Control and Synergies in the Outsourced Supply Chain -
Recommendations for how to improve and organize Tetra Pak’s supply chain.

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This article is an extract of a master thesis written at the Division of Engineering Logistics, Department of Industrial Management and Logistics at Lund Institute of Technology. The thesis was conducted at Tetra Pak. The aim was to investigate how Tetra Pak, a company characterized by a high level of outsourcing, shall organize its system suppliers’ purchase of components. A part of the assignment was to specifically evaluate Tetra Pak’s suggested solution, which was a distribution central for both spare parts and components to the system suppliers’ production.

KEYWORDS
Supply chain management, supply chain design, complexity, control, purchasing, outsourcing, system suppliers

Introduction
In the recent years, the growing globalization and increased competition have forced companies to focus at their core competence. Therefore many companies have outsourced activities not considered to be core competences. Whilst more and more activities are outsourced, the purchasing function at the companies has become more strategically important. The purchasing function becomes the contact to the suppliers. However, outsourcing can bring not only positive effects but also some negative. It requires different skills to manage the outsourced supply chain compared to managing in-house activities. Companies have experienced problems regarding how to manage and control quality, lead-time and delivery reliability. Purchasing also has problems in retaining leverage in the purchase when the manufacturing operations that consume the products have been out-sourced. Tetra Pak has outsourced all of its production of packaging equipment and is an example of a company in the situation described above. The company has system suppliers delivering modules that are assembled into packaging machines. Component suppliers deliver components to the system suppliers and also to Tetra Pak as spare parts. There are approximately 700 component suppliers and approximately 45 system suppliers, as shown in Figure 1.

The large number of suppliers, for both systems and components makes the current supplier structure complex with several interfaces and order locations. One reason to the complex and growing supply chain is that Tetra Pak has not worked with standardization for long. Moreover, the influence from the purchasing department has been limited regarding which suppliers that should be chosen as suppliers of components for the new machines. Another reason to the complex supplier structure is the fact that the machines at Tetra Pak have a very long lifetime, sometimes up to 40 years. This explains why the effects of the standardization work are long-term effects, i.e. it will take many years before this work will reduce the total number of suppliers.

Problem analysis
The complex supply chain of Tetra Pak suffers the following main problems:

Tetra Pak experiences a lack of control regarding which volumes of components that are bought from the component suppliers and which suppliers the system suppliers use. Tetra Pak needs to know this to guarantee high quality and find supplier synergies in the second tier.

Tetra Pak and the system suppliers experience complexity: There are many interfaces and relations

1 van Woele (2002), Purchasing and supply chain management, p. 8.
3 Ellram & Billington (2001), Purchasing leverage in outsourcing decision, p. 15.
between the component suppliers and the system suppliers.

Tetra Pak wants to know if there are any possible savings in an alternative supply chain structure. We have chosen to focus on savings in transport, administration, handling and inventory costs.

Those were the problems explained to us as a base for the master thesis. One topic was added, which is strategic fit: We must take the cooperate strategy of Tetra Pak in consideration. This topic ensures that the conclusions are aligned with the overall strategies.

**Purpose of the Master Thesis**

To investigate how Tetra Pak, a company that has a complex supply chain and is characterized by a high level of outsourcing, can organize the system suppliers' purchase of components to gain control and utilize possible synergies.

To specifically evaluate Tetra Pak’s own suggested solution, which was a distribution central (DC) for both spare parts and components to the system suppliers’ production, see Figure 2.

![Figure 2: DC structure.](image)

**Method**

A system approach was chosen for this purpose. In our case, a system approach means that we do not only use calculations but also search for forces that affect the supply chain. Such forces could be long-term strategies of Tetra Pak, how the supplier’s relation to Tetra Pak is affected by the changes etc. We have chosen this approach since it is suitable with the holistic purpose of the research. A case study was considered as a preferable method since there was a need to cover many factors of a complex system.

Many interviews have been performed. Secondary data was collected in existing statistics at Tetra Pak and literature studies. Representatives from three other companies, IKEA, Volvo Construction Equipment and Alfa Laval, have also been interviewed. The purpose was to gather knowledge of how other companies handle the problems that Tetra Pak is facing.

**Theoretical frame of reference**

To perform this research there are several theoretical areas of interest that need to be scrutinized. As explained in the introduction the increased competition puts focus on the supply chain. Well known theories for sourcing and relationships with suppliers such as Kraljic’s portfolio technique and the Bensaou model are therefore highly interesting. Discussions concerning the core competence of a company naturally leads into the theories of Make or Buy, which must be considered a strategic issue to handle. Christofer noted: "The real competition is not company against company but rather supply chain against supply chain." The supply chain must therefore be effective, if not there is risk of the Bullwhip effect. Information technology now makes it possible to use electronic methods for the spreading of information between parties in a chain. This has also been an interesting area to investigate for the purpose of the master thesis.

One of the key issues for companies is whether to meet the future challenges with a centralized or de-centralized organization. As a result we have also used literature discussing advantages and disadvantages with different levels of centralization of for example the purchasing function.

