

Mapping and analysis of a distribution process in a make-to-order supply chain

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When the material flow in a distribution process grows, problems may occur. This article summarizes the findings from a case study performed at IKEA Distribution Services North Europe. The object of the study was IKEA's distribution process called Direct Delivery Customer (DDC) which manages customer orders as home deliveries supplied directly from the supplier. This is a process that historically has been small, but has grown a lot the last years. This process has been mapped and analyzed in order to find problems typical for this kind of process.

INTRODUCTION

Historically, it was common that one company handled the whole supply chain; from “farm-to-fork”.¹ Today, this is a rare situation and a supply chain is often a complex network consisting of many actors. Each company intends to focus on their core competence². The complex structure makes the supply chain harder to understand and manage. Mapping can be a helpful way to understand and evaluate a company's supply chain and its processes³. A map can act as basis for redesign or modification, it helps to visualize the business and identify areas for further analysis and improvement.

IKEA's distribution process Direct Delivery Customer (DDC) has a rather unique characteristic at IKEA. It manages home deliveries of custom made worktops, sofa covers and a part of the sofa assortment. Those products are not stocked by IKEA and a so called make-to-order strategy is used. When a customer ordering such a product, the product is in turn ordered from the supplier. It is then delivered direct from the supplier to the end customer's home, with transshipment at IKEA's terminal in Torsvik. The DDC material flow has historically been very small and has therefore

not received much attention from management. The volume of this material flow is continuously increasing. IKEA's terminal in Torsvik perceives problems as lack of gate areas and increasing manual administrative work due to the growing DDC material flow. The trend indicates that the impact of the perceived problems becomes more and more serious as the flow continues to grow. To fully understand the process and enable process improvements, it is first necessary to thoroughly map the process. The purpose of the case study was therefore to map the DDC process and investigate how it is managed. Another purpose was to identify problems in the process managed by IKEA's terminal in Torsvik and suggest improvements.

FINDINGS

Based on interviews and observations, the process was mapped. Already in this step, problems were revealed. The process was then analyzed with help of tools as process activity mapping, value analysis and analysis of handovers. These analyses resulted in that additional problems were identified. In total were nine problems identified;

- Low efficiency in administrative work
- Transport damage
- Missing goods
- Lack of gate area

¹ (Goetschalckx 2011)

² (Paulsson and Gammelgaard 2005)

³ (Gardner and Cooper 2003)

- Limited way to follow up performance
- Custom related problems
- Long lead time
- Large amount of handovers

The problems were ranked of importance for IKEA. The ranking were performed by parts of the management team at IKEA Torsvik.

Seven of the problems were further analyzed in terms of source, consequences and customer impact and potential solutions. These seven problems are described below. The problem ranked as most important for IKEA is described first.

Lack of gate areas – The terminal lacks free gate areas due to the fact that the DDC goods are stored at the gate areas during its time in the terminal. The lead time is long inside the terminal which leads to that the goods occupy the gate areas for a long time. The consequence of having a lack of gate areas is lowered efficiency and a higher risk of mixing goods that should be delivered to different destinations. In worst case, the terminal cannot manage to receive the amount of goods that is sent to the terminal. The solution with highest potential is to shorten the lead time, which is the next problem.

Long lead time - The lead time inside the CDC terminal today is 48 hours. It has been identified that the lead time includes much waiting time. The outgoing transport of the goods cannot be booked before the goods have arrived. Due to low IT-support is information about incoming goods volume not known. The goods have to be measured when arrived at the CDC terminal before planning of outgoing transport can be made. If the volume had been known in advance the lead time could be halved to 24 hours. By analyzing the information in the IT-systems, a solution was found that enables the reduction of the lead time. This will in turn also solve the first problem, *Lack of gate areas*.

No one responsible for the entire process - The responsibility of the DDC process is divided

between different departments and actors. There is no overall responsibility assigned for the entire process that extends over the functions and units within the supply chain. It was revealed in interviews that this leads to disagreement of who should take care of problems that arise in the process. This uncertainty can lead to that problems stay unsolved. Another consequence may be the risk of sub optimizing the process. Sub optimization means that an improvement that is done in one part of the process could lead to that it works worse in another part of the process. The entire process performance might be lowered. Another potential consequence is the risk of performing double handling and unnecessary work. Processes can be improved by centralizing process responsibility⁴. A potential solution to assign central process responsibility is to introduce a process owner.

Low efficiency in administrative work - The low efficiency in administrative work is associated with a lot of manual performed work that is time consuming. The reasons that so much work is done manual has two explanations. The most significant is the low support from IT-systems. With low IT-support is there no other way than to manually handle the information flow in paper form, which is very time consuming and leads to low efficiency. The other explanation may be undeveloped processes in need of streamlining. If double handling and unnecessary work occur, also seen as waste, it causes time consuming work. One solution is to implement an IT-system that supported the process so there would not be any need of manually handle information in paper form. Implementing IT-support for the DDC process is seen as a long-term solution at strategic level.

Another partial solution is to improve the handling of the information flow in the process. Conducting a workshop could lead to agreement of where unnecessary steps and double handling occurs so it will be possible to improve the

⁴ (Mansar and Reijers 2007)

process. Conducting a workshop is seen as a short-term solution which can be done at an operational level.

