# The TQM Journal

Operational integration in a craft-oriented small enterprise
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# Operational Integration in a Craft-oriented Small Enterprise

**Structured Abstract:**

**Purpose:** Many leisure boat manufacturers have thrived on designing and building highly customized boats based on longstanding traditions of craftsmanship. To achieve efficient value chains, it is not enough to optimize each process step, but also important to achieve a smooth flow through the dependencies between each process steps. This article has focused on assessing enablers and disablers for operational integration in a craft oriented small enterprise.

**Design/methodology/approach:** One case company has been studied, to identify enablers and disablers for operational integration in the value chain. The research methodology is based on semi-structured interviews with selected persons from different levels within the company.

**Findings:** The results indicate the importance of management promotion and support of integration and a strong relationship between foremen and operators. Furthermore, to avoid functional myopias, mechanisms to encourage horizontal integration could be useful. Small company and informal culture make integration easier. However, to further establish a common standardized platform, could be necessary. Even small physical barriers in the layout were experienced to affect the integration negatively.

**Research limitations/implications**: This has been an exploratory study of one single craft oriented enterprise; hence it is difficult to generalize.

**Practical implications**: Based on empirical findings from the case study, recommendations on how to achieve better operational integration will be presented.

**Originality/value** The research initiative provides knowledge experience of operational integration from a case study in one company within craft and artisan sector in Norway.
**Keywords:** Craft, Operational integration, Visual management, Team board, Transparency

**Article Classification:** Research paper

## 1. Introduction

The vast majority of SME's (Small and Medium sized Enterprises) in Europe are craft-oriented small enterprises. They contribute the lion's share of job creation in the European Union (Buschfeld, 2011). Furthermore, SMEs are shown to be important to maintaining a sustainable industrial economy, as they are assumed to be the main driving force in future economic growth in industrialized world economies. They often belong to the craft and artisan sector, and employ around one third of the total European workforce (de Vries and Margaret, 2003).

Today such companies are a part of a global environment in which customer requirements are continually increasing, leading to more complex work conditions, such that what was considered good or core competence yesterday might not be regarded as such today. The increased competition in the modern craft industries requires that craft manufacturers, together with their supply chains, continuously innovate, improve, and increase their efficiency to be able to meet the challenges (O'Sullivan et al., 2011). The leisure boat industry is one example of an industry which has experienced increase competition in recent years. The advance of industrialization of leisure boats puts high quality craft-based "high end" producers under strong competitive pressure. The craft producers attempt to rise to this challenge and at the same time seek to maintain their unique quality of craft production (Seim et al., 2010). Competitive pressure necessitates more streamlined production and closer collaboration between members of the value chain to increase efficiency. Since the increased volume creates an increasing number of interdependencies, caused by the increased volume, an increased focus and effective management of, these interdependencies is essential. Management of these interdependencies is described by Malone and Crowston (1994) as "coordination", and includes sharing of resources and synchronization of prerequisite

activities. Additionally, it is important that functional strategies are derived from the overall strategy. When there exists a consensus regarding strategy, operational integration in the value chain is easier to achieve (Pagell, 2004). Galbraith (1977) uses the following definition of organizations: "Organizations are composed of people and groups of people in order to achieve a shared purpose through a division of labor, integrated by information based decision processes continuously through time." This illustrates the need to coordinate information to ensure achievement of the common goal for the value chain (Lawrence et al., 1967). Moreover, it is important that all value chain participants understand the needs of their customer's customers and their supplier's suppliers, to be able to optimize their own operation (Horvath, 2001) and to align and balance the intra-organizational customer demand and supply capabilities to provide the optimum value for the customer (Morash and Clinton, 1998).

Authors use several different terms as "cross functional integration", "intrafirm integration", "interfunctional", "supply chain integration", "operational integration" and often alternating, and many authors do not present any formal definition, which may confuse and reduce the possibility to improve the research on the topic (Pagell, 2004) (Frankel and Mollenkopf, 2015) (Van der Vaart and Van Donk, 2007).  In this article, the term operational integration will be used, which will be further described in the theory chapter. Even though much research exists on the concept integration, literature claims that there still is a need for more research on the topic. In fact, as Frankel and Mollenkopf (2015) puts it: "Rather than being a passé´ and over researched concept, cross functional integration represents an exciting and challenging avenue for future research." According to Porter, linkages between value adding activities can be both horizontal and vertical, and therefore this will also relate to the integration concept (Galbraith, 1973) (Mintzberg, 1983).

 The aim of this article is to contribute to a better understanding of:

- What are the enablers and disablers for operational integration for a craft oriented small enterprise?
- What can practitioners in craft oriented SME's expect and what should be highlighted to achieve operational integration in the value chain?

