An investigational model for reduction of tied up capital and deepened supplier collaboration
- A case study at ABB Xinhui and ABB Cewe-Control

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This article is a short presentation of an assignment given by ABB Cewe-Control in Västerås, Sweden which has been conducted as a master thesis for Lund University, Faculty of Engineering. In this assignment an investigational model has first been developed and then applied on an existing supplier relation, the Chinese ABB company ABB Xinhui, to identify improvement proposals. The completed investigational model consists of six stages which will be further presented in this article together with the eight proposed improvements that were identified when using the model. The investigational model will be used by the supplier developers at ABB Cewe-Control in order to help them continue reducing tied up capital together with other suppliers.

Key words: Tied up capital, supplier collaboration, investigational model, lead time reduction

Introduction

In September 2008 the world was facing an economical recession which is still present. During the previous time of prosperity ABB had focused on guaranteeing on time delivery and large inventories were not considered a problem. However, now ABB has both incentives and time to focus on reducing their inventories. ABB is also focusing on reducing the amount of tied up capital. This project is initiated by ABB Cewe-Control as a part of this work.

Purpose

The goal of the thesis is to reduce the amount of tied up capital at ABB Cewe-Control and deepen their collaboration with suppliers. Therefore the purposes of the thesis are:

a) Develop an investigational model for this goal
b) Identify improvement proposals by applying the model on an existing supplier relation

Methodology

The working procedure used in this master thesis has its foundation in the constructive research approach (Lukka, 2003) [1]. The method used to create a model is based on Storhagen (1985) [2]. The working procedure has its starting point in the purpose of the thesis, from which a theoretical frame of reference is created, see figure 1. Interviews are held with the future users of the model, the

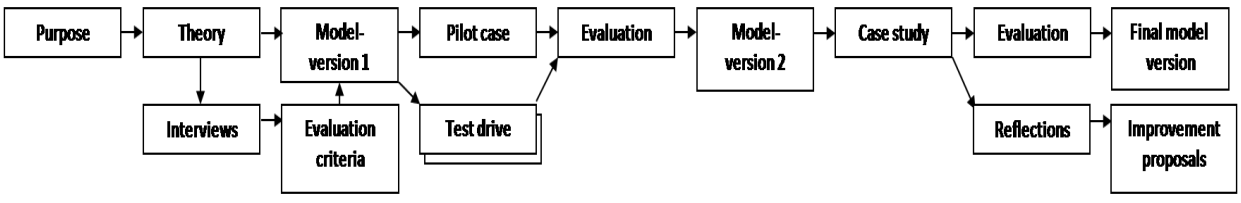

Figure 1: The working procedure

supplier developers, and the project assigner in order to identify what criterions to use when evaluating the investigational model. Based on the theoretical frame of reference and the criterions a first version of the model, model 1, is created. Model 1 is then tested by the supplier developer and the investigators through a pilot test which is followed by an evaluation of the model. The supplier developers, the project assigner and the investigators take part in the evaluation which is based on the criterions. A second version of the model, model 2, is then created and used in the case study at ABB Xinhui. Model 2 is also evaluated in order to create the final version of the investigational model. As a result of the case study improvement proposals are identified which are analyzed according to the theoretical frame of reference before the final proposals are presented.

Theoretical frame of reference

The theoretical frame of reference includes theory about tied up capital, how to measure it and how to reduce it (e.g. Lumsden (2006)) [3]. The framework also concerns the material and information flow between customers and suppliers and how to map and visualize it (e.g. Oskarsson *et al* (2006)) [4]. Furthermore, different theories about collaboration and supplier development are discussed together with how to carry out improvement projects (e.g. Lee (2004)) [5].

Time-based principles for process improvements

The following nine principles are the most important when redesigning and improving the performance of logistic processes [6]:

1. Reduce or redistribute lead times
2. Reduce or adapt to the uncertainties
3. Redistribute or increase frequencies
4. Eliminate or adapt to expected pattern of demand
5. Simplify structures, systems and processes
6. Differentiate
7. Postpone
8. Improve the information processing and the decision support systems
9. Strengthen the internal and external integration

The investigational model

The final investigational model consists of six stages which are illustrated in figure 2 and described below;

Stage 1: Preparation

Initially a supplier and one or more products are selected for the study. Basic data is then collected about the product or products and the material and information flows connected to them.

Stage 2: Mapping

This stage concerns mapping of the selected material and information flow/s. The mapping takes place at the supplier and should be illustrated with logistical symbols. Time data and relevant information for different activities should also be collected.

Stage 3: Visualization

The data and information collected in stage 1 and 2 are visualized in this stage through four different types of diagrams. A lead time diagram is created to visualize which activities are building up the flows lead time, see Figure 3. A tied up capital diagram is formed to illustrate where and how much capital that is tied up in the flows different parts: raw material inventory, production, finished goods inventory and transportation, see Figure 4. To visualize the amount of tied up capital in different inventories on a more detailed level an inventory value diagram is created, see Figure 5. Also a demand diagram should be generated to visualize how the own company´s

Figure 2: The investigational model

way of placing orders affect the supplier, see Figure 6. These four diagrams shows a clear picture of the present situation, which should be used as a base for identifying areas of improvement.

