Manufacturing Strategies adopted By Companies For business performance

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Abstract
Manufacturing strategy as a concept, area of study and practice has been growing for the last recent years. Nevertheless, as it has grown the clarity of manufacturing strategy has diminished as different approaches and different views have appeared. This paper briefly reviewed the significance of manufacturing strategy and its implementation by firms to raise their performance. From literature reviewed it can be concluded that different firms have embraced different manufacturing strategies in order to develop their business performance.

Greatest manufacturing strategies in firms should contain aspects such as the anticipation of new technology, and a link between manufacturing strategy and business strategy, a formal strategic planning process, which includes the company’s management, and communication of the manufacturing strategy to firm’s employees. This paper recommends a model of manufacturing strategy that includes five decisions areas namely: 1) product design/engineering; 2) production planning and control; 3) organization and management; 4) plant and equipment; and 5) labor and staffing.

Keywords: manufacturing, manufacturing strategy, manufacturing performance.

1. Introduction
The strategic power of manufacturing in supporting business strategy and creating competitive advantage has been an important theme in the literature on manufacturing management since the 1960s. Beginning in the late 1960s and continuing through the 1970s, work by many authors argued that linking major, long-term decisions in manufacturing—such as the degree of vertical integration, capacity, and facilities focus to business strategy could transform manufacturing from a millstone to a competitive weapon (Wijewardena, & Cooray 1996, Bracker & Pearson 1986, Duchesneau & Gartner 1990). More recent work has elaborated on the concept of manufacturing strategy and provided empirical support on many of its central propositions (Jeon & Wu, 2011). Scholars and practitioners have collaborated to document experience with strategic decisions in manufacturing and their impact on performance. Large-scale survey work on manufacturing strategy has provided additional evidence on practice in making and executing manufacturing strategy (Pelham 2000, Steel 1994, Yusuf 1995).

During 1960s manufacturing was seen as a simple process of changing materials into products. Trying to suggest ideas to make manufacturing work more efficiently and/or effectively, most studies take their outset in offering clients what they want at the lowest possible cost (Platts, 2000). Nevertheless, this view no longer suits as the environment of manufacturing has faced significant fluctuations in the past decade. In fact, the most notable tasks for manufacturing are amplified levels of complexity and ambiguity coming from increased globalization, of markets and operations, the varied demands of customers, radical reductions in product lifecycles, and manufacturing and ICT technology progress. In a word, the knowledge base for manufacturing has become more complex and this process is expected to endure. Consequently, it is quite significant to change our viewpoints on manufacturing, from a resource-based to knowledge-based view; from linearity to complexity; from individual to system competition; and from mono-disciplinarily to trans-disciplinarily (Pun et al, 2004).

Manufacturing strategy is not just about aligning operations to existing competitive main concern but also about choosing and constructing the operating abilities a company will need in the upcoming. A common way of seeing manufacturing strategy has been to isolate the process of manufacturing expansion and its content. The content of manufacturing strategy has been viewed as
the strategy choices in process and organization. Since the initial work of Skinner, writing and practice in manufacturing strategy have advanced on numerous different fronts. The first of these can be considered as competing through capability. This is accomplished through aligning the competences of manufacturing with the competitive requirements of the marketplace. The second is the approach centered on internal and external consistency between the business and product context and the choices in the content of the manufacturing strategy. This is successfully a contingency-based approach (Jimenez et al, 2011). This paper will focus on the significance of strategy and manufacturing strategy and its application to manufacturing performance.

2. Literature review
2.1 Strategy formulation for business performance

Business success relies considerably on the formulation and implementation of feasible strategies. Pun et al (2004) defines a strategy as a plan, or something equal—a direction, a guide or course of action into the upcoming, a path to get from here to there, and also as a pattern, that is, consistency in behavior over time. The strategy should match the organization’s resources (e.g., financial, manufacturing, marketing, technological and workforce) to its varying environment and in particular its markets and clients in the pursuit of its goals and objectives.

A strategy becomes a necessary framework through which an organization can instantaneously assert its vital continuity and enable its adaptation to a changing environment. A strategy consists of “process, content and context”. Process refers to how strategy is made and addresses issues of competitive priorities, which comprises cost, quality, delivery speed and dependability, flexibility and innovation aspects. Content is a pattern or method in which strategy is developed and implemented (Dangayach and Deshmukh, 2001). The context embraces both internal factors (e.g., the enterprise’s structural, cultural and political aspects) and external factors (e.g. economic, social, political, and competitive environments). Even if the strategy is undocumented, informal, or unplanned and even if the business is unaware of, unconscious of, or flatly denies it, a strategy exists. For example, location, premises, facilities, technology, employees, product lines, target markets, supply and distribution channels, reputation, standards and procedures are chosen, formed and adhered to for various lengths of time. When defined and implemented consciously, a formal strategy can become a set of guidelines for future activities.