## 2. Theory

*Craft-oriented SMEs*

Craft manufacturing still plays an important role in the economy. Principles and skills related to craft manufacturing have been shown to be important for European economies to compete with newer developing economies. However, even craft manufacturing has to adapt to new manufacturing principles to be competitive. The focus on quality and time are critical to minimize waste and to achieve a high level of productivity while dealing with increased complexity in manufacturing, and some adoption of formalized managerial practice. Moving from a craft oriented to a more streamlined production with higher production volumes, requires more standardized processes and trained workers. The image of "knowledge stairs" illustrates what is called an evolution of a "built to order" craft company into an industrialized process, whereby it is possible to transform the production process step by step, illustrated in Figure 1 (Svensson and Barfod, 2002).

Figure 1.

SMEs tend to have different needs and decision making processes than larger firms (Shrader et al., 1989), and operational processes seem to be more acknowledged than managerial processes. SMEs are typically less formally organized and have an ad hoc decision making structure (Garengo et al., 2005). Moreover, essential knowledge is often kept by a few vital employees, a weakness which could be critical, especially in periods with high turnover of skilled workers (Lovett et al., 2000).

*Operational integration*
The literature presents different aspects and perceptions of operational integration. Furthermore, perspectives on the concept vary across disciplines. Malone and Crowston (1994) use the term coordination in describing the management of interdependencies between activities. Kahn and Mentzer (1996) use two different processes, interaction and collaboration, that together constitute the process of integration. In addition, based on these two terms they present a formal definition of "Interdepartmental integration" as: "a process of interdepartmental interaction and interdepartmental collaboration that brings departments

together into a cohesive organization". They relate interaction to tangible communication activities associated with interdepartmental activities. These can easily be monitored and include verbal and documented information exchanges, meetings, faxes, teleconferencing, conference calls, memoranda, and transmittal of standard documentation between departments. They define the term collaboration as "departments' willingness to work together, whereby they share resources and understand and have consensus on common vision and goals". These aspects are characterized as typically intangible and difficult to monitor, requiring a common effort to achieve and sustain. The level of integration should correspond to the needs of the different situations, according to Kahn and McDonough (1997). Integration can be seen as a multidimensional concept, and there is a difference in how much effort organizations have to put in to achieve integration effectively. This interpretation seems to have received little acknowledgement in prior research (Turkulainen, 2008).

According to Glouberman and Mintzberg (2001), six basic mechanisms exist to integrate or coordinate work in organizatons: mutual adjustment, direct supervision, and standardization of work, outputs, skills and norms. Mutual adjustment is when workers adjust themselves to each other as their work proceeds. Direct supervision is when one person is responsible for coordinating the work and give directives to those who are supposed to do the work. The other mechanisms are different kinds of standardization: standardization of work, output, skills and knowledge, and norms.

Several factors that affect operational integration in organizations can be mentioned: facility layout, job rotation, cross functional teams, amount of formal and informal communication between functions, structure and culture at the plant, level of consensus with respect to integration and performance measurements (Pagell, 2004; Kahn and McDonough, 1997; Bowersox et al., 1999; Turkulainen, 2008). Another mechanism to achieve integration is the use of co-location, the intention of which is to enable easier and more

frequent interactions between members of different departments (Kahn and McDonough, 1997). There is a complexity to achieving integration, and consensus could be a key component in the integration process, as consensus is defined as having an agreement and knowledge that an agreement exists, on strategic priorities. Additionally, to achieve consensus it is important that all the members of an organization frequently communicate the main goals and priorities for the value chain (Pagell, 2004). The need for integration increases as the number of complex and unpredictable tasks that the company has to deal with increases (Turkulainen, 2008).

The importance of integration has been emphasized throughout the literature for many years (Hayes and Wheelwright, 1984). The literature documents several examples in which poor internal communication*, functional myopia, indistinct organizational boundaries and short-term perspective planning result in poor organizational performance (Shub and Stonebraker, 2009). According to Chen et al. (Chen et al., 2009) when there is a need to respond to fast changing customer requirements, internal process integration will positively affect the firm's efficiency related capabilities. However, while the literature provides several examples that leave no doubt that integration is important (Chen et al., 2009; Turkulainen, 2008; Pagell, 2004), some authors (Turkulainen, 2008; Kahn and McDonough, 1997; Clark and Wheelwright, 1992)(Kahn and McDonough 1997, Turkulainen (2008)) also note that there is less focus in the current literature on the cost of achieving integration. Even though many researchers agree upon that having operational integration in the value chain is important, little research has been performed on how to achieve operational integration across a plant (Pagell, 2004).*

The effects that integration have on performance, have been given much attention in previous empirical research within OM (Turkulainen and Ketokivi, 2012). Turkulainen and Ketokivi (2012) argue that the majority of the research on the topic has referred to the effect of integration on performance to be similar, independent of the

influence of different conditions. However, some recent research has adopted a more conditionally view, and as i.e. uncertainty has been considered as an influencing factor.