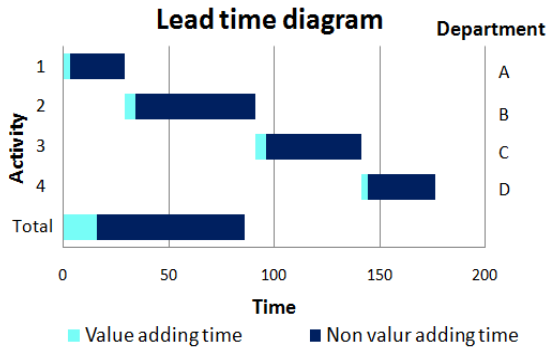

Figure 3: Example of a lead time diagram

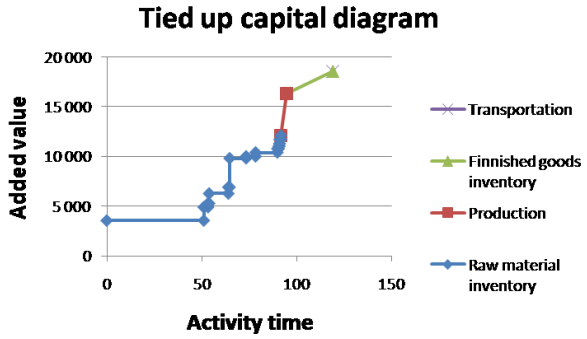

Figure 4: Example of a tied up capital diagram

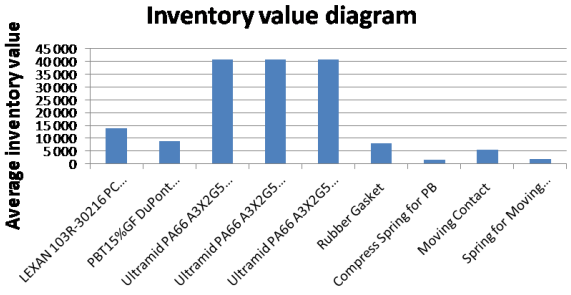

Figure 5: Example of an inventory value diagram

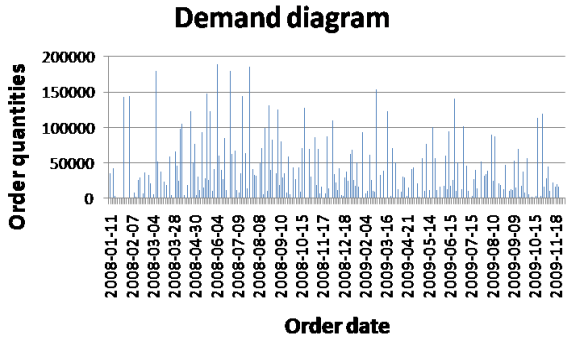

Figure 6: Example of a demand diagram

Stage 4: Discussion about potential improvement areas

In this stage discussions with the supplier are held about potential areas of improvement. Improvements concerning the material and information flows are focused together with supplier collaboration. The discussion should result in improvement proposals.

Stage 5: Analysis of proposed improvements

The proposed improvements are in this stage analyzed by a potential lead time diagram and a potential tied up capital diagram, which both visualize the potential results of the proposals. Also the proposed improvements should be analyzed in a prioritization matrix. Both the own company and the supplier analyze the proposals in the matrix with respect to;

- Positive effects
- Negative effects
- Cost increases
- Cost decreases
- Resources needed
- Time for implementation
- Possibility to realize the proposals

With background in these analyses the proposed improvements are prioritized and selected for realization.

Stage 6: Action plan and follow-up

In this last stage an action plan for realization of the selected improvement proposals should be created. The proposals should be divided into smaller parts for which goals and deadlines should be set. Also time for follow-ups should be set.

Improvement proposals

By applying the investigational model at ABB Xinhui, which supplies ABB Cewe-Control with finished products, eight improvement proposals were identified. The proposals concerns both the material- and information flows between ABB Cewe-Control and ABB Xinhui, collaboration and supplier

development. Each of them will be briefly described below:

1. *Extend information and frequency concerning forecasts*
   ABB Xinhui finds the information in today´s forecast insufficient and requests the following information; number of products in customer orders, reordering points and order quantities. Also, ABB Xinhui would like the forecasts to be updated once a week. By adding information to the forecasts and increasing the update frequency ABB Xinhui will be able to improve their planning.

2. *Improve forecast accuracy*
   ABB Xinhui estimates the accuracy of ABB Cewe-Controls forecasts to 50 %, which results in long lead times for some products. If ABB Cewe-Control can improve the accuracy of the forecasts these lead times could be reduced as ABB Xinhui could improve their planning.

