Production planning and information flow in a business process context – experiences from change projects in SMEs

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Abstract

This paper describes and evaluates experiences of applying a business process perspective as a part of a change project in three different enterprises, especially with respect to improvements in production planning and information flow activities. The business process modelling gives a detailed and structured understanding of the relations between the business processes and the problems in the enterprise, problems that include quality and employee work conditions. The results indicate that the modelling of the processes provides the enterprises with more complete but simple and understandable images of the business, where the business process perspective accentuates a customer focus and a tight integration between production and sales. The perspective can be used to develop the understanding of the relations between the activities of strategic planning, the daily planning and scheduling of the production, and the personal planning of the single employee. The individuals’ working situation can be improved when the understanding of, and the possibilities to affect the own and others role in relation to the rest of the organisation are increased.

Key words

process redesign, planning, scheduling, information flow, working situation

1 INTRODUCTION

Organisation of activities in production planning and information flow that supports an increasing customer focus is difficult to manage for many SMEs. The objective of this paper is to provide an integrative view on production planning and information flow in a business process context, where also the viewpoints of the customers and the employees are considered. The paper describes and evaluates experiences of applying a business process perspective as a part of a change project in three different enterprises. The resulting changes in the participating enterprises’ organisation concerning their planning and information flow activities are discussed.

2 BACKGROUND

Many Swedish wood working enterprises have reported problems with production planning and information flow. This includes problems with the working environment and unsatisfactory delivery precision. The reasons can be found in the development
towards higher demands on shorter lead times, customer satisfaction focus, reduced stock and increased flexibility. Manufacturing planning and control (MPC) systems are devoted to assist in solving the problems of planning and scheduling. However, if the development of the MPC system does not comply with the development of the strategies and ways of working in the enterprise, the MPC system will not give the support needed (Vollman et al, 1997). A mismatch between the MPC systems, the way enterprises organise themselves, and their business processes can make production planning and scheduling problematic. Deficits in planning and information flow will spread through the enterprise and cause other organisational and ergonomic problems like difficulties to collaborate, to delegate responsibilities or to work safely.

Manufacturing planning and control are performed at different levels of the organisation and with different purposes. In small or medium sized enterprises, it is obvious that the planning and scheduling activities are in centre of the competing logics of sales and production, and they can be expressed as e.g. product flexibility versus standardisation, quality performance versus timeliness, or increase of sales versus reduction of costs. Another contradiction is the conflict between the external and internal customers, i.e. the end customer and the employee.

A business process can be divided into six phases (Goldkuhl, 1998). These phases cover business prerequisites for both customer and supplier, exposure and contact search, negotiation, coming to an agreement, fulfilment (by delivery and payment), and satisfaction or discontent. An organisation normally performs several business processes (variant processes), i.e. several ways of doing business (Lind and Goldkuhl, 1997). The conditions for production planning and corresponding information flow are determined by the way enterprises interact with their customer (customer-to-customer processes) as well as how they perform production (production processes). The process of interaction as well as the performed production constitutes a business process. It is seen as the process where the customer is both directly involved, as well as indirectly involved, i.e. the business process deals with potential and specific customers (Lind and Goldkuhl, 1997). The production process is also composed by activities, performed for specific or potential customers, and the different conditions for production involve different degrees of and complexity concerning customisation and relations between processes, figure 1. The character of the interaction with the customer will decide the extent of the integration between customer-to-customer process and production process.

Different business processes and different integrations of these usually are coexisting in one organisation. This is one main reason that planning and scheduling of production becomes a complex task, when e.g. at the same time the production system can be demanded to produce a mix of specific customer orders and forecasted needs. The dependencies between the customer-to-customer process and production process emphasise the need for a customer focus when improving the planning abilities of an enterprise.

