's, has been owned and run by the same management duo since 2006. In 2011 it had a turn-over of SEK 72 million and 106 employees. The business focuses on customer specific aluminum products, in both large series and one piece production. Core competences are CNC-processing, welding, and bending. The company has one large customer, which also is the main material supplier, representing 90 % of the sales. However, this customer has a wide spectrum of customers, why the company indirectly delivers to many different markets. These special conditions, where the company delivers straight to its customer's customers, referred to as Customer 2, implies that the company in reality works with both Make To Order (MTO) and Make To Stock (MTS) production. Production is organized in work groups, which have information meetings every Tuesday. They deal with safety issues, incoming orders, backorders, invoiced orders, customer complaints, and equipment status. Information is short term and focused on financial measures. Further, it is not communicated around an information board, but the leader provides oral information and graphs on A4-sized papers. The company has been working with manufacturing strategies to some extent, with benchmarking and SWOT-analyses. The business plan is followed up by management once a month with larger revisions every year.

4.1. Performance objectives – production-related staff's perception

Quality
All interviewees have a perception of product requirements regarding surface and dimensions and information about the end customer is available on the work card. The purpose of the product is generally known but interpretation of quality yields and problems differ considerably. It is also difficult for them to separate bad products caused by equipment from the ones caused by poor material or by humans. For some processes it is necessary to do human corrections even if the machine works perfectly. Most interviewees agree that the quality and age of the raw material have a great impact on the possibility to produce without errors.
Speed
All operators know the process time at their station. Most interviewees understand production lead time, but they do not consider the product waiting time. Some of them can estimate this time, while others state that they get the information from the Work card. However, when it comes to order lead-time, deviation increases. One interviewee claims that planned order lead time is almost

the same as actual production time and that they want products to 'go through the factory as quickly as possible.' There is a system mismatch between pricing and scheduling, leading to deviation between planned and actual production time. The operators are however not aware of this but it leads to stress trying to catch up while at other occasions be able to work slowly. This makes them question the planners' competence.

Dependability

Regarding delivery promises the perceptions vary. Several interviewees state that they do not know the delivery promises, while one interviewee refers to what he knows as the company policy: right product at the right time to the right customer. All interviewees refer to the Tuesday meetings for information on delivery promises and delivery statistics but there is a tendency that most of the interviewees believe the problems to be caused by other groups; causes of problems are not communicated. There is a large difference in awareness of specific customer requirements between operators working on MTS or MTO; MTO-operators easier see the customers' needs. Regarding internal supply chain, the work card provides information about when each station shall receive the product. Interviewees emphasize importance of clean products without chips and that quality should be checked at each station. Communication on these matters is handled at group leader level.

Flexibility

Regarding range flexibility, it seems as if operators have quite good insight into range of products and available production methods within their group, but range flexibility varies considerably between work stations. Related to new products there are differences between MTO and MTS operators; some interviewees state that they introduce new products all the time, while others have changed once in six years. Complexity in changing production method, or swapping between products, depends on organizational belonging. Most operators, especially the ones working at semi-automated stations, cannot do set-up themselves, but are dependent set-up operators. Set-up time varies for different machines, but the operators are able to roughly estimate the time needed.

Cost

Perception of different costs is in general low but interviewees working with MTO seem to have a better understanding for how to calculate costs. They address concepts such as set of requirements and hourly cost. Awareness of personnel cost is greater than of costs for facilities. Regarding costs for electricity and heating most interviewees do not know but they know that cost for machinery is high. The interviewees state that they receive financial information every week. However, this information is short-term, describing the order stock and the amount which has been invoiced per day, leaving the interviewees guessing about the long term situation.

4.2. Decision areas – production-related staff's perception

Capacity

Some groups work overtime on a much more regular basis than others. Within the groups they decide who and when to work overtime, leading to differences between groups. All interviewees seem to believe that overtime mainly is due to internal factors such as machine problems, human factors, and overscheduling. During the financial crisis, employees had to move temporarily to other groups. Some interviewees appreciate the opportunity to change group, even when it is not necessary. One interviewee states that he takes every chance to learn something new.

Supply network

Most interviewees are at the end of the internal supply chain due to the high variety of products and processes. Most interviewees have an idea of the supply chain, even if some MTS operators have a low perception of the external supply chain. The answers given about received deliveries at the work stations are similar to the ones given for dependability; receiving scratched material is frustrating for the operators. If chips are not removed they cause problems in the following processes.

Process technology

All interviewees seem to know the frequently used machines quite well. However, awareness decreases when it is not the operator, but a set-up operator, who handles set-ups and machine problems. Further, it is evident that operators, working in a frequently rotating group, have a larger general understanding about the equipment. Machines are built by both large companies and small local firms. Interviewees working at MTO work stations with more manual tasks, or in rotating groups, easier perceive the purchasing procedure.

Maintenance is handled both by external parties, often the company which sold the equipment, and by internal maintenance personnel. Daily maintenance, such as clearing dust, cleaning filters, and lubricating exposed parts, is done by the operators. Referring to equipment utilization most interviewees instinctively say that the utilization is maximized. However, interviewees witness that some groups only work one shift; that machines are idle; that some equipment only is used when the original is broken; and that some of the automated stations can be speeded up.

Development and organization

Most interviewees do not have any specific education for their job. The opportunities for educational programs at the company seem to vary depending on the

organizational belonging and employment period; some of the interviewees have been to introductory courses. Some of the work tasks require licenses and for those employees courses are more frequent.

Some interviewees state that they are satisfied at work. Others discuss around satisfaction factors, and what effects different actions, primarily from management, have on their level of satisfaction. Salary is a factor which is brought up as a possible reason for dissatisfaction; even if employees are satisfied with their work tasks and their colleagues, a perceived low salary level affect satisfaction.

All interviewees have daily contact with their group leaders; some regarding scheduling, others for more advisory discussions on problem solving. A number of communication channels are mentioned; e.g. protocols from different meetings; boards on the shop floor; and the Company newspaper. However, from the way the interviewees talk about these channels it is indicated that they are infrequently used and that not everyone are aware of them. Further, awareness does not necessarily imply an interest for them. It is evident that employees who have had organizational commitments in Employee Groups have a much larger perception of the organizational premises and how and who to contact to get information. Most interviewees say that change and improvement work is handled on group leader level; in special cases the HR manager is addressed.

5. Discussion

The case study shows that production-related staff understands their own work setting, i.e. they are aware of their group's work and how it is organized, but they do not seem to be able to relate to their role within the company or to see long-term planning. Hence, they have difficulties perceiving the company's MS. It is especially evident that depending on which group the interviewees belong to and the length of their employment period the perception varies. Further, there are indications that knowledge and knowledge sharing decreases when there is no group rotation and there are significant differences in perception of MS elements between MTO and MTS operators. It seems as if, despite Marucheck's et al. [7] findings, MS implementation, i.e. involving employees in the work with MS, is still developing, especially within SMMEs. MS is often synonymous with the corporate strategy in these companies. It is therefore essential for the competitiveness of the company to reach strategic commitment and alignment throughout the organization [20]. From the case it is evident that the most important aspects to enable this process are related to communication, knowledge sharing, empowerment, and learning in organizations. Development and organization is the element where the interviewees had

most to say and where dissatisfaction was highest. When it comes to educational programs, information sharing, long-term plans, and improvement work there is a gap between the management's view and what the employees actually do perceive. Problems with this type of deviation between different levels' views of the vision are ultimately affecting the company's ability to remain competitive; thinking and acting must be aligned at all levels [17].

It seems as if the perceived knowledge to a quite small extent is communicated by management, but rather gained based on personal interest and commitment to various Groups. Information sharing is often indirect and there is a random chance of receiving information; being part of Employee Groups is the best way to receive information. Further, problems with transferring knowledge are not only evident for tacit knowledge, but quite severe also when it comes to explicit knowledge. Moreover, there are closed communication loops; operators only talk to their group leaders and the information therefore goes through many hierarchical levels. Further, the company has a typical learning process for small firms: learning by doing [9]. Despite the important position the Employee Groups are supposed to have, which can be interpreted as involvement of lower levels in managerial decisions [7], there are problems with concentration of decisions. This seems to hinder involvement from lower levels. The usefulness of these Groups as communication channels between management and employees can therefore be questioned.