3. *Reduce order quantities*
   Today ABB Cewe-Control is consolidating customer orders before placing orders to ABB Xinhui. ABB Cewe-Control is recommended to reduce their order quantities as this will lead to a higher frequency in ordering to ABB Xinhui as well as reduced tied up capital at both companies.

4. *Create export document more frequently*
   ABB Xinhui is recommended to create the export documents related to ABB Cewe-Control twice a week instead of just once, which is the present practice. This will, a part from reducing the variation in the lead time and the total lead time, also result in a better utilization of the days that transportation takes place from ABB Xinhui to ABB Cewe-Control.

5. *Reduce transportation lead time*
   ABB Xinhui is suggested to start the transportation earlier in the morning as this will reduce one day of the lead time. Historical data shows that the transportation in most cases only takes three days in contrast to the estimated six to seven days. ABB Xinhui is therefore suggested to guarantee the transportation lead time to three days together with their forwarding agent.

6. *Improve information sharing*
   Today some of the information channels between ABB Cewe-Control and ABB Xinhui are vague and some information does not reach the intended receiver. The information sharing between the two companies should be looked over so that the right people take part of the right information. Also, ABB Cewe-Control and ABB Xinhui are recommended to hold weekly meetings according to a mutually set agenda standard.

7. *Develop the supplier evaluation*
   Today the supplier evaluation used by ABB Cewe-Control only measure service related ratios. By also measuring improvement performances, for example reduction of lead time or tied up capital, these types of actions would be highlighted and motivate suppliers to focus on these aspects.

8. *VMI partnership*
   The already existing partnership between ABB Cewe-Control and ABB Xinhui, as ABB companies, is suggested to be further developed to a VMI-partnership. This would enable ABB Xinhui to improve their planning activities and also reduce tied up capital at both companies.

   If all the proposed improvements are realized, the lead time can be reduced from today´s maximum of 21 days for

pilot devices and 28 days for soft starters to a maximum of 13 days. The minimum lead time can be improved from 12 to 11 days. This means that the variation in the lead time will be 3 days compared with today´s 9 days for pilot device and 16 days for soft starters. Also, if the proposals are carried out for all products, belonging to the same product categories as the two studied products, the tied up capital for these products can be reduced with 11,6 % in Cewe-Control´s inventory.

Conclusions

The proposed improvements that were highest prioritized and will be realized within a near future are the proposals concerning the reduced order quantities (3), the export document (4), the transportation lead time (5a,b) and the information sharing (6), see figure 7 [7]. The extended information and the accuracy concerning the forecasts will be handled through the improved information sharing. The above stated potential results are still considered to be valid, even though the proposals concerning the supplier evaluation and VMI partnership will not be carried out.

The completed investigational model has received good critic from both the supplier developers and the assigner of the master thesis. Therefore, the supplier developers are recommended to use the model together with other suppliers.

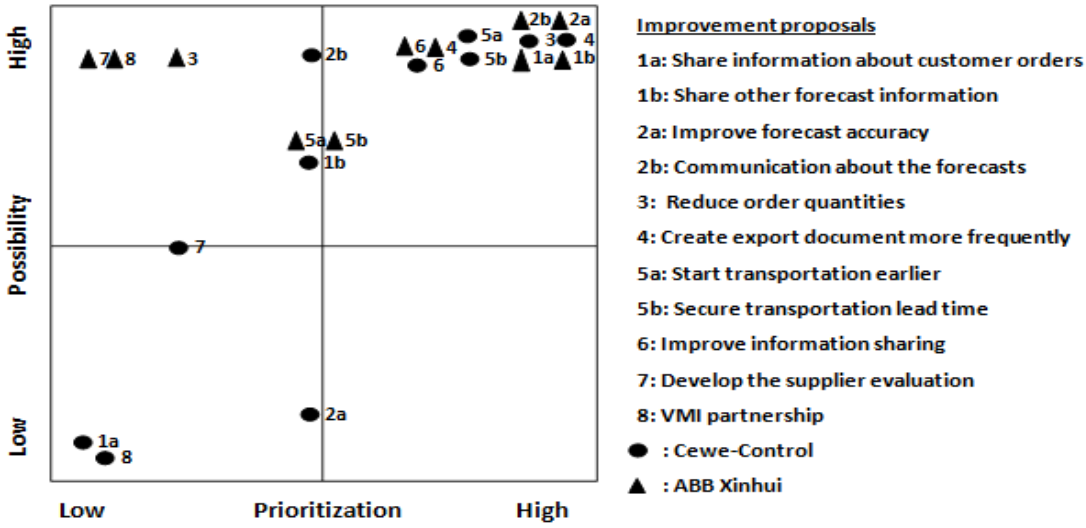

Figure 7: Prioritization matrix

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