Strategy formulation is concerned with the definition of firm mission and objectives, the assessment of internal and external environments, and the determination of strategic choices (Pun et al, 2004). It incorporates the planning elements and the implementation parameters, and allows management to size the progress and assess the results. The strategy formulation process employs a variety of critical variables and recommends possible cause-and-effect relationships that determine the operational and business performance of a firm. The strategy formulation function has a strongly entrepreneurial character, in the sense that executives have to choose among alternative strategies and follow approaches that entail adventurerness and risk-taking. With respect to the dynamic business environments, many researchers and specialists have suggested different planning models, frameworks and methodologies for strategy formulation. These planning models, frameworks and methodologies have distinct structures, with each contributing important ingredients and attributes for holistic, maximally useful strategy formulation. They offer some references and guidance for firms to identify opportunities, affirm positioning and formulate viable strategies.

Nevertheless, there is no one strategy that is ideal for all companies. Individual organizations have to define what makes the most sense in light of their positions in the industry and a thorough, integrated analysis of the external environment and assessment of the organization’s internal competencies (Pun et al., 2004). Linking strategy formulation to implementation is a challenge that manufacturing businesses face today, but the rewards for those who succeed will be gorgeous.

Strategy has been defined as the determination of the elementary long-term goals and the objectives of an enterprise, and the implementation of courses of action and the allocation of resources required for carrying out these goals. Such a broad definition of strategy covers a multitude of
decisions from. What business should we be in? How can manufacturing contribute to the competitive advantage of this business?

Recognizing this has directed to the idea of a hierarchy of strategy with three major levels:

- Corporate Strategy – what set of businesses should we be in?
- Business Strategy – how should we compete in a given business?
- Functional Strategy – how can this function contribute to the competitive advantage of the business?

### 2.2 Definition of manufacturing strategy

Manufacturing strategies has been defined by many scholars. Skinner (1969) was the first to attempt defining manufacturing strategy. The author argues that manufacturing strategy refers to exploiting certain properties of the manufacturing function as a competitive weapon. According to Zhao, et al (2006) manufacturing strategy is a consistent pattern of decision making in the manufacturing function which is linked to the business strategy. Wang, & Cao, (2008) argue that manufacturing strategy is a coordinated approach, which strives to achieve consistency between functional capabilities and policies for success in the marketplace. Voss, C (1995) stated that manufacturing strategy is a tool for effective use of manufacturing strength as a competitive weapon for achievement of business and corporate goals. Dangayach, & Deshmukh, (2001) defined Manufacturing strategy as a collective pattern of decisions that acts upon the formulation and deployment of manufacturing resources. To be most effective, the manufacturing strategy should act in support of the overall strategic directions of the business and provide for competitive advantages. Different definitions of manufacturing strategy given by other researchers are given in table 1. From these definitions; it is clear that manufacturing strategy has a significant role to play and needs critical attention in the corporate setting.

### Table 1 Different definitions of manufacturing strategy

<table>
<thead>
<tr>
<th>Author</th>
<th>Definition of manufacturing strategy</th>
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<tr>
<td>Skinner (1969)</td>
<td>Manufacturing strategy refers to exploiting certain properties of the manufacturing function as a competitive weapon</td>
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<tr>
<td>Zhao, et al (2006)</td>
<td>A sequences of decisions that over time, enables a business unit to achieve a desired manufacturing structure, infrastructure and set of specific capabilities</td>
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<tr>
<td>Ariss (2010)</td>
<td>It is a critical part of the firm’s corporate and business strategies, comprising a set of well coordinated objectives and action programs aimed at securing a long-term sustainable advantage over competitors</td>
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<tr>
<td>Westhead (1995)</td>
<td>It represents a coordinated approach which strives to achieve consistency between functional capabilities and policies and the agreed current and future competitive advantage necessary for success in the marketplace</td>
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<tr>
<td>Hon, (2005)</td>
<td>The effective use of manufacturing strengths as a competitive weapon for the achievement of business and corporate goals</td>
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<tr>
<td>Steel (1994)</td>
<td>Manufacturing strategy as the overall plan for how the company should manufacture products on a worldwide basis to satisfy customer demand</td>
</tr>
<tr>
<td>Hayes and Pisano (1994)</td>
<td>In today’s turbulent competitive environment a company more than ever needs a strategy that specifies the kind of competitive advantage it is seeking in the marketplace and articulates how that advantage is to be achieved</td>
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Wang, & Cao, (2008) Manufacturing strategy as decisions and plans affecting resources and policies directly related to sourcing, production and delivery of tangible products