The case shows that despite the use of newsletters and weekly meetings, i.e., both written and oral forms of communication [20], production-related staff does not see a distinct link between their own work and MS. The tools used are not used in full, graphs are not clearly explained, and the group leaders do not use visual boards to monitor the information, even though pictorial presentation is important for the understanding [14]. The information is to a large extent communicated through financial measures, which are not only difficult to grasp, but which also very clearly direct the operations to short-term actions. This short-term thinking is also evident when it comes to the lack of clearly presented educational programs and to the fire-fighting actions taken for quality and maintenance work, which several interviewees talk about. Therefore, the company needs to focus on their strategic time orientation; at the same time focus both short-term and long-term time frames [19].

It is believed that the OS matrix captures the important aspects of MS when it comes to production-related staff's perception. However, it seems as if some aspects of MS are less important than others, and as if some have closer links than others, e.g. dependability

and supply chain. There is therefore a need for management to direct their communication towards the elements which impact the production-related staff's work. Further, the company, and other companies facing the same problems, needs to have a clear focus on the learning process within the organization; to create organizational knowledge and to build a strong corporate culture [18], which focuses on team work [7] where a common body of strategic knowledge [20] can be created [16]. Nonaka's [15] view of the individual within the organization as the prime mover of knowledge needs to be acknowledged.

It cannot be said that these results are specific for a SMME setting; it is rather believed that the size of the company does not matter. The individual, no matter if the company has 100 employees or 15.000, relates to the own immediate surroundings. It is in these smaller groups, consisting of 5-30 people, where the understanding for and perception of MS must start.

6. Conclusions

The study shows that within the company, despite management's attempts to use a variety of communication channels, communication is the main obstacle to the production-related staff's perception of MS. It is also evident that in a small company, where work with MS is unfocused, there is a risk of employees perceiving the decisions as short-term solutions; as a fire-fighting mentality where there is no long-term planning. In such organizational settings it is impossible to try to communicate a strategy. MS perception needs to depend on other parameters than employment period, organizational belonging, and the employee's own interest in finding information.

The problem areas identified need to be investigated further in order to assess how common they are. Marucheck's et al.'s [7] conclusions from 1990 are still valid; future research needs to focus on the impact corporate culture and managerial styles have on the perception of MS. There seems to be a need to direct different types of information toward different parts of the organization, e.g. differ between MTO and MTS operators. However, this needs to be investigated further and can be framed as defining the desirable perception of MS for production-related staff.

Acknowledgements

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Paper 2

Strategic consensus in SMEs:
Behavioral operations perspective on manufacturing strategy

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STRATEGIC CONSENSUS IN SMEs: BEHAVIORAL OPERATIONS PERSPECTIVE ON MANUFACTURING STRATEGY

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Previous manufacturing strategy (MS) studies have to a limited extent incorporated the people dimension emphasized in the behavioral operations field. This paper aims to empirically examine the relationship between managers' and operators' perceptions of MS from a behavioral operations perspective. Interviews with both managers and operators at three Swedish metalworking small and medium enterprises (SMEs) were conducted. The results show a higher level of strategic consensus, compared to earlier research. Strategic consensus is primarily seen within the intra-organizational dimensions. Lack of consensus seems to be caused primarily by poor communication about strategic objectives and long-term plans. By emphasizing the people dimension of MS, this paper contributes to increased knowledge about strategic consensus at SMEs and the importance of strategic commitment and strategic consensus for a successful MS process.

Keywords:
Strategic consensus, Behavioral operations, Manufacturing strategy, SME

1 INTRODUCTION

Almost all individuals within a manufacturing function make operating decisions; it is therefore crucial for effective decision making that 'everyone have a shared understanding of the organization´s operations strategy' [1], including the lower levels, i.e., operators [2]. Most manufacturing strategy (MS) research barely touches on the operating individuals and their roles in the MS process but rather see the operators as a resource among other resources. Slack et al. [3] define operations strategy as 'the pattern of strategic decisions and actions which set the role, objectives and activities of the operation', i.e., not concerning the operator. This indicates a deterministic view of the human nature, where the people in the manufacturing processes are viewed as being determined and controlled by their environment. A deterministic view of operators increases the risk of people in the organization not working toward the same goals, i.e., a lack of strategic consensus [1], the opposite of which is essential for effective decision making and strategic fit. The people dimension is elaborated on within the behavioral operations (BO) field [4-5], where focus is on 'potentially non-hyper-rational actors in operational contexts' [5].

To some extent, previous MS research has studied the people dimension, e.g., through concepts such as strategic alignment [6-8], strategic commitment [9], and strategic resonance [10]. In those studies where the people are treated less deterministically, the focus is often on the managers as individuals and the management level. That is, emphasis has been on the importance of incorporating operations managers' views with the business-level strategy formulation or other functional strategy formulations [8]. The operator level, and the relationship between operators and their managers (i.e., the intra-functional level [8]), has only been studied to a limited extent earlier, e.g., through the concept of strategic consensus [1], and there is a need to increase the understanding of this.

The purpose of this paper is to empirically examine the relationship between managers' and operators' perceptions of MS, i.e., vertical and horizontal strategic consensus within the operations function, from a behavioral operations perspective.

2 THEORETICAL FRAMEWORK

This section develops the theoretical framework. First, it describes the incorporation of BO. Second, it discusses the essential parts of MS and its division into content and process areas. Third, it defines strategic consensus. Finally, it presents the analytical framework.

2.1 Behavioral operations

The foundation of BO is that 'almost all contexts studied within operations management (OM) contain people' [5] and that this people dimension to a large extent has been left out of OM literature due to the field's rather deterministic view of people. Since the BO field sees operators and managers as non-hyper-rational [5] in decision making, it is therefore an important perspective to adapt to the field of MS and its process. Boudreau et al. [11] establish a framework where OM and human resource management (HRM) are connected and where the HRM dimensions significantly resemble the infrastructural decision categories in 2.2; hence, the people dimension could be incorporated within MS through the connection between OM and HRM. It can thereby be concluded that the main message of BO is the importance of integrating the people dimension into operational settings.

2.2 Manufacturing strategy

Manufacturing strategy concerns linking the operations function with the company's corporate strategy to support the company in achieving long-term advantage [12-14]. To attain a 'desired manufacturing structure, infrastructure, and set of specific capabilities' [15], there is a need for a fit between market requirements and operations resources [12, 14]. Traditionally, MS literature is divided into content and process areas [16] (see Figure 1), where content refers to the strategic decisions regarding competitive priorities and decision categories, while process consists of strategy formulation and implementation [14, 16].
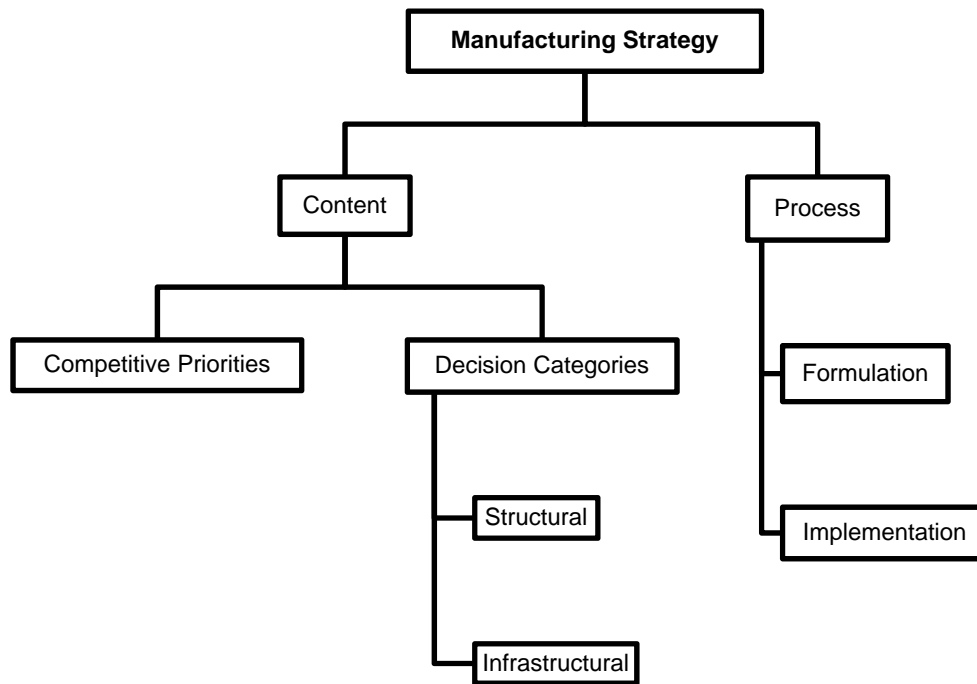
Figure 1: Manufacturing strategy: content and process.

