Mapping of the supply chains to Malmö University Hospital in connection to risks and risk management

- a case study on four supply chains

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Abstract

Today’s hospitals in Sweden are all dependent of large networks of suppliers of medical supplies. These consist of many supply chains that are regularly exposed to both external and internal risks. One hospital affected by these risks is UMAS (Malmö University Hospital). UMAS is dependent on its supply chains to work without disruptions but it is unclear what risks they might be exposed to and how they can be managed.

This master thesis presents a mapping of these risks. Four of the hospitals’ supply chains have been analysed in a case study focusing on the structure of the supply chains, their risks and existing risk management. Based on the result of the analysis, guidelines to future risk management solutions concerning those risks are suggested.

Keywords
Healthcare supplies, hospital materials management, hospital logistics, purchasing, risk, risk management, supply chain, supply chain risk management.

Background

The concern regarding risks and how to handle them is continuously evolving and has gradually come to include more and more extensive areas in society. Businesses and companies are often part of larger networks, whose purposes are to deliver a satisfying product or service to the end customer. These networks range from production of raw materials to end customers and are often called supply chains. If a supply chain is to reach a satisfying result a number of objectives has to be fulfilled. The product or service has to be delivered at the right time, at the right place, in correct form and in right quantities. [1]

The supply chains are regularly exposed to a number of risks that can prevent the reaching of these goals. The risks can consist of external risks such as natural disasters or domestic disturbances. They can also consist of internal risks such as poor organisation, lack of trust and communication problems. [2] To handle these risks in an effective way the concept of SCRM (Supply Chain Risk Management) has been developed. To make SCRM work properly it requires an amount of confidence and cooperation between the different parts of the supply chain and an understanding of the chain as a whole. [3]

Today, many of the activities in the Swedish public sector are also part of supply chains. One of these activities that are depending on the supply chain to work properly is the healthcare sector, especially larger hospitals. Within the healthcare sector, objectives such as receiving supplies at the right time and place cannot only be viewed from an economic perspective. Some products, such as surgical and medical supplies, simply must always be available in order to give patients proper care. They can even make the difference between life and death. [4]

Problem discussion and purpose

This master thesis is assigned by the Supply and Facility Unit of UMAS (Malmö University Hospital), which is one of the largest hospitals in the Swedish southern health region. UMAS is a part of “Region Skåne” which is a regional public body responsible for health, medical and dental services. Every year UMAS purchases and orders medical supplies from thousands of different suppliers to a cost of several hundred million SEK. [5] The hospital is largely dependent of the proper working and effectiveness of its supply chains, and therefore disruptions are not considered to be acceptable. [6]

They do however occur regularly in varying frequency and magnitude. At present day there is no existing statistical database or documentation concerning disturbances in the supply chains, which could have been a useful way of identifying risks and pointing out their main causes.

The purpose of this master thesis is therefore to map the existing risks in the supply chains of UMAS, and to suggest guidelines to future risk management solutions of that area.
Methodology
The work was conducted as a case study, following the principal rules of case study methodology. To make a proper judgement of risks and risk management the study was focused on a fairly detailed level.

Therefore four supply chains have been selected to be studied, but on the basis of specific criteria that will make it possible to generalize the results and conclusions for all of UMAS’ supply chains to some extent. Each of the four supply chains was studied as separate cases, in order to make a cross-case comparison possible as well. Each case was studied from a structural, risk and risk management point of view, based upon interviews, observations and documents.

Furthermore they were analysed qualitatively by the use of existing theories of Supply Chain, Supply Chain Management, Logistics, Purchasing, Risk, SCRM and Risk Management.

Empirical findings and analysis
The four supply chains that were studied are all built up around the physical flow of certain medical supply products, which are all vital to the hospital activities. The four cases were named after those products, as follows:

- The glove chain
- The infusion chain
- The implant chain
- The reactant chain

Examination gloves are widely used within all hospital care activities. In the glove chain, the supply chain of examination gloves to the Emergency Clinic was studied, where they are frequently used in every day work.