Lee, Q (2006) The choice of a firm’s investment in processes and infrastructure that enables it to make and supply its products to chosen markets

Ward, P & Duray, R (1999) A collective pattern of decisions that acts upon the formulation and deployment of manufacturing resources. To be most effective, the manufacturing strategy should act in support of the overall strategic directions of the business and provide for competitive advantages

Platts, K (2000) Manufacturing strategy is a driving force for continual improvements in competitive requirements/priorities and enables the firm to satisfy a wide variety of requirements

2.3 Manufacturing strategies adopted for business performance

Performance measurement is crucial to manufacturing enterprise. If the effective efficiency of an activity cannot be measured, it could not be correctly controlled. While mechanistic or physical measurements could be made extremely accurately due to advances in metrology, the measurement of manufacturing performance remains an uneasy subject due to the diverse and multi-dimensional nature of manufacturing. By definition, performance is concerned with what happened in the past or what is happening in the present instance and therefore it is noticeable and measurable, Hon (2005). Performance measures are necessary for management to understand the state of the manufacturing system and to take appropriate action for maintaining competitiveness.

A study directed by Wang et al (2008) on the significance of consistency between manufacturing strategy and practices in achieving better business performance focused on how different manufacturing strategy and practices affect company performance. The sample used for this research involved of 50 Korean, 41 American and 29 Japanese manufacturing companies selected from the International Manufacturing Strategy Survey database. The empirical test result from this study implied that the gap variable indicating inconsistency between manufacturing strategy and implementation practices plays a more significant role than the strategy or implementation variable in discriminating the superior from the inferior performance groups. For those data sets from the US and Korea, the gap variables of flexibility, quality and/or cost showed more significant contribution in discriminating business performance groups. But none of the gap variables overtake other strategy or implementation variables in discriminating performance groups in Japan.

In another study, Schroeder et al (2002) surveyed manufacturing strategy on a resource-based view of the firm. They discovered the role of resources and capabilities in manufacturing plants that could not be easily duplicated, and for which ready substitutes were not available. Based on data from 164 manufacturing plants, the authors empirically proved that competitive advantage in manufacturing (as measured by superior plant performance) resulted from proprietary processes and equipment, which in turn was driven by external and internal learning.

The consequence was that resources such as standard equipment and employees with universal skills obtainable in factor markets were not as effective in achieving high levels of plant performance, since they were easily available to competitors. The authors also proved the important role of internal and external learning in developing resources that were imperfectly imitable and difficult to duplicate.

The ability of the plant to incorporate internal and external learning into proprietary processes and equipment arose as a main contributor to manufacturing performance. The authors proposed that the resource-based view was as suitable theoretical framework for addressing shortcomings in manufacturing strategy research. The resource base view implied that such innovations could only contribute to competitive advantage when competitors who have access to the factor markets cannot effortlessly duplicate them. By empirically proving that routinized learning and idiosyncratic, proprietary processes were connected with better performance, the authors verified the approach for understanding the link between long-term investments manufacturing processes and competitive advantage. They understood that framing the role of manufacturing processes in that manner was
an input to the manufacturing strategy literature that would support future theoretical developments in that line of research. They empirically revealed that the reliability and validity of internal learning, external learning, and proprietary process and equipment constructs in a manufacturing context.

A study by Voss (1995) offered three distinct, but linked paradigms, which related to the content rather than process of manufacturing strategy. These are;

Competing through manufacturing: It can be argued that this approach leads high visibility for manufacturing strategy in an organization and increases business performance; the visible focus on competing on a limited coherent set of factors can be a unifying force within organization where it can lead employees and managers sharing a common vision and the potential of creating debate between manufacturing, marketing and corporate strategies.

Strategic choice: This can provide a clear view of a varied number of choices that a company has. It can lead to matching the whole of the operations strategy to the market positioning, which can end in strong internal as well as external consistency of a firm. This would lead to a focused manufacturing, from which superior performance would be derived.

Best practice: This approach displays strong linkages between adoption of best practice and operating performance. Companies with best practice perform better than those without. Many companies are seeking best practice as the basis of their manufacturing strategy.