Manufacturing strategy content

Strategic decisions are made in relation to the company's competitive priorities and decision categories [16]. The competitive priorities often encompass: *Cost,* including procurement costs and production costs [17-18]; *Quality,* encompassing specification quality and conformance quality [14, 17]; *Delivery,* consisting of production lead time, procurement lead time, and ability to meet delivery promises [1, 16-18]; and *Flexibility,* comprising changes in product, product mix, volume flexibility, and capacity adjustments [1, 16-18].

Manufacturing strategy decision categories most often encompass structural and infrastructural decisions [15] [19]. *Structural decision* categories concern the company's physical attributes and often require substantial capital investments [19]. These structural decisions are: *Capacity,* including amount, type, and timing [14-15, 19]; *Sourcing and vertical integration*, consisting of direction, extent, and balance [13, 15, 19]; *Facilities,* comprising size, location, and specialization [13, 15, 19]; and *Information and process technology*, including automation level, process technology, and plant and equipment [12-13, 19].

Infrastructural decision categories concern more tactical activities with less visible capital investments [15]. These categories are: *Resource allocation and capital budgeting systems* [15]; *Human resource systems,* including selection, skills, compensation, and employment security [19]; *Work planning and control systems* [19]; *Product and process development systems*, consisting of leader versus follower and project team organization [19]; and *Organization*, including which decisions to delegate, role of staff groups, and organization structure [12-13, 19].

Manufacturing strategy process

The MS process consists of formulation and implementation (see Figure 1). The process of MS formulation sets the content of the strategy [16]. As this paper focuses on the relationship between managers' and operators' perceptions of the content, MS formulation is outside the scope of this paper.

Implementation is the means by which the MS is put into practice [2]; it includes 'what must be done, why it must be done, how it will be done, when it will be done, and who will do it' [13]. For this process it is essential to have the employees accept and consent to the strategy, and build teamwork towards the same goals [2, 13]. Since implementation is considered the most difficult phase of the MS process [20], pictorial methods and information-sharing tools play an important role for an understandable strategy communication between manufacturing managers and operators [9, 21-22].

2.3 Strategic consensus

Strategic consensus is an important means to accomplish a successful MS process where operators and managers consent. The development of strategic consensus is a core component of the strategy compass, which provides a 'general framework for employees at all levels of the organization to make operating decisions' [1]. Boyer and McDermott [1] define strategic consensus as:

> *'the level of agreement within an organization regarding the relative importance of cost, quality, delivery and flexibility to the organization's operational goals, as well as the relationships between these competitive priorities and operational policies'.*

Previous studies, implicitly or explicitly, address strategic consensus at different hierarchical levels within organizations. Focus has been on the operations manager level and management practices' effect on performance in small and medium enterprises (SMEs) [23]; on differences in perception of the strategy between managers and operators [1]; and on differences in perception of competitive priorities between two managerial levels [18]. Further, emphasis has been on the functional management level, and MS content and formalization with regard to company profile, competitive priorities, current manufacturing practices, and performance [17].

2.4 Analytical framework

This study focuses on the managers' and operators' perceptions of MS content in order to assess the level of strategic consensus. To examine the strategic consensus in an SME setting with a BO perspective, a number of factors have to be addressed (see Figure 2).

Strategic consensus should be seen as a measure of how well the implementation process has created a common view of the MS content. The dimensions

incorporated in the analytical framework (Figure 2) are chosen to capture the important aspects of strategic consensus from a BO perspective, i.e., an operational context with operators and managers as non-hyper-rational actors. The BO perspective can be seen as being a part of the MS process, but it can also be the pair of glasses used to look at MS, which is the case here.

ANALYTICAL FRAMEWORK			
Behavioral operations			
Strategic consensus			
Content			Process
Competitive priorities	Decision categories		Implementation
Delivery	**Structural**	**Infrastructural**	
Flexibility	*Information and process technology* (layout)	*Human resource systems* (work enlargement)	*Information-sharing tools*
Quality		*Organization* (relations between managers and operators, long-term plans, participation in work change)	
Cost			

Figure 2: Analytical framework: capturing dimensions.

3 METHODOLOGY

The study involved three Swedish metalworking SME subcontractors. The companies (referred to as C1, C2, and C3) were chosen based on their SNI-code, 25620 Machining; their location in Jönköping County, one of Sweden's most industrialized areas; and their willingness to participate in the study.

From a BO perspective, the individuals in the operational context are the unit of analysis [5]; therefore, the focus was to investigate the individuals' perceptions of the MS dimensions. To collect this data, plant visits were combined with structured [24], one-hour interviews at the two organizational levels of managers and operators (Table 1). The chief executive officers (CEOs) and production managers were asked to choose as diverse operators as possible regarding e.g., gender, age, and work tasks. Not all operators have the type of work tasks which resembles what the authors would have characterized as typical for operators (see Table 1 for interviewees' own definitions of their positions).

The interview guide was based on the work by [1, 14, 17-18, 23, 25] and incorporated the dimensions in Figure 2 through a 7-point Likert scale, based on which the interviewees could show to what extent they agreed. The interviews were recorded and transcribed. The data was analyzed using the analytical framework. The focus was on reporting the core of each interviewee's answers while

presenting a comprehensive overview of the large amount of data. In the cases where the interviewees disagreed, their answers were presented separately (in Table 3 managers are referred to as M1 and M2, and operators as O1, O2, and O3). The table was used to analyze the level of strategic consensus.

4 DESCRIPTION OF THE COMPANIES

Company characteristics can be seen in Table 2.

The companies rely on relatively few customers; both C1 and C3 have one main customer, while C2 has two. Regarding competitors, C1 identifies one main competitor and states that laser cutting by itself is not a factor for competitiveness. At C2 the managers agree that there is a small number of similar companies in Sweden; the operators, however, are not able to name them. At C3 the managers consider the main customer as one of its most important rivals.

All three companies can run three production shifts but currently only use two. Due to the financial crisis, C3 in particular has seen a decline in incoming orders, affecting its utilization rates. Despite this, all three companies state that overtime occurs at least once a month at some phases of the production process.

Table 1: Interviewee characteristics.

	Managers		Operators		
C1					
Position	CEO	Production manager	Normal worker	Set-up technician, operator	Machine operator
Organizational belonging	Management group	Management group	Robot welding group	Machining group	Laser group
C2					
Position	CEO	Production manager	Machining center operator	Warehouse personnel	Robot welder, Alternating group leader
Organizational belonging	Management group	Production	Machining group	Warehouse	Welding group
C3					
Position	CEO	Production manager	Planner	Operator	Shift leader
Organizational belonging		Entire company: management and production	Planning and order group	CNC operators	CNC

Table 2: Company characteristics.

	C1	C2	C3
Company ownership	Owned by a venture capital company.	Belongs to family-owned group.	Managed and owned by the same family.
Management group	Recently changed. Six men: CEO, Finance, Production, Sales, Quality, Purchasing.	Stable for many years. Five men, one woman: CEO/Market, Finance, Production, Quality, Purchasing, Logistics/Planning.	Stable for many years. Three men, one woman: CEO, Finance, Production, Quality.
Profitability	Last year: 7-10%. Had been much more profitable earlier.	Last year: 3.5-5%. Normally lies around 5-7%.	Really bad last year. Aiming for 10% annually.