Integration in supply chains is also relevant to our perception of the term transparency. Transparency is considered a tool for improvement in operations management, and is essential to reveal and banish waste. Womack and Jones (1996) emphasize the importance of transparency, defining it as "The placement in plain view of all tools, parts, production activities, and indicators of production system performance, so the status of the system can be understood at a glance by everyone involved". Furthermore, transparency can contribute to providing more feedback on performed activities and can facilitate coordination by revealing interdependencies, support decision-making and enable improvements (Bauch, 2004; Økland et al., 2010). Hence, transparency can enable increased participation, and provides stakeholders with the ability and authority for decision-making (Klotz et al., 2008). Drucker and Maciarello (2009) call attention to the importance of the human factor of transparency with the following statement: "There are, indeed, some principles of organization. One is surely that organization has to be transparent. People have to know and have to understand the organization structure they are supposed to work in. This sounds obvious – but it is far too often violated in most institutions (even in the military)."

To achieve transparency it is important to be able to share tacit knowledge (Nonaka and Takeuchi, 1995), and even though the SMEs may have a competitive advantage in being less bureaucratic and may use more informal communication than do larger companies, there is also a need for more formal communication (Vinten, 1999). Since the majority of the information flow in SMEs is informal, it could be difficult for the management to get a complete overview of the use of knowledge and information within the organization (Lovett et al., 2000). However, it has been shown that visual planning can make an

essential contribution to tacit knowledge transfer (Lindlof and Soderberg, 2011).

To improve the communication process and improve operational integration, using visual tools (such as team boards) could be useful. Such tools enable each person involved to see and understand different aspects of the process and its status at any time (Parry and Turner, 2006). They may also increase process transparency by providing or facilitating feedback on status (Womack and Jones, 1996b.). Research by Lindlof and Soderberg (2011) reveals several benefits of using visual planning: efficient communication; shared understanding; ability to prioritize tasks and efficient leveling of workloads. However, they observed that there could be limitations when using such systems over a larger geographical distance and difficulties in storing historical data and seeing connections between activities listed on the team board. From case studies within seven European SME's , Bititci et al. (2015) found that visual management systems enable the development and implementation of the strategy, makes performance measurement and review easier, improve employee engagement, enhance the internal and external communication, collaboration and integration and foster a culture for continuous improvements and innovation. They claim that there is a need for supplementary explorative and longitudinal studies to see what long-term impact these approaches have in small and larger organizations.

*To achieve a successful visual management system it is important that the people involved be empowered to develop their own visual process boards. These must be kept simple, and it is recommended that they have a colorful, manually controlled system; the use of an electronic system is not recommended. Another important factor is the support of management, although the overall control of the team board should remain with the team members (Parry and Turner, 2006).*

*Larger companies often have more financial flexibility than do smaller companies, making it easier for them to adjust to short time variations. Since SMEs tend to have a flat organizational structure with few resources, each employee often has to perform several different functions in the organization (Hudson et al., 2001). This shows the importance of using visual management systems to ensure that priorities such as customer satisfaction, minimizing waste, etc. are known to the employees, even though the company has limited resources.*

### 3.   Research Design

A case study was chosen as the research method to understand the concept of operational integration in a craft-oriented industry. The main reason for choosing a case study approach is its distinct advantage in a situation in which 'how' and 'why' questions play a part in the effort to understand a complex phenomenon (Yin, 2009b). Consequently, an exploratory study was performed to understand the degree of operational integration between internal suppliers and customers in the production line. Thereafter, a causality analysis was done to gain knowledge about enablers and disablers for the operational integration that takes place in a craft-oriented enterprise. An important choice in case research is the selection of single or multiple cases (Voss et al., 2002b; Yin, 2009b). This research is based on a single case study. Use of single cases gives greater depth analysis but the generalizability of conclusions drawn from it is limited. Biases such as misjudging are possible disadvantages t to a single case study. A moderating factor is the use of triangulation of data to increase the robustness of a single case study, enabling one to examine the data more deeply and ensure validation of data (Voss et al., 2002b).

This case study is a part of a larger research project, the main objective of which was to develop effective, competitive and profitable production within the leisure boat and craft oriented industry in Norway. The overall project period was from 2008 to 2012. The focus was on modularization and standardization of work processes.  In

addition, preservation of the craft tradition in conjunction with industrialization was emphasized to improve the competitive ability of the industry.

The company is a craft-oriented leisure boat producer with approximately 20 employees. The production line consists of three main departments; molding, pre-assembly and assembly. Even though the organization has taken some steps towards process organization of its internal supply chain, it still has a quite functionally-oriented structure, with several potential built-in delays and inventories. There are very few formal reporting structures and systems, and those that exist are only to a slight extent process-oriented. However, there are many points of contact and communication among the people in the manufacturing process, the foremen and the management. The manufacturing processes are primarily manual, and adjustments are made all along the production process. Few figures are currently measured; the main measures are "number of boats produced per week" and "time of flow". The quality of the manufactured boats is perceived by the market to be very high. To summarize, the company has several of the characteristics of the previously-described craft manufacturing.