Missing goods – Goods get lost in the supply chain. The goods are registered as arrived and dispatched manually. This registration is not dependent on the activities inside the terminal. If an activity is performed wrong, for instance could a pallet be placed on the wrong truck, no one would notice. The pallet would be registered as dispatched from the terminal to the right destination anyway. The goods are hard to track and the costs of handle, transport and produce a new order is high. In the same time will the customer be disappointed and the IKEA brand damaged. The main source of the problem is seen as the lack of an IT-system with a scanning function so the goods could be traced and tracked. With track and trace possibilities, the risk of losing track of goods would be lowered and in the same time would statistics and history be gathered. Another solution is to add an control of the goods loaded into the trucks.

Large amount of handovers - A large number of handovers exist. Low support from IT-system is seen as the source of this problem due to the fact that it creates manual work which in turn creates additional handovers. Misunderstandings can arise during a handover which increases the risk of error.

Customer related problems – When delivering goods to Norway, which not belongs to EU, custom declaration must be done. The supplier is responsible for this because they own the goods during the whole period of transport. Troubles occur when custom documents are not handed over to the Custom Service at the Norwegian border. Human errors, occurring through manual work and many handovers increases the risk of losing documents. Failing with the custom declaration can lead to that the supplier is accused for smuggling. In worst case, the supplier may lose their right to export goods to non EU member countries. Short-term partial

solution is to increase the follow-up controlling if the customer declarations are completed and approved. A long-term solution is to improve the IT-system so it can handle DDC custom declaration in the same way as custom declaration is handled for all other of IKEA's material flows.

SUMMARY OF PROBLEMS

Five of the seven problems depend upon low IT-support, one way or another. The consequences were different for the different problems. Low efficiency, failure and errors, risk of being less competitive, risk that problem remains unsolved and a risk of sub optimization were some of the consequences.

Potential solutions have been analyzed to solve some of the problems and improve the process. From this analysis short- and long-term recommendations have been formed.

SHORT-TERM RECOMMENDATIONS

Reduce lead time – By planning the outgoing transport before the goods arrive to the CDC terminal it is possible to reduce the lead time from 48 to 24 hours. Volume of the worktops could be gathered from the supplier. Volume of the sofas could be calculated by using the volume in IT-system and multiply it with a correlations factor.

Share process map – Sharing the process map by hanging it on a wall so it is available for all employees. This would increase the understanding of the process. By referring to the interviews, the respondents were asked how valuable process maps would be for them and the answer was 8.5 in a scale from 1 to 10, where 10 are most valuable.

Workshop with intention to increase the efficiency in administrative work - It appears possible to improve the process by improve the handling of the information flow. By conducting a workshop with people from each involved department, it could be declared which

information that is of importance and which is not. The process maps are recommended to be used as a basis for the workshop. Hopefully, the workshop can lead to agreement of where unnecessary steps and double handling occurs. The expected result is higher efficiency in terms of less manual work.

Inspection of loaded goods - It is recommended to add an inspection of all loaded DDC goods. This is a solution for the problem with missing goods at the CDC terminal. Every pallet should be controlled to ensure that the pallet is loaded into the correct truck. Even if this is an action that adds waste to the process, it will ensure that goods do not get lost. It will also explore if the problem with lost goods has a source at the CDC terminal.

Modify limit in the IT-system - A limit exists in the IT-system regarding the number of orders that can be delivered each day. Modifying this limit of orders could lead to a small improvement regarding the problem with lack of gate areas. A suggestion is to modify this limit to both delimit the number of order lines and orders. This would create a more stable and predictable material flow in the CDC terminal.

LONG-TERM RECOMMENDATIONS

Investigate possibility to implement IT-support - It is recommended to investigate the possibility of introducing an IT-system that supports the DDC process. Implementing IT-support is seen as a long-term solution on strategic level both due to the long time aspect, over 1 year, and the size of the investment.

IT-support for the DDC process is seen as a solution for many of these problems. Desired features from an IT-system are a scanning function, so it is possible to trace and track the goods. This would solve the problem with missing goods. The IT-system should be possible to integrate with other IT-systems, so all information can travel digital and without need of manual handling papers. Less need of manual handling would in turn, increase the efficiency in

administrative work. When information exist in and travels via an IT-system instead of via paper documents, less handovers is required which is a source for errors. The problems that exist with custom when exporting to Norway would also be eliminated, though it would be possible to handle DDC custom declaration in same way other customer declarations works today. IT-support for the DDC process would also enable storage of data. Historical data would permit introduction of KPI and performance measurement.

Centralize process responsibility - By centralizing process responsibility, process improvement would be facilitated. No doubt would occur of whose responsibility it is to improve process and take care of arisen problems. It would ensure that someone keeps track of the entire process performance and tries to minimize occurrence of sub optimizing and double handling.

Introducing central responsibility can be done by appointing a process owner. This is an action that requires re-organization of the organization and is therefore seen as a long-term solution at strategic level.

CONCLUSION

Nine problems were identified in the process. Seven of these were further analyzed in order to find potential solutions. This resulted in seven recommendations, five short-term and two long-term, in order to solve the problems and improve the process.

In this case study it became clear that a growing material flow creates a more complex information flow. This information flow often requires to be managed with IT-support, which was missing in this case.

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