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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.

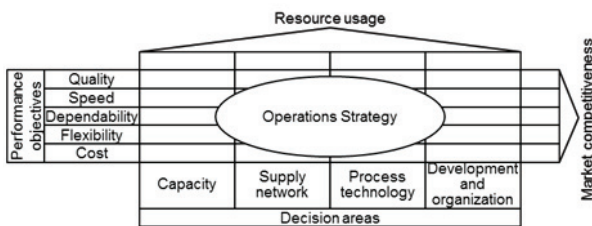


Figure 1 The operations strategy matrix [6, p. 26]

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.

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References

- [1] European Commission, 2005, The new SME definition – User guide and model declaration, Enterprise and Industry Publications, EN NB-60-04-773-EN-C, ISBN: 92-894-7909-4.
- [2] Ekonomifakta, 2012, Företagens storlek, available: 2012-01-27, <http://www.ekonomifakta.se/sv/Fakta/Foretagande/Naringslivet/Naringslivets-struktur/>.
- [3] Skinner, W., 1969, Manufacturing – missing link in corporate strategy, HBR, May-June:136-145.
- [4] Dangayach, G.S., Deshmukh, S.G., 2001, Manufacturing Strategy: Literature review and some issues, IJOPM, 21/7:884-932.
- [5] Barnes, D., 2002, The complexities of the manufacturing strategy formation process in practice, IJOPM, 22/10:1090-1111.
- [6] Slack, N., Lewis, M., 2008, Operations Strategy, 2nd edition, Pearson, Harlow, England.
- [7] Marucheck, A., Pannesi, R., Anderson, C., 1990, An Exploratory Study of the Manufacturing Strategy Process in Practice, JOM, 9/1:101-123.
- [8] Löfving, M., 2009, Enhancing competitiveness in small and medium-sized manufacturing enterprises – A study of the manufacturing situation of subcontractors in Sweden, Chalmers University of Technology, Göteborg, Sweden.
- [9] Cagliano, R., Spina, G., 2002, A comparison of practice-performance models between small manufacturers and subcontractors, IJOPM, 22/12:1367-1388.
- [10] Miltenburg, J., 2005, Manufacturing Strategy – How to Formulate and Implement a Winning Plan, 2nd edition, Productivity Press, New York, USA.
- [11] Mills, J., Platts, K., Gregory, M., 1995, A framework for the design of manufacturing strategy process: A contingency approach, IJOPM, 15/4:17-49.
- [12] Säfsten, K., Winroth, M., 2002, Analysis of the congruence between manufacturing strategy and production system in SMME, Computers in Industry, 49:91-106.
- [13] Mills, J., Neely, A., Platts, K., Richards, H., Gregory, M., 1998, The manufacturing strategy: incorporating a learning perspective, Integrated Manufacturing Systems, 9/3:148-155.
- [14] Mills, J., Neely, A., Platts, K., Gregory, M., 1998, Manufacturing strategy: a pictorial representation, IJOPM, 18/11:1067-1085.
- [15] Nonaka, I., 1994, A Dynamic Theory of Organizational Knowledge Creation, Organization Science, 5/1:14-37.
- [16] Nonaka, I., Takeuchi, H., 1995, The Knowledge-Creating Company: How Japanese Companies Create the Dynamics of Innovation, Oxford University Press, New York, USA.
- [17] Senge, P.M., 1990, The Leader's New Work: Building Learning Organizations, MIT Sloan Management Review, 32/1:7-23.
- [18] Fang, S.-C., Wang, J.-F., 2006, Effects of Organizational Culture and Learning on Manufacturing Strategy Selection: An Empirical Study, International Journal of Management, 23/3:503-514.
- [19] Voss, C., Blackmon, K., 1998, Differences in manufacturing strategy decisions between Japanese and Western manufacturing plants: the role of strategic time orientation, JOM, 16:147-158.
- [20] Gagnon, M.A., Jansen, K.J., Michael, J.H., 2008, Employee Alignment with Strategic Change: A Study of Strategy-supportive Behavior among Blue-collar Employees, Journal of Managerial Issues, XX/4:425-443.
- [21] Yin, R.K., 2009, Case Study Research: Design and Methods, 4th edition, Sage Publications, London, England.
- [22] Williamson, K., 2002, Research methods for students, academics and professionals: Information management and systems, 2nd edition, Centre for Information Studies, Wagga Wagga, Australia.
- [23] Bryman, A., Bell, E., 2011, Business Research Methods, 3rd edition, Oxford University Press, New York, USA.
- [24] Flick, U., 2009, An Introduction to Qualitative Research, 4th edition, Sage Publications, London, England.