## 4.   Data collection and analysis

Prior to the start of the research project, a research protocol was prepared to make a plan for the execution and selection of the sources to use to collect data. There are potentially several different approaches to data collection; the selection is made to suit the problem at hand and the situational context. An underlying principle when collecting data is the use of triangulation, which means the use and combination of different methods such as surveys, interviews, observation and content analysis of documents to study the same phenomenon (Voss et al., 2002a). In this research project, triangulation was achieved through semi-structured interviews, content analysis of documents, formal and informal meetings, workshops and direct observation.

Several formal meetings were conducted in the research period. The researchers participated in different project meetings at the leisure boat manufacturer, with the aim of improving their competitiveness. These included project board meetings, task meetings and workshops related to the projects. However, most of the time was spent on the shop floor together with the workers in informal meetings. Clarification of questions and discussions of findings, special issues and further actions were typical foci for the informal meetings on the shop floor. Repeated visits were made from 2008 to 2012 to clarify previously-gathered information and to gather more valuable information. A document analysis was carried out with a focus on strategic documents. Additionally a study of the measurement-, quality-, and planning systems was performed.

Evidence from observation is often useful in providing additional information about the topic being studied (Yin, 2009b). The behavior of the professionals and the directionality of their communication are critical issues for inquiry. Observation and inquiry into the systemic relationship between the individual and the team is essential in the context of managing change in the organization. Closeness to the company gave the researchers valuable observations of people's behavior, expressions, and interaction. Observations of what was happening in the present were made during formal and informal meetings both on an individual basis and within a larger group. Such meetings are important in observing group dynamics and how people relate to each other.

Interviews are seen as important sources of information, in that one can ask key professionals about the facts of a matter as well as their opinions about events (Yin, 2009b). Semi-structured interviews are defined as planned interactions for which some predefined guidelines are set. Well-informed interviewees can provide important insight into facts of a topic in addition to their opinions (Yin, 2009b). 12 semi-structured interviews were performed to dig deeper and to identify the operational integration for the production line and its enablers and

disablers. The interview session consisted of 12 in-depth interviews with operators from different process steps of the production line. To ensure that all process steps were adequately covered, at least two operators were interviewed from each process step. An interview guide was outlined in advance in order to ensure that the same questions were asked and the same characteristics were covered by all participants, and to ensure consistency among the elements of the research questions. The actual interviews took the form of semi-structured conversations in which the informants were asked pre-written questions but were allowed to answer freely. Moreover, the same questions were asked of multiple people, as recommended by Karlsson (2009). Throughout the interview process, it is important to stick to asking your actual questions in an unbiased manner to serve the needs of your line of inquiry (Yin, 2009b; Yin, 2009a). However, the aim was to create an informal setting, so that the interview would open up and provide rich data. This means that the process was open-ended and the interview was conducted in a conversational manner, but it still followed a specific set of questions derived from the interview guide. The response could to some extent reflect what the operators were concerned with at the moment. For example, at the time when the interviews were carried out, there had been some challenges connected to component supply. This led to frustration among many of the operators, and could also affect how they comprehended other issues. All of the interviews were tape recorded and later transcribed.

*The collected data were analyzed and coded (Tjora, 2010; Yin, 2009b) into main categories in order to identify the enablers and disablers for operational integration between internal suppliers and customers in a production line. As described in Miles and Huberman (1994), propositions related to the research questions were developed for the explanation building. Thereafter, they were thematically grouped and evidence was evaluated and further classified as strong, qualified, neutral, or contradictive for each proposition. From this*

*process, the propositions were confirmed, dismissed, or reformulated. (Miles and Huberman, 1994).*

## 5.   Analysis & discussion

The producers of the "high end" leisure boats are traditionally primarily craft manufacturing companies. Still, the performance and the quality of the end product are largely dependent on the suppliers. Hence, it is necessary to achieve good coordination of production and deliveries from the supplier. Furthermore, there should be a predefined coordination of the concerted internal activities of the manufacturing company to produce decks and interior, assembling different components and equipment – an effort that involves a multitude of roles and skills and several organizational units. This is illustrated in Figure 2.

Figure 2

This leisure boat company was studied in an effort to determine which factors were experienced as contributors or hindrances to operational integration in a craft industry. To our knowledge, there is little literature that presents categories of the influences of operational integration. We adopted categories from the research of (Pagell, 2004),

(Leenders and Wierenga, 2002) (Basnet and Wisner, 2012) and (Turkulainen, 2008) as a basis for our data, and further modified the categories to fit our case. The categories represent both horizontal and vertical integration, as shown in Table 1. Each of the categories is given a short explanation followed by a short description of how it can contribute to integration. Table 2 shows the observations from the study; these are further discussed below the table.