3 Method

The possibilities to support changes in information flow and production planning were studied in three wood working enterprises. An action research project was run in each enterprise with the aim to initiate improvements. The chosen attempt was to improve the production control and scheduling routines in enterprises through a broad change process, where not only the tasks concerning production scheduling were approached, but instead the functioning of the whole systems, both concerning organisation, information flow and planning activities. A change method was developed
that included process modelling and process categorisation as well as investigations of experiences of problems and strengths in the present organisation (Karltun et al, 1999).

3.1 Process modelling and categorisation

The change method also covers process redesign. As part of this work, a group was formed in each enterprise, including the researchers (change agents) to reconstruct the processes of the enterprises. The modelling was concentrated to a "flying seminar" (Lind and Seigerroth, 1999), which is a time- and resource-efficient way to reach a mutual understanding of the studied organisation through modelling the current work situation. The groups modelled the activity processes during this seminar. The business processes in each enterprise were then identified and categorised by the researchers and the results were discussed with the enterprises. The process categorisations were performed in order to distinguish the organisations’ different business processes. The results of the investigations were reported to the enterprises and informed to the entire personnel in each enterprise. The enterprises then had a period of change activities when some of the change activities were supported with active researcher participation while other activities were conducted by the enterprises themselves.

In two of the enterprises, A and B, an evaluation of the work has been done with interviews, questionnaire, seminar work groups and process reconstruction. This evaluation was made about three years after the project in each enterprise started. In the third enterprise, C, which started their project participation two years after A and B, only the results of the initial analysis and process descriptions were at hand at the time when this paper was written.

3.2 Enterprise description

Enterprise A had about 80 employees. It was marketing and selling shop fittings, especially for multiple chain stores, and the enterprise was very market oriented. The marketing and sales department had a high status, and top management was working operationally in marketing and sales. The problems concerning production scheduling in
enterprise A were concentrated to the co-ordination between sales and production and the annual variation in delivery volumes, deduced to main customers with similar seasonal variations. Enterprise A was successful and annual turnover was growing by 10% or more every year during the project time. The growth was made possible by increasing manufacturing at suppliers, while the own production volume remained more constant.

Enterprise B was a supplier, which at the time for the project start had 14 employees. B was delivering to enterprise A (main customer) and to a number of other customers. The basic strategy of enterprise B was to develop a lean, technically advanced, and almost continuous flow production system with short throughput times. Enterprise B more than doubled its turnover with a preserved high profitability and increased the number of employees with 40% during the project period. Possibilities for growth were made through selling to additional customers and profiting from the successful strategy. The problems of planning the production was concentrated to growing problems like capacity of production system, capacity of white collar workers, and poor information available for the employees on e.g. the need for overtime. Enterprise B was beginning to engage suppliers to manage the volume expansion.

Enterprise C was a small sawmill with added production units for planing, precision cutting and glueing, and it had 25 employees. The strategic combination of sawmill and value adding secondary woodwork, producing tailor made components for demanding customers was rare in the Swedish sawmill industry. Enterprise C was profitable and the executive manager meant that this originated from the applied strategy and lack of successful competitors. The problems concerning the planning were to optimise and reduce the plank stock between saw and secondary production units, to create better ways to produce job orders, to report production result and to co-ordinate between the production units.

4 CHANGE PROJECTS

The experiences from the use of the process modelling and experience evaluation show that the method was efficient in creating understandable models of the existing processes and their relations. The business process modelling approach made it possible to find the unique structures and administrative relations for each enterprise and how these related to the production planning and information flow activities. The approach also made it possible for participants from the enterprises to redesign parts of the processes and to simulate the consequences of their redesign. They learned in a few hours to read, understand and make use of the models of the enterprises’ processes. Since the method used the experiences of the people in the organisation as basic data, the results and need for changes were perceived as accurate and strongly supported in the organisation. A basic concept in the used method was situational adaptation and the results in the different enterprises demonstrated that the adaptation worked.

