

IT Support for Project Management

- affects on integration in a product development process

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Abstract

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- affects on integration in a product development process
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- Issue:** To create a supporting IT-tool for project management in an integrated product development process at global companies is a complicated task. The IT-tool must be embedded in the organisation, managing the information flow in a correct way, support the product development framework, be accepted and commonly used in the whole company. These aspects must be fulfilled if an IT-tool for project management should be able to support the integration in a product development process in a global company, for example at Tetra Pak.
- Purpose:** The theoretical purpose is to increase the understanding of how an intranet based support tool for project management affects the integration in a product development process in a global company.

The practical purpose is to identify the possibilities and limitations of the Project Management module in Tetra Pak Innovation Network (TPIN) and make suggestions on how this IT-tool can be improved to better support the integrated product development process for international projects in Tetra Pak.
- Method:** Business process has been used as the base element in this thesis. To narrow down this field, theories in integrated product development and information system have been used. By building this concept a focal point could be created. This focal point has then been divided into four essential elements. These elements were then applied to analyse how an intranet based support tool for project management affected integration in the product development process. This analysis was made by using a case company, Tetra Pak, and studying the creation of the IT-tool TPIN and how it has been used in two product development projects: one at Tetra Pak R&D and one at Tetra Pak Carton Ambient.

Conclusion: An intranet based support tool for project management does not create integration. Instead this type of IT-tool provides coordination through a common structure and terminology. If the IT-tool is intended to create both integration and coordination it will be stuck in the middle, since these two things requires different levels in detail and adjustment. Coordination requires that there is just one generic version that creates a company-wide structure. Integration on the other hand requires that each project can have their own detailed systems where all daily documents can be handled.

It is therefore important to make it clear that the project management module in TPIN is a tool that should provide a company-wide process that facilitates coordination. To create this clearness, daily documents should not be handled within TPIN and different versions of the project management module in TPIN must not be created in different parts of the company.

Keywords: Project management, information systems, integrated product development, business processes, integration, coordination, information management.

Acknowledgements

The saying; “*the only definite thing with a plan, is that it will change*”, has been obvious in our case. Looking back at where we started, it is amazing how many different shapes and different contents this thesis has had during the creation process.

Now when we are at the end of our project it all seems clear and easy to understand, but it took us quit a while to get there and a lot of collected material has been put aside before we were able to find the core of the subject.

First and most of all we would like to thank all the persons at Tetra Pak that we have interviewed, for taking the time to answer our questions and to help us to better understand how an intranet based project management tool can be used in product development. A special thanks to Jens Aggerbeck, for making this thesis possible, for your guidance, good advises and kind attitude.

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1 Introduction

In this chapter the problem is discussed. Thereafter the purpose of the thesis is presented. In order to fulfil this purpose a case company has been used, which is described at the end of the chapter. The chapter also includes a description of the structure of the thesis, which aims to work as a guide for the reader.

1.1 Background

It is a myth that products are developed by isolated genius working in their labs, who turn sudden inspiration into practical innovation. Not even in Thomas Edison's days this was true and it is certainly not true today. Talent and inspiration are necessary but not enough. To create and launch new products today many persons with many different skills are required. To do so cross-functional coordination, integration and a disciplined way of working is needed.¹

Innovation management includes two basic tasks. The first is strategy formulation: making fundamental decisions about technologies, products and markets.² This means doing the "right" things and is about; identifying opportunities, making choices, determining where, how, and with what frequency the company intends to compete with new products.³

The second basic task in innovation management is about transforming the strategy to output; doing things "right".⁴ It is within this part of innovation management the thesis at hand is focused. In product development this means how to turn the chosen ideas into reality in the most efficient way, in order to satisfy the customers needs⁵.