Table 1

The data collection for this study is structured under the topics described. However, some of the items have been found to belong under more than one single topic.

*Table 2*

*Culture, social mechanisms and creation of lateral relationships*
Organizational culture is found to matter in achieving internal integration. Thus, if a company struggles with achieving integration, efforts to change the culture might be necessary (Braunscheidel et al., 2010). Much of the information sharing is verbal and to some extent situation-dependent and inconsistent; the overall impression of the culture is that it is not conducive to formal information sharing. Communication in the production area is of an informal character, both between colleagues and between employees and management. This informality makes it easy to bring up challenges and tends to result in a short response time when something occurs. The lack of formal structures may in a sense influence the workers to communicate more often. On the other hand, since there are few standards of what has to be communicated, there is some haphazardness with respect to the kinds of subjects that are taken care of.

The problem solving culture in this company could be characterized as typically ad hoc, a quality which could be experienced as both positive and negative; The positive aspects include the short response time when something occurs along with a greater acceptance of the use of creativity in the problem solving process. On the other hand, if the creativity goes beyond what is written in the work descriptions and decision making procedures are ignored, this could sometimes lead to further problems. The matter of who is involved in problem solving is also somewhat variable since there is no formal structure in place.

Even though the company has made an effort into capturing these processes in work descriptions, a lot of the information is still tacit knowledge. Information captured during the workday is often converted into notes taken in a notebook, which may then be put into a hip pocket. Furthermore, it seems difficult to achieve consistent recording of information by the use of forms.

Although the operators have a clear comprehension of the common goal of the production line, the observations indicate that they have minimal focus on how each process step interrelates with other steps. Within parts of the production line, there exists some job-rotation, but operators seldom switch to departments on the other sides of the separating walls. Research of (Basnet and Wisner, 2012) find evidence that job rotation enhances integration, especially with respect to the coordination aspect.

*Management support / vertical integration*
The project group was given full authority to lead the project process together with the operators. The project group was grateful for the trust; however, since management participation in the project was rarely visible to the operators, the operators seemed to think that this work was of minor importance, since the management was not participating driving force. To achieve successful integration, participation and focus on the part of management is important (Morash and Clinton 1998); (Basnet and Wisner, 2012).

Even though there could have been more managerial focus to enhance integration, operators who have worked in the company for many years says that the management often drops in and is easy to communicate with in an informal manner. According to research by (Braunscheidel et al., 2010), a minimal degree of hierarchy is a positive contributor to integration. However, since product development is performed and driven primarily by the top management, there may be limits on the time available for managerial focus. On some occasions, operators expressed frustration at the sense that there was insufficient attention paid to considering opinions on production issues, and some also missed feedback on their work. When the operators were questioned about what type of information sharing they use in their daily work, many of them answered that the foreman is the main source of information regarding their daily work tasks. This could be one explanation of why contact with the top management is perceived as more rare. Between the operators and the foremen there is what

Glouberman and Mintzberg (2001) call a direct supervision, in which the foreman supervises the operators on what to do in their daily work. Several of the workers trust the foremen to do the planning of their daily work, and according to one of them: "The foreman takes all the responsibility, and makes the total plan for the daily work." From this study, we see that this strong connection between the operators and the foremen could contribute to reduced horizontal integration between the operators, in that they may perceive it as relatively less important to relate to other operators regarding production data, since the foremen give them all the information they need. To improve the mutual adjustment and thereby increase horizontal integration, one possibility would be to put increased focus on standardization of norms, which means to promote common systems of beliefs to further establish a common culture (Glouberman and Mintzberg, 2001).

*Formalization and standardization*
When m**oving** towards more industrialized production (knowledge stairs Fig.1), it is necessary to formalize and standardize the information flow, a process which also will contribute to a higher degree of integration (Glouberman and Mintzberg, 2001). The company has been certified according to ISO 9001, but in recent years the system has only been occasionally updated. Today, there is an impression of a high degree of autonomy with respect to standards in the organization, and when the standards are not updated or too few standards exist, it is easier for the operators to "do it their way".

Once a month the top management informs the workers about the status of the company, and each Monday the foreman for each compartment has a meeting with his or her workers. The formal horizontal communication between the managers consists primarily of daily coordination meetings in the morning. In addition to this, the organization has little formal structure for information sharing and the information is mostly single sourced.