In enterprise A, the modelling of the business processes ended up in two different processes, one producing for a customer assigned stock and the other producing for direct delivery. Assumed differences concerning other variables like selling to single shops or selling to chain stores, producing single or batches of products etc. was reduced and thus the perceived complexity of the business. The relations between the in-house production and purchase from suppliers was examined in a focused analysis and resulted in a much more well structured organisation with clearer responsibilities concerning these activities. The organisation of the production planning and scheduling was changed to a series of meetings, co-ordinated with purchase activities and calculations.
of available supplier and in-house production resources. The enterprise had started to implement a MRC system and the business process models were used as an input to achieve an appropriate working system. Enterprise A was bought by a Danish firm during the project time, which meant that an additional business process, marketing and selling standard shop fittings for food stores, was added to the activities of enterprise A. This new business process was modelled by the enterprise themselves, to better understand the difference between this business process and the already existing, and how to reorganise the enterprise activities.

Enterprise B was at the start of the project already very process oriented in its operations. The identified differences between existing business processes did not affect the organisation of the production planning. However, the process modelling revealed the process planning of incoming orders as an important bottleneck in the production system. The personnel resources for process planning were doubled during the project period and the use of computer aid was expanded. Enterprise B started a new way of making business in collaboration with an architect during the project period. Since this new way of making business had potential to give orders with the size of half the annual turnover, it was very critical that the enterprise did not make any big mistakes. This new “networking” business process was modelled in the project, and enterprise B was able to reduce their vulnerability when going into this new business.

In enterprise C, four different business processes were identified together with one conditional production process for which the customer demands played a minor role. The production planning in the conditional process dealt with purchase of timber, sawing, sorting and drying planks into an inventory of dried raw material for further manufacturing. This part of the production worked with a different time schedule and could be planned mainly from forecasts, deduced from long-term customer orders and experience. Three business processes were identified and categorised after the type of product-customer relation existing. One additional process that dealt with how to build new customer relations based on product specifications and customer service agreements was also identified. The planning consequences were that both the fulfilling of existing customer relations and ongoing deliveries and building new complementary customer relations had to be planned more carefully in the future. The need for adding resources to the marketing activities was obvious and the enterprise now plan to employ a production manager, permitting the executive manager to work with market development and improving customer relations.

5 CONCLUSIONS

The business process modelling gives a detailed and structured understanding of the relations between the business processes and the problems in the enterprise. In the case of planning and scheduling the production, the business process modelling communicates a simplification and conceptualisation of the enterprises’ processes to their personnel. The modelling of the processes provides the enterprises with more complete but simple and understandable images of the business, where the business process perspective accentuates a tight integration between production and sales. Looking upon production planning from a business process perspective means that a contextual perspective is put upon production planning. The effects of this can mainly be seen in two main levels of the enterprises’ planning.

At the strategic level, the impact of context on the business processes and the related production planning can be clarified. The modelling reveals the relations between different business processes and the needs for a strategic planning for each identified
important variant business process. In the case of a diverging material flow, the needs for a combination of strategic business processes with entirely different focus are apparent. The possibility to model and assure new, expanded or emerging, business processes is another obvious advantage at the strategic level.

At the operative level, business process modelling can be used as a tool for developing the demands on the planning activities of a SME. The understanding of the necessary planning activities in the enterprise can be deepened, broadened and spread inside the organisation. Business process modelling deals with relations between details and whole systems. Thus, the relations between the strategic planning, the daily planning and scheduling of the production, and the personal planning of the single employee become more clear and understandable. This means that a change project including process modelling will reveal contradictions at any level or between levels. Demands for e.g. organisational integration between sales and production, a common infrastructure for both internal and external production as well as demands on computerised support for planning and scheduling can be clarified.

Concerning the individuals working situation, the business process modelling can reduce the perceived complexity and integrate the personal understanding of the enterprise activities. This increases the understanding of the own and others role in relation to the rest of the organisation, and possibilities to affect the own work situation. Business process modelling can also be used to deduce an appropriate set of activities that preferably should be performed to solve the problems of planning and scheduling a manufacturing system and resulting problems related to individuals working situation and customer service quality.

6 ACKNOWLEDGEMENT
This project was funded by the Swedish Council for Work Life Research.

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