**The supply chain of Tetra Pak**

In Tetra Pak there has been a strong technology focus. Design and quality have come first, which means that a low price has not been equally important when a design engineer have chosen or designed a new component. The main source of income for Tetra Pak has been the packaging material.

The trend of outsourcing has increased in Tetra Pak. Today there are system suppliers that also perform final assembly of a whole machine and deliver the machines directly to the customer after final testing. Some system suppliers are also more involved in the design of the machines. There are, however, a number of technologies that Tetra Pak wants to keep in-house since they are considered to be core competence. Such strategic technologies are for example the aseptic, sealing and filling technology.

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8 Lee et al. (1997), *The bullwhip effect in supply chain*, pp. 546-558.
In the area of sourcing and the supply chain structure there are a number of strategies set up to accomplish greater competitiveness:

- The number of suppliers is to be reduced.
- Tetra Pak wants to have the same supplier for a component independent if it is going to be used in production or as a spare part.
- Greater effort is going to be put on standardization work to reduce the complexity in the wide variety of articles. An earlier involvement of purchasing competence in the design phase shall result in the commercial aspects of sourcing being taken into consideration better.
- Tetra Pak now investigates sourcing in China as a part in the search for suitable suppliers.
- Work according to World Class Manufacturing is performed with key suppliers to assure competitive production.

In a time-period of four years these actions are part of an overall evolvement, which shall result in better performance and therefore also great savings.

Tetra Pak negotiates agreements with both the component suppliers and the system suppliers. In the agreements there are fixed prices of the products purchased. Other conditions such as delivery time, terms of payment etc are also stated. For the Supply Managers negotiating the global agreements with the component suppliers they shall negotiate the total need of components in order to get purchasing leverage. However, it is hard to know the needs, concerning the components, of the system suppliers. Forecasts are stated in the agreements but they never involve any commitment from Tetra Pak’s side.

To lower the administrative costs. To have EDI or other automatic connections save a lot of administrative costs.

**Collect information.** Tetra Pak could extract all the information concerning all transactions made. Furthermore there are other possibilities such as cross selling and visualization of inventory levels at different points in the supply chain. Alfa Laval is an example of a...
Buyers

is performed with key suppliers, involves having no central concept of Tetra Pak. World Class Manufacturing, which that the DC solution contradicts the system supplier to optimize themselves today. Therefore it can be argued suppliers. This is something that the system suppliers have responsibility of the supply of components to the system

In the DC solution the DC takes on some of the complexity.

The DC structure does give Tetra Pak control but there does not decrease the complexity. The e-hub as well as taking actions in today’s structure will decrease the complexity.

We have reached the conclusion that the DC structure does not decrease the complexity. The e-hub as well as taking actions in today’s structure will decrease the complexity.

The DC structure does give Tetra Pak control but there are other strategies that achieve this control easier.

In the DC solution the DC takes on some of the responsibility of the supply of components to the system suppliers. This is something that the system suppliers have to optimize themselves today. Therefore it can be argued that the DC solution contradicts the system supplier concept of Tetra Pak. World Class Manufacturing, which is performed with key suppliers, involves having no central storage of direct material. This philosophy is therefore not possible to follow with a DC solution.

4. Cross-docking. The fourth strategy is to have a direct information flow between the component supplier and system supplier as today, but have the components transported through a cross-docking point. When we analyzed the existing distribution network of the haulers we found that Tetra Pak components are already cross docked. The cross-docking of Tetra Pak components are then performed together with goods of other companies. Therefore we see no reason why a cross-docking point exclusively for Tetra Pak components should be more effective than the existing distribution network of the haulers. We conclude that there is no need to further evaluate the cross-docking concept.

Compilation. Now we have evaluated the different strategies against the problems that they should solve. The result of the evaluation is summarized in Table 1. We filled in the squares if the strategy solved that specific problem.

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As can be seen in Table 1, there are several problems that could be solved already in today’s structure. Administrative costs and complexity is further solved with an e-hub. So the only thing that the DC adds further is the transport savings.

**Recommendations**

In order to make our conclusion and a recommendation regarding the changes that needs to be done at Tetra Pak, we evaluated the effort needed versus the effect of the different strategies, as illustrated in Figure 5. The most reasonable thing to do is to first focus on the changes that will have the best effect and at the same time require the least effort, so called low hanging fruit.

First of all we find good potential for improvements in today’s structure. By implementing a number of changes and tools a lot of the problems could be eliminated. We consider the following action steps necessary for Tetra Pak:

**Continuously updated bills of material in a standardized format.** To guarantee correct updating there has to be a clear ownership of the bill of materials. The responsibility for correct bills of material has to be clarified. This is very important since it is a condition for

![Figure 4: Centralized information flow in e-commerce hub.](image-url)
control over the components. The bills of material must contain all components, both standard and drawn.