In the infusion chain the supply of infusion devices to the Anaesthesia Clinic were studied. Infusion devices are, as the examination gloves, used in large quantities in many different clinical areas. These two products are manufactured by two different large international companies, but are both ordered and stockpiled at the central storage of Region Skåne, Skåneförrådet.

In the implant chain the flow of orthopaedic implants to the Orthopaedic Clinic was studied. These are high cost and high technologic products that has to be in hand at the exact right time, place in correct quality, which poses special requirements to the supply chain.

In the reactant chain, the flow of reactants for analysing blood samples was studied. The analysing process of blood is a vital support function to other clinical activities, and the reactants used require very specific qualities.

Information regarding these supply chains were collected and structured for each actor and the chains as a whole, based upon their structure, risks and risk management. The mapping of their structures after analysis resulted in maps such as the one presented in figure 1. These maps include the different actors, the physical flow of the product and the information flow between the actors.

The structure of the chain was analysed focusing on contributing risk factors. Risks identified during interviews were analysed and completed with those risks further identified by the authors. Finally the existing risk management of the chains was analysed in connection to its impact on the identified risks.

![Diagram](image)

Figure 1: The figure presents the mapping of the glove chain, clarifying the different actors of the chain, the physical flow of gloves and the information flow between the actors. The grey parts represent that part of the chain especially studied in this case study.
The analysis is focused on the consequences and causes of the identified risks and the present state of risk management work. Probabilities are only estimated roughly due to the lack of historical data.

**Results**

The results from the analysis indicates a number of concrete risks specific to those supply chains studied. In brief, these risks consist of a too high complexity in the communication and information flows, lack of proper contractual agreements, loss of experienced staff and quality sensitivity of products. One of the most frequent occurring consequences from disruptions was an added workload to hospital staff that manages materials. This was not considered as a risk by those interviewed in the staff of e.g. the Emergency Clinic or the Orthopaedic Clinic, but more as a regular problem they had to accept in their daily work.

A report from the US Institute of Medicine suggests that such problems should not be taken lightly. It estimates that 44,000 to 98,000 Americans die each year as a result of medical errors and that the most common errors are: distractions, too much work and inexperienced staff. [x] It is possible that this could also be true within the Swedish health-care sector.

The general conclusions concerning risks in supply chains to UMAS as a whole indicate that the overall risks are not of considerable magnitude. On the other hand the existence of a number of conditions that adds to the risk exposure in the supply chains were found. In “Region Skåne”, UMAS and the supplying company organisations the use of SCRM, or even risk management, risk awareness and full-scale thinking is absent. Risks in the studied supply chains are managed mainly by the extensive use of stockpiling and by relying on the few but experienced and effective key-staff working close to the physical flow of materials. Its possible that this system is trusted too much, which is why small but highly probable risks often are accepted and larger risks are met with a “it won’t happen to me” mentality.

**Suggestions to future risk management**

The results highlight some of the most significant risks and problems concerning the supply chains of medical supplies to UMAS. These results have led to a number of suggestions to guidelines on the development of future risk management within UMAS and Region Skåne. These guidelines are not meant to give a detailed description to how specific risks can be managed, nor are they covering all areas. They are, however, meant to be a useful support in developing the risk management work and to reduce the most important risks identified in this study. The suggestions are shortly as follows:

- Develop a risk management policy within Region Skåne.
- Implement methods of Supply Chain Risk Management at Region Skåne’s purchasing organisation, MA-Skåne.
- Establish a function at MA-Skåne to conduct continuous analyses on both local and worldwide events affecting the supply of medical materials to Region Skåne.
- Set up clear and legally proper contractual agreements with all suppliers and, if possible, reduce the numbers of suppliers and develop closer relations to the ones currently used.
- Develop and improve communications channels and information flows in the supply chains.
- Establish a user-friendly system for reporting and documenting disruptions and incidents concerning the flow of medical supplies to UMAS.
- Develop a proper system for which medical supplies to be prioritised in times of general shortage or crisis.
- Establish a central materials management organisation at UMAS.
- Establish a central risk management unit at UMAS.

The authors hope that this master thesis will be helpful in managing risks within the supply chains of medical materials to UMAS and Region Skåne in the future, as well as contributing to the general knowledge of risks in supply chains in connection to hospitals.

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**References**


