Traceability in the chilled food supply chain

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This article is an abstract of a master thesis in Engineering Logistics. The thesis was conducted at Frigoscandia Logistics office located in Helsingborg. The aim was to map and analyse the movement of a target product through the chilled food supply chain and from this identify the most vulnerable processes as well as possible changes that can improve the performance of the supply chain in the future.

KEY WORDS: Food supply chain, RFID, temperature control, cold chain, traceability, quality assurance

Introduction
An increased price pressure together with harder regulations on food safety has put more pressure on the companies in the food supply chain. To be able to improve the performance, better product traceability and quality assurance is needed without increased logistics costs.

Purpose
The purpose of this study is to map the movement of a target product through the chilled food supply chain. Throughout this study the most vulnerable processes will be recognized as well as possible changes that can improve the performance of those processes in the future.

Methodology
The study is of a qualitative sort. The empirical data have mainly been collected through observations and interviews. The approach of the study is inductive and has as a main purpose to explain and improve the knowledge of the investigated processes. The interviews have been of an open character with a special focus towards the processes that the respondents are working in.

Theory
The aim for this thesis is to map and analyse a food supply chain and also suggest possible improvements in the traceability and food safety. The theory chapter thoroughly describes different aspects of food safety for example the regulations around handling and storing perishable goods. Other topics in this chapter are quality control, process mapping and traceability. In the last part different technologies within traceability is explained in more detail especially the RFID technique. This is an identification technique that enables a reader to scan the identities of the goods by radio
waves i.e. the identities can be red even though the tag isn’t in the line of sight of the reader.

**Empirical study**
In the supply chain that was chosen for this study there are five different actors

- Cattle framer
- Butcher facility
- Producer
- Logistics provider
- Retailer

The mapping was predominantly focused on the butcher facility, producer and logistics provider. A short pre-study showed that the biggest possibilities of improving the overall performance of the supply chain was in these three sections.

The empirical study showed that the supply chain is fulfilling the standards required by law but lives not up to the level that could be seen as sufficient in order to service the customer in an optimal way. Also the observations that were made during the study indicate that the flow of information between the different actors is handled in a very resource demanding and manual way. The routines when it comes to quality assurance are also very manual and not performed as frequent as they should.

**Improvements and Analysis**
To improve the traceability and quality control in the supply chain a new identification and temperature monitoring system is recommended. This includes an RFID tag with integrated temperature sensor and the IT-infrastructure needed to support this kind of equipment. In the study five different critical success factors are individually analysed to get the full picture of the implications in the proposed RFID-system.

- Tied capital
- Time
- Customer service/quality
- Cost
- Risk

The tied capital in stockholding is expected to be reduced but the increased demand of IT-support will balance out some of those profits.

The time needed in the different processes will be reduced in most instances. For example all warehousing activities will require less resources and time. Also time spent on correcting errors will decrease when the new system is expected to generate fewer handling errors.

When it comes to customer service and quality of the products this is where the largest benefits are
believed to be seen. Because of the more automated quality control and identification system the information flow upstream in the supply chain will improve significantly with the result that the stock levels will be better planned meaning less out of stocks and out of dates on the shelves. The retailer will also be able to guarantee the quality of the products in the store because of the detailed information regarding the temperatures in the supply chain.

The cost connected to running the traceability system will increase significantly. This will be compensated with less cost for personnel in the warehousing, distribution and store handling activities and also a decreased level of scraped goods and lost sales.

In the more automated supply chain the risks are less evident. The production planning and stock optimization will be possible to improve with better information to base the forecasts on. Also the risk of selling bad product will be minimized with a closer temperature control in the different processes. All the improvements in the logistics will decrease the risk of large withdrawals which gives the brand a weaker position in the eye of the customers.

**Conclusions**

The study shows that there is a positive as well as a negative effect on the logistical performance in the supply chain when implementing RFID technology. The positive aspects of an implementation are mainly an increased traceability, fewer errors, a greater food safety and general time savings in the handling of the goods. The negative aspects have mostly to do with the cost, both through investments and through operational costs. How big the expected improvements are going to be depends on how efficient and automated the flow is today. The supply chain in this study is expected to have big improvements in efficiency if RFID technology is implemented.