Clearly the three different paradigms should not be treated in isolation, and indeed many authors and experts take at least two of them together. It can be concluded that all three paradigms of manufacturing strategy partially overlap each other.

A similar study by Ward et al (1999) used the emerging approach of strategic configurations as a vehicle for synthesizing manufacturing strategy with broadly accepted views of competitive strategy, environment, and structure. The configuration presented in their paper recommends the predominant modes in which manufacturing capabilities can be marshaled to strengthen the strategic position of the business unit. The configurationally approach was selected because it harvests a systematic, detailed, and holistic image of reality, without attributing causation to any of the individual parts of the model.

Thus, the authors claim that there is an underlying theme or consistency among environmental, structural, and strategic dimensions without indicating that it is always, for example, environment which regulates the appropriate structure and strategy for a business unit. The configurations are composed of “tight constellations of mutually supportive elements”. The authors argue that manufacturing strategy, competitive strategy, environment, and structure are configured or interlinked such that there are natural congruencies between these elements. Direct links are suggested to exist between all elements except the link between structure and environment. Competitive strategy has durable relationships with environment. Traditional contingency literature suggests that environment influences strategy (Leong et al, 2006). Manufacturing strategy is also hypothesized to have a strong, bi-directional link with environment. Mutual causality also exists between strategies (whether competitive or manufacturing) and structure. Business strategies have an influence on structure (Zhao et al, 2006).

Another study by Wang et al (2008) presented two approaches for planning manufacturing strategy, a strategic approach and a paradigmatic approach. The key decisions of these two approaches were located in the choices of competitive priorities and manufacturing paradigms. Three hypothesis models on the relationships between these two approaches in a turbulent environment were founded with the help of structural equation modeling and tested with 107 samples from the Chinese manufacturing industry. The results suggest that when established the relationships between manufacturing strategy and business strategy, the mediate function of competitive priorities is not suitable for manufacturing paradigms, and it is more suitable to make the key decisions in each approach based on business strategy directly. The strategic approach model focused on the external consistency among manufacturing strategy, business strategy and other functional strategies, such as marketing strategy, and on the internal consistency among the components of manufacturing strategy,
such as competitive priorities and action plans. A paradigmatic approach favors that innovative manufacturing paradigms and practices can represent new rules and sets of coherences between numerous choices about manufacturing, and provides the best practices for benchmarking.

Ward et al (1996) established a conceptual model of manufacturing strategy from the literature and tested the model using data from a sample of manufacturers in three industries in the United States. Their research contributes to manufacturing strategy literature in four ways. First, it supports empirically a model of manufacturing strategy that is principal in the conceptual literature. Second, it reveals that the strategic linkages in manufacturing businesses are clearer among good performers than poor performers. Third, the research suggests that competitive strategy acts as a mediator between an organization’s environment and its manufacturing strategy. Fourth, their findings suggest that the relationship between competitive strategy and performance is mediated by manufacturing strategy. Their model proposes that environmental dynamism affects both competitive strategy and manufacturing strategy. Competitive strategy is cast in a mediating relationship because it intervenes between environmental dynamism and manufacturing strategy. The model also indicates that competitive strategy directly influences manufacturing strategy. Further, the model suggests that the relationship of environment, competitive strategy, and manufacturing strategy is linked to performance. The model also implies that direct links exist between strategies and performance.

Another study by Williams et al (2004) examined the relationship between manufacturing strategy, business strategy and firm performance in a mature industry. Past research was synthesized, and a parsimonious conceptual framework was developed. The framework was then tested on a sample of 85 firms in the broad woven fabric industry. The results presented an important relationship between the business strategy and the manufacturing strategy of the firm. They support the argument found in the literature that functional level strategies should support business level strategies. A significant relationship was also found between manufacturing strategy and performance of the firm. In particular, the manufacturing function’s quality assurance process and its ability to deliver a quality product/service were found to correlate considerably with firm performance. The primary objective of developing a business unit’s strategy is to improve its performance and competitive position. Based on synthesis of the literature, Williams et al (2004) developed a framework to relate business level strategy, manufacturing strategy, and business unit performance. In this framework, the business unit’s strategy offers a guideline for the development of manufacturing strategy. Business unit performance is a result of how these manufacturing strategies are implemented.