*To improve information on component accessibility, a visualization of the main storage system together with the use of "shopping wagons" for component supply was introduced. The shopping wagons functioned as Kanban boxes, with lists telling workers what components to produce and put into the wagons. This system contributed to smoother overlap between some of the process steps, an outcome which is in accordance with the research of Parry and Turner (2006), who found that the visual control tools establish discipline in the process while creating process transparency, and further "act as an 'in-process' metric to aid resource allocation and scheduling."*

*The organization has little bureaucracy, a factor which could to some extent make the work more flexible. However, through several expressions, an apparent overall lack of confidence in and compliance with written systems (production plans, process descriptions etc.) was revealed. Some mentioned that the production plan was "not always correct", and that they to compensate for this by additionally communicating the data orally. Some operators claimed that written information and system descriptions were seldom used, and one operator said: "Everyone assembles in their own way." As an explanation of why he did not use the production descriptions, an operator said: "I know what to do." Another operator mentioned that the descriptions were seldom updated, and that "changes might be forgotten." Since one of the foremen was the only one who had both the knowledge of and responsibility for both writing and updating the work descriptions, the operators might have felt less ownership to the instructions. However, looking at the interdependencies between the operations, we see a producer/consumer relationship, in which whatever is produced must be usable for the following activity. Therefore, to standardize the work so that the output fits the expectations of the user seems essential (Malone and Crowston, 1994).*

The flow of information in the production is mainly informal, and there appears to be inconsistency as to who receives the

information. According to Pagell (2004) this factor is not necessarily negative. He claims in his research that informal and real time communication offers better value than formalized/scheduled communication. This presupposes that the other workers know the workers and their work tasks, a situation that could have been achieved through job rotation and/or cross-functional work (Basnet and Wisner, 2012). The production plans are performed primarily by the foremen, using production lists from the production manager. The foremen also have primarily responsibility for facilitating information coordination in the production line. In the molding area, the responsible foreman daily conducts a team board meeting, in which he presents the production plan for the week. This forms the basis for planning for the rest of the production. The daily morning meetings with the managers give further input to the team board meeting at the molding area.

Through interviews, the researchers received the impression that the workers fully trusted and expected the foremen to be the main source for both horizontal and vertical information flow, and that further information sharing was rarely necessary. Between the operators there seemed to be what Glouberman and Mintzberg (2001) call a mutual adjustment mechanism, whereby two or more people equally adapt to each other, usually by informal communication, in order to flexibly handle the unexpected. As mentioned above, coordination between the foremen and the operators consists of direct supervision, whereby the foreman is responsible for coordinating the work. Although this seems to be a good solution for this company, there is also a risk that the foreman can become a bottleneck in coordination and information sharing, when all the information has to go through him. Additionally, when the operators only trust the foreman to be their main source for information, this could reduce the integration between the operators.

*The operators have little team work experience, and formal information sharing arenas such as meetings and team boards were among some of the tools considered superfluous. When team boards*

*were introduced as a possible tool for information sharing, one of the operators said: "It is not necessary; we just go and talk to each other."*

**Figure 3**

*To improve transparency and create a learning environment with common arenas for information sharing, and to increase operational integration, the possibility of using team boards for each compartment was introduced. There was already a team board in the molding area, showing detailed data of number produced per week. This made the basis for the plans for the rest of the production line. The operators at the molding area had meetings at this team board each morning, and this information could either be passed on by the foreman to the rest of the value chain, or the operators went to see the information themselves. To have additional team boards were desirable, to cover issues for the rest of the production line and to improve the connections between the process steps. However, through interviews and observations, a general skepticism to implementation of new and more detailed team boards, was uncovered. Visual planning systems, as i.e. team boards, are found to be useful to make*

*coordination* and communication efficient in teamwork, since it is an easy method and fosters commitment (Lindlof and Soderberg, 2011).

*Facility and Layout*

In his research, Pagell (2004) finds little evidence that plant size has any influence on the level of integration. In this case, the leisure boat producer has a small organization with little hierarchy, hence there is a perception that communication flows more easily because of the small distances between the activities. This small value chain makes it also easier to understand and see the entire process, and there is also reason to believe that the communication flows better in an intimate and well known work environment. Moreover, according to one of the operators; changing to line flow has contributed to an increased horizontal communication. However, the current layout of the production facilities offers challenges in achieving value chain transparency.

*Figure 4.*

The assembly area and body assembling area are divided into two sections with a physical wall in between, see Figure 2. This physical separation has contributed to the development of different cultures on each side of the walls, a situation which also has made cooperation and information sharing more difficult, and with the result that functional silos are created. One way to bond these two sections together could be to create common arenas for information sharing and interaction, such as team board meetings, but to succeed, it is much more important to focus on the quality of the interaction, rather than the frequency (Ayers et al., 2011).

Most of the operators have little experience in working in teams, and while some of them express the importance of seeing the whole value chain, others focus primarily on their own work tasks. According to (Pagell, 2004), working in "functional silos" typically hinders the achievement of cross-functional integration. To increase cross-functional work and to further enable operational integration when organizations struggle with functional myopia, the use of different types of collaboration is suggested (Stevens, 1990; Kahn and Mentzer, 1996; Stank et al., 2001). Furthermore, moving departments closer to each other has been found to be a contributor to integration in the existing research on integration (Leenders and Wierenga, 2002; Basnet and Wisner, 2012). Additionally, it is important that the management encourage positive attitudes between departments to overcome functional myopia (Basnet and Wisner, 2012).