Traditionally a product development process is carried out in a sequential way, with the different functions involved working rather independently from each other⁶. A product development project that is sequentially performed often suffers from many costly and time-consuming changes towards the end of the project. The developed product might also be difficult to manufacture and to successfully launch on the market.⁷

Many kinds of concepts for organising the product development process and making the functions along the process more integrated have been proposed during the last

¹ Hammer, 2002, p.82

² Tushman and Nadler in Starkey, 1996, p.140

³ Grant, 1998, p.19

⁴ Tushman and Nadler in Starkey, 1984, p.140

⁵ Ulrich and Eppinger, 2000, p.108

⁶ Boer and Paashuis, 1997, p.79

⁷ Hakelius and Sellgren, 1996, p.3

years under terms as, concurrent or simultaneous engineering, integrated design and engineering, design for manufacturing, and lifecycle engineering. There are some differences but many more similarities between the various concepts.⁸ In the thesis at hand the term Integrated Product Development (IPD) will be used.⁹

In short, these new concepts can be achieved by introducing several persons with different competence early into the process, more options and problems can then be identified at an earlier stage and many problems and costly changes towards the end can be reduced. IPD requires a well functioning cooperation between different persons, functions and organisational levels in the company.¹⁰

The application of IPD is gradually becoming the norm for developing and introducing new products to the market place¹¹. At the Tetra Pak the ideas of an integrated work method started in the end of the 1980's. But the idea of IPD was not adopted at that time. The reason for this was that the concept was developed and presented within Tetra Pak R&D and not on a senior management level, which has the ability to present the idea company wide.¹² At this point of time there was no structure in the development work at Tetra Pak and the people involved in different product development projects had different definitions on what they were doing.¹³ The need for a common structured innovation process became more evident in the 1990's when many large and costly projects had to be closed at Tetra Pak. This time the new innovation process was initiated from senior management in cooperation with a consultant company.¹⁴

The main creator behind the structure of the innovation process that was applied at Tetra Pak was a professor in Technology Management that is responsible for Technology and Innovation Management at the International Institute for Management development in Lausanne. The innovation process at Tetra Pak is very similar to this proposed structure, even though many of the phases and the contents in the different phases have changed. The innovation process consists of six sub-processes, referred to as modules.¹⁵ It is within the Project Management module that the product development process is executed and it is in this module that it is secured that things are done "right". This module will therefore be in focus in the thesis at hand.

The work to develop an intranet-based project management module at Tetra Pak began in 1997, as a result of the initiation of the innovation process. A cross-

⁸ Boer and Paashuis, 1997, p.79

⁹ Olsson, 1995, p.44

¹⁰ Hakelius and Sellgren, 1996, p.4

¹¹ Ainscough and Yazdani, 2000

¹² Interview, Ralph Maleus, Process Owner – Project Management, 2003-02-04, and

Interview Per Nilsson and Andres Johansson, ADL 2003-04-16

¹³ Interview, Bengt Nilsson, Process Owner – TPIP, 2003-04-24

¹⁴ Interview, Ralph Maleus, Process Owner – Project Management, 2003-02-04

¹⁵ Ibid

functional task force was set to develop the project management module. The aim was to decide what should be done in the different phases in the project and to come up with a best practice in how to run product development projects at Tetra Pak.¹⁶

1.2 Problem discussion

Well-functioning integration between different parts of the company is essential for the product development process, especially between marketing, manufacturing and R&D. To be able to establish this cross-functional integration several critical elements have to be considered.¹⁷

1.2.1 The people and the organisation

The complexity and challenge of organising and leading development projects increases dramatically when a company grows larger. In large companies it is difficult to find the individual contributors in the project, due to the large number of development projects and geographical and organisational distance. It is often complicated even further by complex organisational structures, which makes it difficult to get an overview of the stakeholders, job definitions and reporting relationships in the development projects.¹⁸ Another complicating issue for a company is the paradoxical result of long periods of success, which may result in an increased self-satisfaction and tunnel vision in the organisation. Thus the longer the success lasts, the greater the internal forces for stability becomes and the organisational ability to learn and innovate decreases. This pattern is for example seen in organisations that for a long period of time have dominated a product class.¹⁹ From this point of view Tetra Pak's product development process is interesting to analyse, since the company for many years has dominated the carton segment of packages and has grown into a global company with a complicated organisational structure with different functions in different parts of the world.