2.4 Competitive strategy and manufacturing strategy

Even if Shibanda and Edebe (2010) point out that they are relatively few in number, existing studies do provide empirical proof of the existence of the predicted relation between competitive strategies and manufacturing strategy, i.e., that manufacturing strategy supports competitive strategy in high performing businesses. For instance, this connection is borne out by Jeon et al. (2011). It is significant to note that a major tenet in the improvement of manufacturing strategy has been that poor business performance results when manufacturing strategy is not associated with competitive strategy.

2.5 Manufacturing strategy and performance

The existence of a connection between manufacturing strategy and business performance has long been supported positively related to a particular manufacturing strategy, flexibility. Several studies have shown that quality is associated with good performance. Tella and Mutava (2011) and Kauranen (1996) have argued that successful manufacturing strategies usually begin with quality as a base. Several studies describing world rank manufacturers propose that the best competitors compete on the basis of a diversity of manufacturing capabilities (Jeon and Wu 2011).

2.6 Environment and manufacturing strategy

The literature also contains proof of a direct association between environmental factors, in particular environmental dynamism, and manufacturing strategy (Ariss, 2010). The researchers also associated business performance to the relationship, suggesting that the high performing factories
choose manufacturing strategies consistent with their environments. Because of this proof, then it can be argued that there is a direct connection between environmental dynamism and manufacturing strategy.

2.7 Competitive strategy and performance

Many authors suggest that a number of diverse, uniformly effective strategies can be used to accomplish good performance (Bracker & Pearson 1986, Duchesneau & Gartner 1990, Bikker & Laura 2009). Strategy implementation is the key link between competitive strategy and success measured by business performance. The authors have argued that functional strategy, in general, or manufacturing strategy, in particular, describes such implementation by providing a further detailed picture of how a competitive strategy is pursued. This leads to a conclusion that manufacturing strategy mediates the relationship between competitive strategy and performance rather than having an independent effect.

3. Methodology of study

A review of the Literature was adapted for this study. Review of the Literature was suitable for the study since as Laaria (2013) noted, literature review were conducted to determine the status given and were concerned with the gathering of facts rather than the manipulation of variables. In the study the research was involved in getting facts from literature on the understanding manufacturing strategy and its application on manufacturing performance. Furthermore, according to Good (2006) a literature review was useful in that it not only secures evidence concerning existing situations or current conditions but also identifies standards or norms with which to compare present conditions in order to plan the next step.

Studies were identified through an electronic search of the databases such as Science Direct, Web of Science, library files and reference list. In addition, the literature review was extended to the Internet, by use of Google, Yahoo, Baidu, and other internet search engines.

4. Discussions, Summaries and Recommendations

The importance of manufacturing strategy has never been questioned and has been emphasized in many theoretical concepts, frameworks, and models. Studies dealing with the connection between manufacturing strategy and manufacturing performance have played a significant role.

The literature has shown that, there is no simple cause and effect relationship between manufacturing strategy and business performance; a well-selected portfolio of strategy is needed to reach manufacturing success. There are five decision areas: 1) plant and equipment; 2) production planning and control; 3) labor and staffing; 4) product design / engineering; and 5) organization and management. These basic ideas (trade-offs and consistency of objectives/policies) have designed the foundation from which the current understanding of manufacturing strategy has developed. Manufacturing strategy should contain the five decision areas to bring effective manufacturing performance.

We hope this paper contributes to a better understanding of the directions in manufacturing strategy research. It is felt that research is needed in developing a mission based performance system, transnational comparison of manufacturing strategy, effect of organizational culture, green manufacturing issues, resource-based operations strategy, and sector specific manufacturing strategy. It is encouraging to note that the most recent years, in particular 2003 to 2011, have seen a dramatic increase in manufacturing strategy exploratory cross-sectional research. Exploratory cross-sectional research methodology alone accounted for 38 percent among all five methodologies (empirical, descriptive, conceptual, exploratory cross-sectional, and exploratory longitudinal), whereas exploratory longitudinal research is only 4 percent. It is hoped that future researchers will concentrate more on exploratory longitudinal manufacturing strategy studies. Similarly, the process approach in manufacturing strategy has received much less attention from researchers. Therefore efforts should be made in this direction by the researchers. We hope that this paper will give momentum to process research. Based on this, the following propositions are suggested which require further attention:

- Installation of an effective, multi-dimensional performance measurement system leads to superior manufacturing performance.
Organizational culture (reflected in teamwork, top management power equations, decision-making attitudes) plays a vital role in formulation and implementation of manufacturing strategy. Currently, the authors are carrying out further research in this direction. Manufacturing strategy for SMEs cannot be viewed in isolation, but needs to be viewed in connection with their relation with large companies.

5. REFERENCES