Having an unorganized production line could make it more difficult to identify the workload per operator and interrelationship among each process steps. During the project period, the production line was rebuilt from batch production to serial production. According

to the manager, "streamlining of the production line has reduced the need for communication in between the process steps, since each operator's responsibilities and work tasks became more visible". On the other hand, some operators were not so satisfied with this change, since changing to single line production also affected the material support. Components that they previously had to walk around to collect were now available for each work station. According to the operators, they missed the opportunity to have variety in their daily routine, and also the communication with colleagues. However, according to (Khan and Shah, 2011) it is important to coordinate information flow to create a good environment for learning.

*Information systems*
The company uses few systems for information control, and it is primarily the managers who have access to computers.

*Consensus / integration*
The operators seem to have good knowledge of the overall strategy of the company. To achieve the overall goal, it is important to break down this strategy into "subtasks" for achieving the company's overall goal. Hence, it is important for all managers in a traditionally conceived hierarchy to decompose this goal into tasks that they, in turn, can delegate to their employees (Malone and Crowston, 1994). In the case company, we see minor direct linkages between the overall strategies towards measures for individual operators. The focus on the overall strategy is inconsistent, and when asked about their relationship to other process steps or the total production line, few operators found it necessary to look beyond their own process step, and only a few considered previous and successor process steps as "internal supplier and customer".

*Measurement, rewards*
The company used bonuses related to the number of boats produced per week. A positive effect of this system was that all the workers were aware of the common goal and for some this was a true motivation.

However, this could on occasion lead to frustration among some the operators, when the motivation for achieving this goal was variable and it was observed that some worked slower than others. Another effect of the bonus system was that the operators were satisfied when the goal was achieved, even though it would have been possible to enhance the results through the remaining weekdays. Nabavizadeh et al. (2013) found that aligning bonuses for two departments could help support the effort to achieve collaboration, however.

## 6. Conclusion

The aim of this article has been to build on existing research and contribute to a better understanding of what enablers and disablers for achieving operational integration can be found in a craft-oriented small enterprise. The discussion can also help practitioners in craft oriented SME's to consider what to expect and what to highlight to achieve good operational integration in their value chain.

This article contributes to existing research by providing insight on what processes influence operational integration in one single craft oriented SME. But what are the primary lessons that managers can draw from this study? The findings of this study indicate that it is a strong relationship between the foremen and the operators. Hence, for the management to promote and support integration by using mechanisms to encourage integration that is more horizontal to avoid working in functional silos could be useful. The size of the company and the informal culture make integration easier. However, it could be necessary to further establish a common standardized platform. Furthermore we have seen that even small physical barriers in the layout can affect the integration negatively.

Our study has focused on enablers and disablers of operational integration of the main part of a production line, to create new insight on how these mechanisms influence operational integration in a craft-oriented enterprise. This knowledge may also provide operational

guidance for similar type of companies who want to improve their operational integration.

The limitation of this study is of course that it has only been an exploratory study of one single craft oriented enterprise, and it is therefore difficult to generalize.

Further research should focus on studying more companies, with the aim of developing more knowledge of what mechanisms contribute to companies' abilities to achieve operational integration.
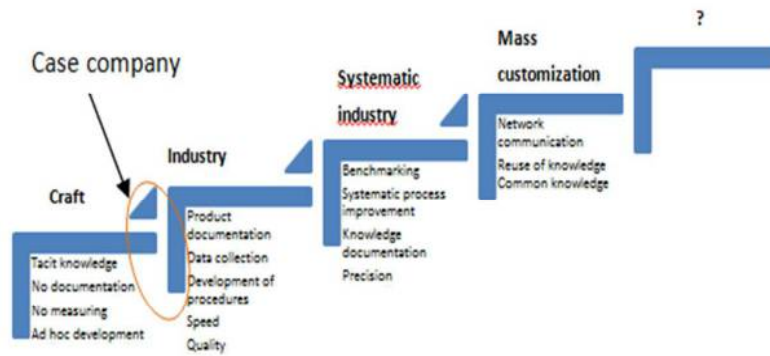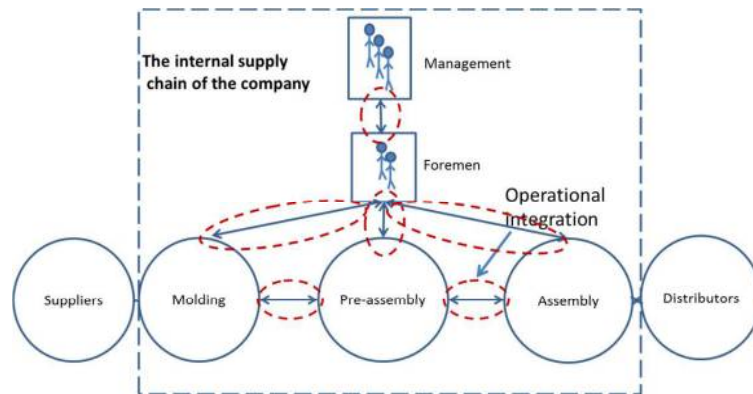
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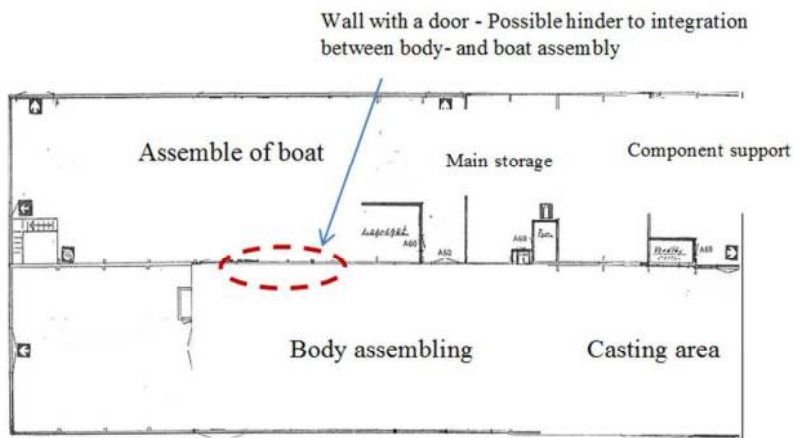
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Case company