5 ANALYSIS

Table 3 presents the empirical data related to the dimensions in the analytical framework. The numbers in the table represents the interviewees' choices on the Likert scale; a hyphen indicates that the interviewee did not want to or was not able to state a number.

5.1 Level of consensus on manufacturing strategy dimensions

In this section the dimensions from Table 3 are analyzed, with the level of consensus as focus.

Delivery

The operators at C1 and C2 who are late in the production process answer differently from the majority regarding internal delivery reliability.

Perceptions concerning buffer usage differ both between and within the hierarchical levels; e.g., at C2 M1's statement that they "always" use buffers shows a different view compared to those of the operators and M2.

Regarding customer delivery demands, none of the operators have a clear view of what these imply. This indicates that the operators have an intra-organizational focus.

Flexibility

There is a lack of consensus between managers and operators regarding the size of the product portfolio. The reason may be that all three companies on a regular basis produce only a small portion of the thousands of different products in their systems. Moreover, operators seem to have only a limited knowledge about the products that are not part of their work tasks.

C3 has consensus regarding the flexibility of the delivery date. At C1 the operators agree that they are flexible; however, M1 disagrees, but makes an exception for the main customer. At C2 one operator deviates by referring to the management's unwillingness to change. Regarding flexibility of delivery quantity, the two hierarchical levels diverge; operators generally consider their companies more flexible than managers do. This could be explained by the operators' intra-organizational focus.

Quality

All interviewees show awareness about customers' product requirements. Further, all three companies have consensus on the high quality of their products and what constitutes such products.

An analysis of the responses regarding the management's responsibility for quality reveals that operators consider the managers primarily accountable, while the managers place the responsibility on the operators. C2 is an exception; none of the interviewees give a rating and at both hierarchical levels they acknowledge a shared responsibility.

Table 3: Empirical data.

Dimension	C1		C2		C3	
	Managers	Operators	Managers	Operators	Managers	Operators
Competitive priorities						
Delivery						
Dependability: Materials at the right time to the operator	5, 6-7 Differs between departments; the last departments take the hit.	6, 2-3, 6-7 If components have not arrived, the planner or group leader re-plans. O2: Planning almost never works.	6, 4 Depends on the operation; the later you are the more often it is late.	-, 2, 7 The planner changes the priority if material is missing. O2: Parts are missing almost every day.	-, - At the moment, almost always on time since there is little to do.	5-6, 7, 5 If something is late, we do something else. Recently often on time since we only have had 40% bookings.
To what extent are buffers used in production	7, 7 Too much. Everywhere.	2, -, 5-6 O1: Do not keep any stock, just some components. O3: They do not want stock; it costs money.	7, 3 M1: Always. M2: Buffers created for some products in MPS[1] system.	7, 7, 7 WIP[2] between operations, however sometimes small.	-, 1 Very few items stored.	2-3, -, 4 O1: Supposed to keep one day buffers. O3: Material for next week might already be ready and stored.
Delivery lead time and delivery precision to customer	Depends on product complexity: 1-12 weeks. New products: at least 3-4 weeks. 95% delivery precision last month. Aim for 93%.	Depends on need for purchased components: 2-12 weeks. 93-98% delivery precision (varying answers among operators). The goal is 95%.	In general: 4-6 weeks. New products: 3-8 weeks. 97% last year.	Do not know the lead time but it probably depends on the product. 93-98% delivery precision (varying answers).	Depends on the product and incoming orders. Call offs: 1 week, otherwise M1: 4-5 weeks M2: 6-8 weeks. 95% last year, last couple of months: 98-100%.	Depends on the product and incoming orders, on average 3 weeks. Very good delivery precision: 96-97%. At the moment 100%; almost 6 months ahead due to lack of incoming orders.
Customer demands on deliveries	Two types of customers: conventional order, and the ones with forecast, with 1-3 days delivery.	O1: JIT[3]. O2: At the agreed time. O3: Do not know.	Has to be 100%, delivers straight into assembly lines.	Do not know.	Depends on the customers' planning. They require constantly shortened times.	100%; as fast as possible.
Flexibility						

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[1] Master production schedule

[2] Work in process

[3] Just in time

Dimension	C1		C2		C3	
	Managers	**Operators**	**Managers**	**Operators**	**Managers**	**Operators**
Size of product portfolio	5000-7000 articles in the system. Last year: 700 different products to main customer.	Guesses: 400, 1000, 1749	2000-4000 articles in the system. Last year: delivered 1049 different products.	O1:75 O2: 2000-3000 O3: everything	A couple of hundred, but around 50 active.	Guesses: 18 per week, 100, 150
Importance of changing delivery date	2, 6 M1: Policy to never change anything. Higher flexibility for the main customer; try to solve it. M2: Never impossible in any direction. Good at communicating changes.	4-5, -, 5-6 Pretty flexible, if it is possible we do what the customer wants.	-, 5 Try as much as possible, very flexible to move forward.	6, 3, 2 Possible to change. Almost always works for important customers. Sometimes management does not want to change.	6, 6	6, 6, 6
Importance of changing delivery quantity	2, 1-2 M1: Try to solve delays. M2: Flexible with increase since it means more sales.	-, 6, 6 Depends on the work load, but it is possible.	6, 5 Depends on capacity and raw material.	-, -, 7 O1: Better with large batches and fewer set-ups. Have to accept losses with large customers. O2: Depends on stock levels. O3: If the customer wants it, we change.	6, 3 Not too flexible with an ongoing order.	5, 7, 5 Normally manage to change.
Quality						
What requirements do the customers have on the products	Production to blueprints; customers' requirements. Important to check what is possible to do and comment on it before starting production.	O1: Perfect, no complaints. O2: Fulfill customers' requirements. O3: Need to fulfill the customers' requirements on the work order: tolerances.	The blueprint decides what to produce and includes requirements on tolerances, function, and finish.	Should be according to what is written.	The important parts are: tolerances, cleanliness, surface. There are TS requirements.	There are TS[4] requirements. The work card defines customer requirements: surface and tolerances.

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[4] ISO technical specification for automotive-related products

Dimension	C1 Managers	C1 Operators	C2 Managers	C2 Operators	C3 Managers	C3 Operators
Conformance quality: Reliability of machines/equipment	-, 6 Very reliable. The unreliable element is the operator, the human factor.	6-7, 7, 6 Faults can happen, but they are pretty accurate.	6, 6	7, -, - The machines do what they have been programmed to do.	6, 6	6, 6, 7
Conformance quality: Quality between operations	6, 6 Sometimes we have internal claims or customer complaints.	6-7, 5, 6 Very seldom a bad part comes. However, tolerances between departments are not always the same.	6, 5 The welders experience insufficient quality since they have many parts to fit together.	6, 6, 6	5-6, 5-6 M1: Problems mostly related to purchased materials and services. M2: Faults appear because we fail to provide the right conditions.	4-5, 6, 5 We work a lot to improve this.
Management's responsibility for quality	7, 6 Operators are responsible for the quality	-, 7, 7 Group leader and quality manager have the final say; they have thus larger responsibility.	-, - Every employee is responsible to deliver good quality.	-, -, - We share the responsibility.	7, - The responsibility lies with all employees.	5, 6, 7 O1, O2: The responsibility is with the managers. O3: Operators are responsible for producing correct parts.
Cost Production cost reduction	7, 7 M2: Depends on how brainwashed you have become. Can decrease to a certain level.	5, 7, 7 Very important, so the owners can make money.	6, 7	7, 6, 7	6, 6-7	5-6, 6, 6
Competitive factors, why customers chose the company	Provide combination of high-class welding and cutting at the same facility. We are fast.	O1, O2: Quality, delivery precision and price. O3: Good machines and production of complete products.	Technical knowledge, quality, equipment and price.	Flexible machine park and good quality. O2: High delivery precision.	High technical knowledge, good quality, price and capacity.	Good and fast. Delivers high quality with high delivery precision. Price. Have a lot of certifications.