The essential cross-functional integration in the product development processes increases the complexity even more.²⁰ Barriers arise among the functions, since the functions have different responsibilities and task priorities. Another barrier for cross-functional integration is that employees from different functions have different background and education. This leads to separate mindsets and make it difficult for the functions to understand one another's goals, solutions and tradeoffs. Even if they have the same overall goal their interpretation of the goals sometime differs.²¹

¹⁶ Interview, Ralph Maleus, Process Owner – Project Management, 2003-02-04

¹⁷ Ulrich and Eppinger, 1995, pp.3-4

Wheelwright and Clark, 1995, p.166

¹⁸ Wheelwright and Clark, 1995, pp.184-185

¹⁹ Tushman and Nadler in Starkey, 1996, p. 142

²⁰ Hovmark and Nordqvist, 1993, p.3

²¹ Beskow, 1997, p.24

1.2.2 Information management and supporting IT-tools

Due to the separate mindsets and geographical distance, terminology barriers occur. Each function uses their own terminology. Miscomprehension may then occur even though each group think they are talking about exactly the same thing. Subtle differences in terminology can make the difference between a successful and an unsuccessful project since the interpretation of critical information then differs.²² The barriers increase with the geographic distance between the functions and even more barriers are added if the functions are established in different countries, because of culture and language.²³ Another barrier for sharing information is information politics. To make cross-functional processes work efficiently information must be freely shared across functions and units. Because the information is sometimes considered as a source of power the employees are unlikely to share it.²⁴

In the project management part of innovation management it is essential to achieve integration and coordination between different functions.²⁵ In order to achieve this, an extensive amount of information sharing between different persons and functions is required. To support information management in product development a support tool can be used.²⁶

An IT-tool that is shared between marketing, manufacturing and R&D can increase the communication by creating a shared platform. This can lead to the creation of a common terminology that can be understood and used by employees in any company functions.²⁷

Tetra Pak has created an IT-tool called Tetra Pak Innovation Network (TPIN). The tool is designed to support the handling of information and documents in the innovation process. But it is also made to help visualising a structured framework and a best practice in how to work in the development process at Tetra Pak.²⁸

1.2.3 A structured development process

A framework can be described as a brief set of ideas for organising a process for a particular situation, describing reality without every detail of it. This helps people to identify topics that should be considered and to showing how these topics are related.²⁹ A common framework in the development process creates structure and makes things work faster and more efficiently because it helps people to understand what must be done, when and how. The framework also facilitates the essential understanding of how the elements work together and helps the communication. The

²² Griffin and Hauser, 1996, p.195

²³ Beskow, 1997, p.24

²⁴ Davenport, 1993, p.91

²⁵ Tushman and Nadler in Starkey, 1996, p.147

²⁶ Norell, 1992, p.8

²⁷ Öhrwall Rönnebeck, 1999, pp.67-68

²⁸ Interview, Ralph Maleus, Process Owner – Project Management, 2003-02-04

²⁹ Alter S, 1996, p.54

framework helps creating a shared language and structure, which is crucial for an effective development process.³⁰

The product development framework at Tetra Pak is described in the project management sub-process in the innovation process. The whole innovation process is called Tetra Pak Innovation Process (TPIP) and was initiated by a management consulting company that delivers solutions within innovation management.³¹ The following information was found at the consultant company's homepage.³²

“Performance Boost in Packaging

Arthur D. Little's Intranet-based PCP helped a large multinational packaging company to improve the yield of its development programmes dramatically and reduce its development lead-time by 40%. The company's original one-product strategy, though highly successful, was running out of steam. Diversifying into other product segments was proving difficult, especially given the geographically dispersed nature of the company. We refined the company's product creation process, developed new sub-processes (e.g. for strategy and planning), and migrated the revived innovation process onto the company's Intranet, which is now the working platform for creating new products.”³³

A structured way of working can be useful for a company that has adopted an integrated product development approach. This IPD approach increases the efficiency by highlighting the need of parallel activities and the need of cooperation between functions, levels and individuals in the company.³⁴ In order to work in a structured manner discipline is required. This discipline does not eliminate the need for individuality or creativity. In some cases it actually encourages creativity by providing a framework for individual work that allows each person to leverage their own activities. Structure ensures that the parts come together as a whole.³⁵