**Continuously updated source list.** Anyone who is involved in the sourcing of material within Tetra Pak and among system suppliers need to be able to access a correct source list. In the source list one should be able to search for a certain article or commodity and find out which suppliers to choose for each purpose. There is an existing tool today at Tetra Pak, called Product Information Viewer, that resembles what we are searching for but it needs to be improved. It is very difficult to work towards standardization without such a tool. The lack of a correct source list also makes it harder for the system suppliers to follow Tetra Pak’s choice of suppliers. The ownership of the source list must be clear. As soon as a new agreement is negotiated the source list shall be updated. In the design phase of equipment the source list shall also be updated with the new components. In this matter it is important that purchasing competence is involved early. We suggest that the purchasing organization shall take responsibility for the correct source list and its distribution.

**A tool connecting the source list and the bills of material.** To find out the volume value and supplier structure of a machine today different bills of material and information from the agreements have to be merged manually in Excel. This is time-consuming and a source of error. If both the source list and the bills of material are standardized the tool does not have to be advanced. It is only a question of automatically merge different lists of information. However, the number of different lists is rather high since every module in a machine shall be in a separate list and every variant of a machine need to be separated.

By knowing the **forecast and sales** of the different machines it is possible to disaggregate these on a components level. As a result, the supply managers will have much better information regarding which components and quantities they shall negotiate. The information about sales and forecasts shall be part of the same tool.

The information that this tool will provide can, in our opinion, be looked upon as a prerequisite to perform effective purchasing and thereby support the production.

These measures can be implemented in the existing supply chain structure. In perspective the effort invested to do this is rather low and the problems solved, i.e. the effect, is nevertheless big. Therefore we consider these changes to be low hanging fruit and strongly recommend their implementation. We consider these actions as a requirement to gain control before making other changes. Without this knowledge the effect of other changes will not be measurable. Apart from these we make two further recommendations to implement in today’s structure.

**Make lead-time a performance indicator.** Today the price development of the components is being measured quarterly. This is used as an indication of the performance of the Supply Managers in their negotiations with the suppliers. To put focus on decreased lead-time we suggest that also negotiated lead-times are part of the performance indicators. What gets measured gets done. The lead-time is, however, just one example of how we think purchasing within Tetra Pak needs to focus on more holistic measures. That is possible only when there are tools that can show the true costs.

**Continue and strengthen the work towards a lower number of suppliers.** That is a healthy way of reducing the complexity and must be prioritized more than it is today.

The second strategy involves implementing an e-commerce hub for the order placing process. As a result the system suppliers would have one virtual order location. The e-commerce hub must be connected to the source list so that the correct suppliers are chosen for different components. The component supplier would receive their orders from this order-placing hub and thereby it would be easier to see Tetra Pak’s aggregated volume. Such a tool for order placing involves an investment and the effort to implement it is higher. Based on the assumption that change number 1 is implemented first, the e-commerce hub has the possibility to further improve the efficiency in the supply chain. The effort needed and the level of extra value added makes it more of a strategic change. From the e-hub Tetra Pak would be able to extract valuable information regarding what components that are actually sold and furthermore see that the right prices are used etc. Apart from this, the efficiency is improved since the fax and invoice procedures are simplified.

The third strategy, that involves also redirecting the physical flow, requires the largest effort. Apart from handling the components in an extra node in the supply chain it also involves great responsibility of the party that handles this point. If the first two changes are implemented first there is little extra that can be achieved by redirecting of the physical flow. We come to the conclusion that having the components passing through a DC increases the complexity. The only additional benefit with the DC would be the transport savings and as
mentioned there is a potential risk that the cost of implementing the DC structure will be larger than those savings.

**Conclusion**

As stated in the purpose we aimed to answer two questions. The questions and a summarized answer is presented here:

*How can a company that, like Tetra Pak has outsourced its production, organize the system suppliers’ purchase of components, in order to get control and utilize potential synergies?*

We think that the strategic and some of the tactical work should be handled centrally in order to create synergies. We think that Tetra Pak and several other companies can achieve savings in global agreements negotiating the aggregated volume of its system suppliers. However, the operative work should be handled decentralized in order to achieve flexibility and nearness to production.

Crucial is also the correct and fast spreading of information in the supply chain. There are several benefits to achieve by integrating different information systems. We think that initiatives in new information tools should be initiated centrally. The working procedures and responsibilities must be clearly defined in the supply chain to remove any double work.

To Tetra Pak it is our recommendation to first do the proposed action steps in today’s structure. If not satisfied with the results: investigate the e-hub further and possibly implement it. The e-commerce hub involves big investments but this must be measured against the control and positive outcomes of such a solution.

We believe these solutions will give Tetra Pak the control back, decrease the complexity, generate savings and also fit well into the overall strategies for Tetra Pak.

*Should Tetra Pak implement a DC solution handling both spare-parts and parts to production?*

No, mainly because of two reasons:

It is impossible to implement a DC structure without first implementing the actions in the structure of today in order to gain control of the source list etc. and implement a e-commerce hub in order to create control and an efficient order handling system.

When the two solutions that we conclude is a prerequisite to the DC solution are implemented, the problems will already be solved and it will not be worth the effort to implement a DC solution.

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