Dimension	C1 Managers	C1 Operators	C2 Managers	C2 Operators	C3 Managers	C3 Operators
Decision categories						
Structural						
Information and process technology						
Layout	Functional layout with production placed along the walls; warehouse in the middle. Difficult to see a flow.	Products follow different complex flows passing many stations.	A visible flow between the four production groups.	Very crowded, functional layout. Probably planned with a flow for the large jobs.	Cell-based, rather structured pulling flow.	Somewhat visible flow, but not optimal.
Infrastructural						
Human resource systems						
Work enlargement: Possibility to learn more	7, 3 Trying to improve the possibilities and make people more movable.	5-6, 1, 2 O1: Depends on how long you have been hired. O2, O3: Small possibilities. Want to learn more.	4, 4 M1: Too bad. M2: Always a possibility.	-, 1, 5 O1: Do not know, have never tried. O2: No possibility. O3: If good, always a possibility,	5, 5 Depends on work tasks.	7, 5, 4-5
Organization						
Relations between managers and operators	Good, but can always be better.	O1, O2: No problems, has become better with new management. O3: Have limited contact; the information is really poor.	Alternating group leader responsibility within the group. The production manager meets everyone on a regular basis. Try to have a flat organization; to be close and meet on a daily basis.	Daily contact with the alternating group leader. Production manager walks by on a daily basis, flat organization. Mostly good contact.	Good relations: operators have daily contact with production manager and constant contact with shift leader.	Good relations: contact with production manager several times per day and CEO on a daily basis.
Long-term plans	M1: Go from entrepreneurial reactive organization to more conventionally managed. To be profitable, keep the turnover, and invest. M2: Cannot see orders in a longer perspective than five	O1: We do not really know anything. O2: Double the turnover and develop and invest more. O3: We do not get any information, maybe one month ahead.	M1: Increase the turnover by 50% until 2016. M2: Double our turnover until 2016 with a reasonable profit. Expand the market.	O1: Maybe have to lay off people due to the financial crisis. O2: Double our turnover within five years. O3: We used to be informed every month; incoming orders and the plans.	Long term is 1 year. Aiming at finding more, larger customers.	O1: Do not know that much, the past year has been hard. O2: Do not know. O3: We only get information on a monthly basis.

Dimension	C1		C2		C3	
	Managers	**Operators**	**Managers**	**Operators**	**Managers**	**Operators**
	weeks.					
Participation in work change	3, 4 Improvement suggestions on group level. The group leader is an unwanted filter. Do not yet have possibility to encourage suggestions.	2, 5, 5-6 Do not have many changes, are asked for improvement suggestions every morning.	5, 1 M1: They are very involved if they themselves have made a suggestion. M2: Too little, we need to work more with the groups.	3, 3, 2 Open dialogue about suggestions, but not many changes.	6, 5 Group level discussions generate improvement suggestions for their 5S board. Lean meetings every month.	6, 3, 4 Small things: talk to the production manager or put it as a suggestion at the 5S[5] meeting. Larger investments: taken further to production technicians, CEO and the management group.
Implementation						
Information sharing tools	Intranet: sometimes miss to put information. Monthly meetings; everyone gathers. Morning meetings: daily with group leaders, management, and planners.	Intranet: not properly used. Monthly meetings: incoming orders and current situation. Morning meetings: quality problems and continuous improvements. Notice board. Information from group leader.	Monthly meetings (not always): incoming orders, financial situation, quality. Morning meetings: group level about accidents, machine problems, staffing problems. Morning meeting 2: group leaders and production management.	Monthly meetings (not always): financial situation, incoming orders, and quality. Less frequent Morning meetings: group level, can bring up problems. Not in all groups. Lack of information to afternoon shift. MPS system. TV screen: backlog. Website: not that much information.	Daily planning meeting: production manager, quality manager, production technician, and shift leaders. Afternoon meeting: group level, feedback from daily planning. Monthly meeting: management about e.g., finances, projects, organization, future, quality. Intranet Information board.	Afternoon meeting: group level about illness or broken machines. Monthly meetings: management present, e.g., results Production manager: fast information at the shop floor Information board.

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[5] Workplace organization method

Cost

Even though some operators receive regular information, none of them can relate to the costs and investments. Surprisingly, neither can M2 at C3, who refers to M1 for such answers.

Regarding importance of cost reduction, the numbers show consensus within all three companies. However, C1's M2 states that there are limits to what is possible. Further, one of the operators at C1 cites profit for the owners as the reason why cost reduction is essential.

Competitive factors

Both at C2 and C3 the managers identify high technical knowledge as their main competitive advantage. Meanwhile, all operators at all three companies cite delivery precision as their major competitive advantage, something which is only implicitly mentioned by the managers at C1.

Information and process technology

The layout is clearly understood by everyone; hence, all companies have consensus regarding their production process.

Human resource systems

At C1 and C2 the operators disagree with one another regarding possibilities to learn more. Referring to the ratings, the managers at C2 agree, while the managers at C1 do not; M1 appreciates the possibilities for work enlargement better than M2, and the operators.

Organization

C1 does not reach as high levels of consensus regarding the contact and relations between the hierarchical levels as do C2 and C3. A possible reason is that C1 recently changed owners and management, which the operators may have received with skepticism. C2 and C3 show consensus regarding flat organizations with good contact.

In this type of business, it seems rather problematic to know about the corporate long-term plan. This most likely relates to the fact that all three companies rely on a few customers, and thus may not be as independent in making long-term plans, compared to more diversified companies.

No clear patterns emerge regarding the operators' participation in work change. At C1 the managers do not consider their organization ready to support suggestions, which can explain the different ratings among the operators. At C2 the operators and M2 agree that their participation is low, while M1 has a slightly deviating opinion, placing the responsibility for it on the operators. At C3 there is a higher level of consensus.

Implementation

All companies use some similar types of information-sharing tools and there is an awareness of them. This implies that there are information channels in place to facilitate information exchange and strategic consensus creation.

5.2 Strategic consensus among managers

At C1, but also sometimes within C2 and C3, the managers disagree on a number of dimensions where the CEO and production manager should assumedly have a shared view. This indicates not only a lack of strategic consensus among individuals, but also a lack of vertical alignment between the corporate strategy and the manufacturing strategy [6]. At C1 the CEO and the production manager are relatively new; thus deviations are not surprising, as they have not had the time to create consensus.

Divergence in the answers at C3's management level can most likely be associated with the size of the company and how they have chosen to organize themselves. Their production manager seems to be more operations-oriented than those of the other companies. This might partially be explained by the family relationships within the company and their focus on maintaining a flat organization, where the CEO is present at the shop floor on a daily basis.

5.3 Strategic consensus among operators

The operators at C1 disagree to a larger extent than operators at C2 and C3 do. The company's new ownership and the unstable situation it creates for the operators may probably account for the disparity in opinions. In general, there are greater differences among the operators within a company than there are between the companies. This indicates that perception of MS is more closely related to the individuals than to the organizational settings.

6 DISCUSSION AND CONCLUSIONS

The purpose of this paper has been to empirically examine the relationship between managers' and operators' perceptions of manufacturing strategy, i.e., the vertical and horizontal strategic consensus within the operations function, from a behavioral operations perspective. The analysis shows that strategic consensus seems to be in place to a much larger extent than what is implied by previous studies, e.g., Boyer and McDermott [1].

It can be seen that the operators have a greater awareness related to the intra-organizational dimensions. This is particularly evident within and to some extent between groups in the production process, as there is a high degree of consensus within the dimensions of Quality, Information and process technology, and Implementation. For the dimensions of Delivery, Flexibility, and Competitive factors, which to a higher degree incorporate inter-organizational elements but are still connected to the operators' work environment, there is a lack of strategic consensus. For the dimensions of Cost, Human resource systems, and Organization, which are on a higher intra-organizational level, there are not only a lack of consensus but also disagreements and minimal awareness of these dimensions among the operators.