Craft
- Tacit knowledge
- No documentation
- No measuring
- Ad hoc development

Industry
- Product documentation
- Data collection
- Development of procedures
- Speed
- Quality

Systematic industry
- Benchmarking
- Systematic process improvement
- Knowledge documentation
- Precision

Mass customization
- Network communication
- Reuse of knowledge
- Common knowledge

?

Wall with a door - Possible hinder to integration
between body- and boat assembly



Assemble of boat

Main storage

Component support

Body assembling

Casting area

| Categories | Explanations and consequences |
|---|---|
| Culture, Social mechanisms and creation of lateral relations | · Set of values, guiding beliefs, understandings, way of thinking<br>· Informal communication, connecting links, cross functional teams, transfer of managers, job rotation<br>⇨ Increases capacity to process information<br>⇨ Influences decision making and information sharing<br>⇨ Decreases equivocality<br>⇨ Gives potential for more creative ideas |
| Management support / Vertical integration | · On which level are decisions taken<br>· Vertical transfer of strategy<br>· Horizontal communication between managers<br>⇨ Simplifies information processing when decision maker gathers, controls and processes information |
| Formalization and standardization | · Policies, rules<br>· Job descriptions, standard procedures, technical reports<br>· Charts, information process practices etc.<br>· Strategic planning, functional plans, scheduling<br>· Team boards and visual systems<br>⇨ Formal platform for information processing<br>⇨ Standards for processing of communication reduce need for further communication |
| Facility and Layout | · Plant size, physical distances, partitions<br>⇨ Impact the ability to communicate |
| Information systems | · Increasing scope of data base and degree of formalization of information flows<br>· Enhanced capacity of information processing<br>⇨ Rapid information exchange without overloading the hierarchy |
| Consensus / integration | · All functions support the business strategy and each other, and all managers know this is going on.<br>⇨ Increased understanding of common tasks |
| Measurement, rewards | · Bonuses<br>· Formal measurement systems, performance control<br>⇨ People tend to perform the activities for which they are rewarded. |

| Enablers | Disablers |
|---|---|
| *Culture, Social mechanisms and creation of lateral relations* | |
| · Informal culture – easy to contact colleagues and management | · Little information sharing mentality<br>· Little teamwork experience<br>· Ad hoc culture, fire-fighting mentality<br>· Tacit knowledge<br>· Little focus on interrelation of process steps |
| *Management support/Vertical integration* | |
| · Informal culture between management and operators<br>· Small organization, little hierarchy | · Management not driving force in achieving integration |
| *Formalization and standardization* | |
| · Little bureaucracy<br>· Visual system for logistics<br>· Visual system; shopping baskets and Kanban for component supply,<br>· Team boards | · Autonomy regarding standards<br>· Few standards; operators find their own way<br>· Few formal meeting arenas<br>· No reliance on written information<br>· Mainly single sourced information flow; mainly linked via the foremen<br>· Little standardized information sharing |
| *Facility and Layout* | |
| · Little physical distances. | · Functional silos |
| *Information systems* | |
| | · Few information systems and mainly used by the management |
| *Consensus / integration* | |
| · Overall strategy is well known | · Little transfer of overall strategy down to individual measures.<br>· Different focus on overall strategy<br>· Main focus upon own process step. |
| *Measurement, rewards* | |
| · Bonus when a target number of produced boats was reached<br>· An overall common focus | · Different motivations towards achieving bonuses.<br>· Operators satisfied when the goal was achieved, despite possibilities of enhancing the results. |