It is also apparent that even if the operators and the managers reach consensus regarding their ratings on the Likert scale, differences exist in their understanding of the underlying reasons for the prioritization of the dimensions. This is interesting, as all three companies have information-sharing channels in place. For example, Mills et al. [21] stress the importance of pictorial methods for strategy communication and in this study, this seems inadequate. Either the quality of the information is poor, or the ability to grasp the information varies among the operators. Edh et al. [22] arrive at similar conclusions, i.e., that the operator's perception seems to depend on individual factors such as employment period, organizational belonging, and the operator's own interest in finding information. Hence, even if strategic consensus at several dimensions is reached, the organization still does not work towards the same goals. There is therefore a need to further develop the concept of strategic consensus.

The SME context has been described as a flat organization with personalized management, resource poverty, low levels of employee involvement, fire-fighting mentality, high flexibility, and closeness to markets with few customers [16] [23] [26]. The companies in this research match these descriptions to some extent. Some of the findings can be described based on SME characteristics; there is a fire-fighting mentality and few customers, which do not allow for long-term planning. However, the resource poverty

cannot be confirmed; all companies have been able to make necessary investments. There is a lack of consensus between the hierarchical levels regarding flexibility and employee involvement; thus it is hard to say that flexibility is high and employee involvement is low. On the contrary, C1 strives to decrease flexibility and some of the operators are very involved in their company's operations. However, the latter seems to be connected to the will and abilities of individuals.

The main contributions of this paper are the focus on the people within the MS process and that strategic consensus is not equal to strategic commitment. Studying the people dimension from the BO perspective leads to the conclusion that the traditional way of describing MS shows a deterministic view. It is important to further investigate the consequences of seeing people as non-hyper-rational individuals on the MS process. The research was based on case studies of only three companies, and did not include the MS formulation process. In further research, and to decrease the deterministic view, both the formulation and implementation elements of the MS process should be studied.

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Paper 3

Manufacturing strategy in a behavioural operations perspective:
The people dimension

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Manufacturing strategy in a behavioural operations perspective: The *people* dimension

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Abstract

Manufacturing strategy (MS) literature is analysed from a behavioural operations (BO) approach to provide a perspective on why "people" – in particular managers and operators – are relevant to MS. Much of the current body of knowledge is shaped by functionalistic perspective, in which individuals are approached from a deterministic (or mechanistic) point of view; people within the processes (acting upon plans issued by managers) are treated in a mechanistic manner. Based upon a literature review, it is concluded that the connection between MS and BO is not well developed, and the quest for more focus on "operators" is presented by two propositions.

Keywords: Behavioural operations, Manufacturing strategy, People

Introduction

The terms *manufacturing* and *strategy* are widely used in the operations management (OM) literature. The combination *manufacturing strategy* (MS) commits to two layers of the organisation: managerial decision and operations processes. In this paper, we provide a perspective on why "people" – in particular managers and operators – are relevant to MS, how this has been addressed in current MS literature, and what opportunities this may have in regards to interaction between these two layers in MS.

Traditionally, MS is defined in terms of a contingency approach – the creation of a *fit* between market requirements and operations resources (Skinner, 1969; Slack & Lewis, 2011). The achievement of this is accordingly operationalised by the distinction of *process* – formulation and implementation – and *content* – strategic decisions that are made with respect to competitive priorities and decision categories (Mills et al., 1995; Slack & Lewis, 2011). Whilst current literature has aimed to capture this fit through concepts such as "strategic consensus" (e.g. Boyer & McDermott, 1999) and "strategic alignment" (e.g. Brown & Blackmon, 2005), it overlooks an important dimension that has been emphasised by the emerging behavioural operations (BO) perspective, namely that "almost all contexts studied within operations management contain people" (Croson et al., 2013). Hayes et al. (2005) do mention "people" in their call for a more "interactive" approach to strategy formulation and implementation: "…people throughout the organisation are continuously identifying opportunities, developing new technologies, developing new knowledge and capabilities, and testing out their ideas",

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yet this perspective does not elaborate further on the people dimension. Recent empirical studies emphasise the people dimension in MS (e.g. Edh et al., 2012; Gagnon et al., 2008; Kathuria et al., 2010); however, this perspective is yet to be understood in regard to theoretical underpinnings and implications.

The aim of this paper is to provide an understanding of the importance and role of people in manufacturing strategy, with particular attention to two layers in the organisation: the managers and operators. The paper is outlined as followed: Section two describes the research methods, and section three presents a frame of reference that serves as theoretical foundation for the scope chosen in the paper. Section four presents the findings that are synthesised in terms of a set of propositions, and the final section presents the conclusions.

Method
The body of knowledge within MS is vast and spread over different types of publications and academic journals within a number of disciplines. A structured search of the MS literature was conducted in three steps. The first step was based on a trusted sources approach, i.e. a review of high-ranked journals within operations management (JOM; IJOPM). A second step entailed a domain-based search, in which academic articles in ABI/INFORM and Science Direct were searched for the term "manufacturing strateg*" in the title (and hence regarded as "core" to the subject of MS) in combination with a set of constructs that can be associated with people in a broad sense ("people* OR individual* OR actor* OR human* OR operator* OR manager*") in the title, abstract or key words. This was to capture the extent to which people appear in the MS literature and allow for development of the first proposition presented in section four. Another combination was by reviewing "manufacturing strateg*" and "behavioural operations" (BO) literature in order to explore to what extent MS has been approached in that body of knowledge. This search string serves as a foundation for the second proposition. Finally, "snowballing" was used to track a selection of core articles identified through the first two search approaches. The articles identified were ranked according to a 4-graded scale regarding the relevance to the subject of this paper: with the grade 3 indicating high relevance, and the grade 0 indicating no relevance at all. The results and future direction are presented in terms of two propositions that explain the contemporary notion of the people dimension in MS. Based on the gap identified and the key attributes of BO, the following discussion (in sections four and five) extends the current view on MS through the role and importance of the people in MS. For the purpose of validation and discussion, the results are linked to other bodies of knowledge within the fields of operations management and strategic management where the people dimension has already been addressed.

Theoretical background
This section presents the theoretical underpinnings of the paper, namely manufacturing strategy (MS), and the quest for further development that can be materialised through behavioural operations (BO).

Manufacturing strategy
Much research has been conducted on MS since Skinner's publication in 1969, and the literature seems to agree upon what MS encompasses. Marucheck et al. (1990) offer the following definition of MS: "Manufacturing strategy is a collective pattern of coordinated decisions that act upon the formulation, reformulation and deployment of manufacturing resources and provide a competitive advantage in support of the overall

2

strategic initiative of the firm". Traditionally, MS is thoroughly linked to corporate strategy by the reference of a creation of a fit between market requirements and operations resources (e.g. Miltenburg, 2005; Skinner, 1969; Slack & Lewis, 2011). This is accomplished through a sequence of structural and infrastructural decisions made by manufacturing over a long period of time (Hayes & Wheelwright, 1984; Miltenburg, 2005). The formulation and implementation of strategy are commonly referred to as the *process* of MS. The *content* perspective of MS entails strategic decisions that are made with respect to competitive priorities, such as cost, quality, delivery and flexibility (Acur et al., 2003; Boyer & McDermott, 1999; Slack & Lewis, 2011), and decision categories (structural and infrastructural (cf. Hayes & Wheelwright, 1984; Hayes et al., 2005). Both decision categories and competitive priorities refer to tangible and systemic parts of the operations. The competitive priorities are usually based upon "hard measures", and the assumption is that these can be articulated and communicated across various levels in the organisation. The decision categories share somewhat similar characteristics: (1) *structural decisions* concern capacity, sourcing and vertical integration, facilities, and information and process technology (Skinner, 1969) (they often require a substantial capital investment and are difficult to alter) (Hayes et al., 2005), and (2) *infrastructural policies and systems* refer to tactical activities, including resource allocation and capital budgeting systems, human resource systems, work planning and control systems, quality systems, product and process development systems, and organisation (Hayes & Wheelwright, 1984; Hayes et al., 2005; Miltenburg, 2005; Skinner, 1969; Slack & Lewis, 2011).

Together, competitive priorities and decision categories define the logic by which the manufacturing processes operate. Accordingly, the ability of manufacturing strategy to achieve its goals is made upon assumptions by a particular paradigm; the role of "people" in such a scenario is to carry out relevant operations given these circumstances:

- *Managers* "form and implement" strategies that are shaped by "competitive priorities" and that are given by the market place (cf. "fit" to market requirements).
- *Operators* are expected to continually strive for achieving goals in a particular setting (shaped by the "decision categories"), which they have not been involved in setting (but rather are set by the "competitive priorities" and operationalised through manufacturing strategies "formed and implemented" by managers).

In such setting, the assumptions made upon "human beings", i.e. how they relate to the world in which they operate, seem to view people from a deterministic point of view and that operators both *will* and *can* comply fully with the intended impact of MS (for a similar discussion within the logistics management discipline, see Mears-Yong & Jackson, 1997; Aastrup & Halldorsson, 2008). People behaviour is set by the logic of a wider system and becomes predictable, as such, and perceptions and beliefs become less apparent. This might be further enhanced by the separation of the content from the actual process of MS. It is during implementation of MS that the people dimension becomes crucial through the emphasis on strategic consensus, which calls for particular attention to the operator level. It includes "what must be done, why it must be done, how it will be done, when it will be done, and who will do it" (Miltenburg, 2005:112), and the importance of making MS understandable and communicable for manufacturing managers and workers is acknowledged by others, e.g. Mills et al. (1998). It is a process in which it is essential to get the employees to accept and consent to the strategy and to build teamwork towards the same goals (Miltenburg, 2005; Marucheck et al., 1990). Previous empirical research (e.g. Edh et al., 2012; Gagnon et al., 2008; Mills et al.,

1998) has stressed the role that information sharing has for communication and sharing of MS. Marucheck et al. (1990) also stress the impact of corporate culture, top management commitment and managerial styles on MS implementation.

Behavioural operations
The call for increased attention to the people dimension is not new to MS. Barnes (2002) suggested that the "soft" factors of organisational structure, culture and politics are rarely mentioned in the MS literature, which allegedly "…largely ignores the impact of internal contextual factors and remains dominated by Skinner's original prescriptive model, that is firmly in the top-down corporate planning paradigm" (Barnes, 2002:1106). Even if the body of knowledge on human resources and organisational behaviour, e.g. is rich in regards to the "workforce dimension", an early observation in the OM literature suggests that these are "not normally thought of as strategic" (Anderson et al., 1989:145). Some branches of OM have established a framework to connect OM with human resource management (HRM) (e.g. Boudreau et al., 2003), yet without explicating the implications of this for e.g. MS.

The emerging approach of BO offers a set of assumptions that opens up the opportunity of combining operations more explicitly with behaviour. The foundation of BO is that "almost all contexts studied within operations management contain people" (Croson et al., 2013). It is not suggested that "people" have been left out of OM literature; rather, the novelty of BO seems to be the ability to explicate the fundamental assumptions on which "people" are addressed in the current body of knowledge. It is suggested that the OM literature offers a rather "mechanistic" view on people. BO, however, sees operators and managers as non-hyper-rational (Croson et al., 2013) in decision making. Based upon the observations above of the key assumptions of MS, this emerging perspective may allow for further development of the field of MS. In particular, Croson et al. (2013:2) define hyper-rational actors by presenting three criteria: "(A) they are mostly motivated by self-interest, usually expressed in monetary terms; (B) they act in a conscious, deliberate manner; and (C) they behave optimally for a specified objective function". For research to be classified as BO, it has to deviate from at least one of these criteria (Croson et al., 2013), e.g. deviating from (A) by seeing behaviour as being motivated by social preferences; deviating from (B) by seeing emotions as key triggers of behaviour; and deviating from (C) by seeing decision makers' behaviour as non-optimal. Further, BO research has to be in an operational context, and its unit of analysis is at the micro level, i.e. individuals or small groups of individuals (Croson et al., 2013).

In summary, the characteristics of MS and the discussion of its distinction of content and processes along with the emergence of BO serve as (1) theoretical justification for the aim of the paper (namely "why" the people dimension is critical) and (2) the theoretical underpinning of the subsequent presentation and discussion of the findings.

Findings
The previous section explained the limitations of "people" in the current body of knowledge on MS and the potential explanatory power of the emerging BO perspective. This section presents the findings of the literature review and how the people (in particular, managers and operators) have been addressed in the current literature on MS. Derived from this and the key assumptions offered by BO, opportunities regarding the interaction between the two layers – managers and operators – are discussed. The literature review resulted in a list of 46 articles that were ranked as relevant to the objective of this paper. The earliest article dates back to 1985, and the rate of

publication seems to have declined in the early 2000s, with the bulk of the publications presented during a period of 15 years. Further, this subject is somewhat dispersed over a variety of academic disciplines (31 different academic journals). This leaves the impression that a people dimension associated with MS is not well established even outside the domain of OM (e.g. in organisational behaviour), and perhaps more interestingly, the emergence of BO has yet to be developed into the field of MS.

The findings are presented in terms of three categories: The first category (1) includes articles with a strong profile in MS, hence, that are within the manufacturing function and that in some way refer to "people". This category is divided into two subgroups, based upon the nature of the evidence: (1a) conceptual articles and (1b) empirical articles; The second category (2) includes articles which relate to the role of managers vis à vis manufacturing, e.g. interaction and alignment with business strategy and other functional areas. Category three (3) includes articles that are ranked as those that present the most advanced view on the people dimension.

Category 1a: Manufacturing strategy – the conceptual evidence
In this category, frameworks are presented that emphasise, for example "optimum utilisation of all hierarchical levels", a view in which "people" are referred to as human resources or a workforce. Improved monitoring results in better control (Akhtar & Tabucanon, 1993). Garvin (1993) also acknowledges the importance of various groups of the organisation in the "development of a list of actions", which include the "lowest levels of the manufacturing organisation". This involvement, however, only takes place once management has set the strategic priorities, and such involvement is not elaborated further on in the framework presented. Managers seem to be given more attention than workers operating in the manufacturing process (i.e. operators and shop-floor workers), and the dominant role of managers seems to be to choose between a list of operational options (e.g. Garvin, 1993; Platts et al., 1998). Swinehart et al. (2000) assign a more active role to manufacturing workers by stating that the essential parts of "world class manufacturing" are skills, involvement and participation of employees (defined in broad terms). However, the notion of "employees" is not developed further, and elements of what we today know as BO are not identified.

Category 1b: Manufacturing strategy – the empirical evidence
Articles based upon empirical evidence which use e.g. interviews and direct observation as data collection methods allow for in-depth understanding of the emphasis on managers and their roles in a specific context (DeHoratius & Rabinovich, 2011). Data that is not only acquired from managers but that is also about them can come from multiple sources of evidence, including from managers at various levels as interviewees (e.g. Jalham & Abdelkader, 2006; Swamidass & Newell, 1987) or as respondents to surveys (e.g. Kim & Arnold, 1996; Schroeder et al., 1986). Only two articles have collected evidence from more than one hierarchical level of an organisation. First, in a study on the link between management systems, practices and behaviour, Morita & Flynn (1997) collected evidence from individuals ranging from shop-floor workers to the level of plant managers. Albeit the focus was "managerial characteristics and behaviour", which were regarded as "ripe with implementation problems", the findings were derived from the viewpoints of not only that group but also from others who interact with managers within an organisation. Second, Staughton et al. (1992) studied the role of education and training in "manufacturing strategy formulation and implication" by collecting evidence from individuals at three levels in an organisation (directors, managers and staff). The conclusion emphasised an iterative approach to MS

5

in which education and training play a "key role", not only during formulation and implementation, which seem to be a conventional scope of MS, but also in two additional respects. First, to gain wider acceptance in the organisation, and second, to provide the management team with the capability of subsequently renewing the strategy. Despite the multiplicity of data sources in such studies, these articles reveal a strong focus on the managerial level of the organisation; e.g. it is the managers who organise improvement efforts, while workers are suggested only to take part at a detailed task formulation stage (e.g. Jalham & Abdelkader, 2006). Two of the articles indicate a BO perspective, discussing pride in work, morale, commitment and learning in relation to best practice (Morita & Flynn, 1997); linking MS with education and training, and focusing on the importance of involvement at all levels (Staughton et al., 1992).

Category 2: Role of manufacturing and managers
The people dimension is more evident in this second category, in which a large number of the reviewed articles fall. In particular, these studies imply a quest for a more inclusive approach to MS, first, by pointing out the relevance of multiple levels in the organisation, and second, by implying iteration between such levels.

 Multiple levels in the organisation: The topics studied include seniority of manufacturing personnel and their involvement in strategic decisions at the firm (Brown, 1998; Brown et al., 2007), the role of corporate, business and functional managers in MS development (Fine & Hax, 1984), and the need for consensus between managers at different levels and functions (Kathuria et al., 1999). Swamidass (1986) elaborates on MS assessment, conceptualises the perception of executives, and points out the existence of a "mismatch of priorities" between CEOs and manufacturing managers. This is to some extent in line with the assumptions that are explicated by BO. Finally, Barnes (2002) emphasises the importance of viewing managers as individuals, including individual, cultural and political factors in the interpretative processes of MS development. More recently, Paiva et al. (2012) argue for a cross-functional activity of MS from a knowledge-based view.

 Iteration between levels: Adamides and Pomonis (2009) refer to the multiple levels with a more dynamic and integrative vocabulary, using terms such as *alignment*, *vertical hierarchies* and *managers' mental models* for decision making. Evidence of this is also found in earlier work by Youndt et al. (1996), which emphasise the importance of the people in an organisation through the relationship between human resources and firm performance and their alignment with MS. However, despite stressing the importance of employee skills and commitment and people as a source for competitive advantage, the unit of analysis was at the plant level, and the respondents were general and functional managers. Furthermore, Mills et al. (1998) identified both the concepts of managers' perception and group consensus in relation to MS communication through a strategy chart; however, it still focused on the managerial level. Overall, this category implies a more evident role for people than the first category by referring to different hierarchical layers of "people", yet the predominant perspective seems to be the one of managers rather than workers in manufacturing.

Category 3: A people dimension in manufacturing strategy
This third category represents the most developed perspective regarding the people dimension in MS as derived from this literature review. Only five articles fall into this category; they were published between 1987 and 2000. Although they were published before BO was presented in the OM literature, they captured elements of the people

dimension in MS to a greater extent than articles in the previous categories; all five articles stress the importance of operators (workers and employees). In a conceptual paper by Santos (2000), employee role behaviour and employees' mindset are presented as the human dimensions of MS. Open communication between employees and managers are regarded as relevant to company's success (Kiam, 1987), and the need for employee acceptance of the strategy (Marucheck et al., 1990) indicates a clear link between MS and human resource management. This view is further confirmed by Kinnie & Staughton (1991) and Kinnie et al. (1992), which recognise that it is the non-technical factors that influence the experience of changing MS. However, none of the articles have included operators as a "data source", nor do they depict operators as individuals or establish the hierarchical level as the unit of analysis.

Further development through two propositions
All three categories confirm a bias towards focusing on managers and their organisational roles and actions, both with regard to the content and process of MS. This implies that MS as a subset of OM is dominated by the logic and perspective of "management" rather than "operations". As a means of summarising the discussion hitherto, and to suggest options for future direction, two propositions are suggested. First, *the predominant focus on managers as key actors of MS must be complemented by including the role and viewpoints of operators*, i.e. those individuals who are an integrated part of processes by which products and services are generated. This requires conceptual development (as well as empirical studies) of MS that includes evidence from *both* of these two levels. Second, a predominant logic in MS is that operators have a particular role compared with the management level; they are subsumed to the logic set by strategic priorities such as quality, responsiveness and flexibility. *Difficulties of implementation and further advancement of MS are constrained by these key assumptions about human beings. BO offers a perspective and vocabulary to question these assumptions.*

The unit of analysis should no longer be multinational corporations or individual plants but should necessarily refer to a micro level, in which a part of an organisation is studied (Croson et al., 2003). In terms of research design, this also implies a quest for the use of qualitative field studies, in which individuals and events are studied in a particular context. Methods such as in-depth interviews and direct observation should be used to allow the researcher to be sensitive to changes in context and to the viewpoints of the individuals who work in that particular setting. A number of articles reviewed in this paper discuss the impact that strategy has on employees. When looking at the method, this input data often comes from top management or manufacturing managers. In order to assess the situation for the employees, the employees need to be the unit of analysis.

Discussion and conclusion
In this paper, we aimed at providing a perspective on why the people dimension – in particular managers and operators – is relevant to MS by investigating how this has been addressed in the current MS literature and what opportunities this may present in regards to the interaction between these two layers in MS.

A perspective on why "people" – managers and operators – are relevant to MS
In line with the criticism raised by behavioural operations, the literature review confirms that MS tends to treat people mechanistically, assuming that clear strategies can be formulated and that individuals will subsequently follow these. In the light of

this development, it might be tempting to suggest that MS has remained in the same sphere, turning around on its own axis since its early development, decades ago. Companies and organisational structures do not only consist of assets and resources. Behind those concepts are people: individuals with their own perceptions and beliefs that may influence the way they receive and interpret the management's decisions about strategic priorities and directions. Overlooking them and their importance for company success/competitive advantage in terms of MS and its process leads to MS capturing only an incomplete picture of reality. For the field to advance, it is essential to incorporate the people dimension and the BO perspective. This has to some extent been done by a closer focus on the manager layer. However, it is argued that further attention should be placed on the operator layer, based upon the assumptions of BO that offer promising pathways for further development. In addition, the inter-relationship between the two dimensions of people – managers and operators – must be regarded as reciprocal rather than unilateral. Adopting and integrating concepts and ideas from related fields would not only push the MS field forward and allow it to focus more on the empirical aspects of the people dimension, but would also bring the field closer to its origin and justify its position under the OM umbrella.

The people dimension as addressed in the current MS literature
When analysing the articles, it becomes clear that very few of them incorporate anything similar to what BO defines as behavioural operations research. Viewing people as "resources" or "assets" (e.g. Akhtar & Tabucanon, 1993) indicates a mechanistic view of the human being.

Category 1a: Presents frameworks where the managers are the actors and the operators are either viewed as resources, or their skills and participation are important for MS, but it is not stated how.

Category 1b: Managers are the sources of data/respondents for studies that have a strong focus on the managerial level (as in category 1a).

Category 2: Focuses on manufacturing managers and their roles to other organisational functions, with a slightly more evident people dimension. However, it only captures one of the layers: managers. It emphasises the importance of the other layer (operators) but does not incorporate operators as study objects.

Category 3: Links HRM and MS, emphasising employees and operators as people (and not resources) by discussing their mind-sets and experiences. However, operators are still not study objects.

The evidence suggests that MS does not have any settled "home"; the articles identified are published in a variety of academic journals, but most of the notable contributions were published more than a decade ago and never managed to penetrate the predominant discussion of the content and process of MS. The decline in writings since the early 2000s leaves the impression that researchers interested in the people dimension have focused on other branches of OM. MS has in turn not undergone any major changes, and it has been somewhat isolated from developments within e.g. strategic management as well as from the methodological debate of key theoretical assumptions. During this research, it came as a surprise that concepts such as strategic resonance and strategic consensus did not appear more evidently in the literature search, despite having clear indications of relating individual perceptions at different hierarchical levels to each other by analysis of small groups in a manufacturing setting. When looking into the BO field, MS is not covered, except in relation to parts of its content, e.g. quality management practices and innovative, lean systems.

Opportunities through interaction between the two layers of "people" in MS

This paper contributes to a redefinition of the process of MS by incorporating a people dimension. For MS to be a means for a company to reach competitiveness, the process in itself has to be viewed as an important resource for sustained competitive advantage. People cannot be viewed as a production resource with an optimised behaviour but have to be regarded as non-hyper-rational human beings, and MS must establish a reciprocal obligation between managers and operators. Greater attention to operators requires the conceptual development of this dimension into MS. Further, research design must embed this group of individuals as a study object and ensure that data collection methods do assert the world views of operators and not only the world views of managers, as seems to be the case in the current body of knowledge.

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11