To spread the innovation framework and make it available for the participants in the product development process the intranet based solution TPIN was created.³⁶

³⁰ Wheelwright and Clark, 1995, p.162

³¹ Interview, Ralph Maleus, Process Owner – Project Management, 2003-02-04

³² www.adl.com, 2003-02-21

³³ Ibid

³⁴ Beskow, 1997, p.18-24

³⁵ Hammer, 2002, p.83

³⁶ Interview, Ralph Maleus, Process Owner – Project Management, 2003-02-04

“The functionality of the system can be further improved, both the usability and the implementation of the system needs continuous improvement. The biggest change of TPIN is done at the moment, this change where introduced in October 2002 when a new version of TPIN was released. TPIN has just begun to mature in the organisation and the vision for TPIN in the future is that it should create a proactive environment, with clearer time view that shows when different activities should start and also to show whom is responsible for this task or activity. This way a higher responsibility can be created. Today many activities are started too late in the process.”³⁷

1.2.4 Complications with a web based support tool

Although an IT-tool can reduce barriers for cross-functional integration in the product development process, the risks with implementing an IT-tool for this purpose must not be forgotten.³⁸ An information system cannot create a cross-functional process by itself, it is only a powerful resource. Changes in organisations need a careful combination of both technical and human enablers.³⁹ An IT-solutions itself are unlikely to become a competitive advantage, instead it is the organisations ability to develop and integrate IT and the employee into an efficient system.⁴⁰ If the information system and the organisation not are adapted to each other the information system becomes an island in the organisation. It is then impossible to take full advantage of the system.⁴¹

Another major problem is if the information systems do not solve the issues they are purposed to.⁴² The search for a best practise does sometimes involves solutions from consultants to make changes of the existing development process. But changes in mission-critical and complex processes as the development process is not simple since both the social and the technical systems have to be taken into account. Manipulation of one factor can have strong and unanticipated effects on other parts of the development process.⁴³

Many of the existing information systems in the marketplace are complex and difficult to modify. This leads to that companies sometimes are forced to change their processes in order to fit the package solution. Then the information system determines the process instead of just supporting the existing process.⁴⁴ Employees often resist changes in their working habits. To go from a decentralised free-for-all to a coordinated approach in information systems is a big change. This change requires much business management leadership.⁴⁵

³⁷ Interview, Ralph Maleus, Process Owner – Project Management, 2003-02-04

³⁸ Öhrwall Rönnebeck, 1999, p.60

³⁹ Davenport, 1993, p.95

⁴⁰ Wheelwright and Clark, p.243

⁴¹ Öhrwall Rönnebeck, 1999, p.59

⁴² Ibid

⁴³ Dooley and Johnson, 2001, p.32

⁴⁴ Davenport, 1995, p.7

⁴⁵ Cook, 1996, p.25

To create a supporting IT-tool for doing things “right” in a product development process at a global company is a complicated task. The IT-tool must be embedded in the organisation, managing the information flow in a correct way, supporting the development framework and, be accepted and common used. These aspects are critical to take into consideration if an IT-tool should be able to support an integrated product development process in a global company, for example at Tetra Pak.

When searching for theories about the affects an IT- tool can have on the integration in product development processes, there was not much to be found. The few articles that were found did not include both the creators and the users point of view of the IT-tools’ affect.

1.3 Purpose

The theoretical purpose is to increase the understanding of how an intranet based support tool for project management affects the integration in a product development process in a global company.

The practical purpose is to identify the possibilities and limitations of the Project Management module in Tetra Pak Innovation Network (TPIN) and make suggestions on how this IT-tool can be improved to better support the integrated product development process for international projects in Tetra Pak.

1.4 Delimitations

The concept development phase in a product development process is crucial and dependent on cross-functional integration. The research is therefore focused on this phase in the product development process. At Tetra Pak this means that only the Concept development phase in the Project Management module of the TPIP/TPIN was analysed. The other sub processes such as Strategy & Planning, Idea Management, Technology and Business intelligence, will not be analysed.

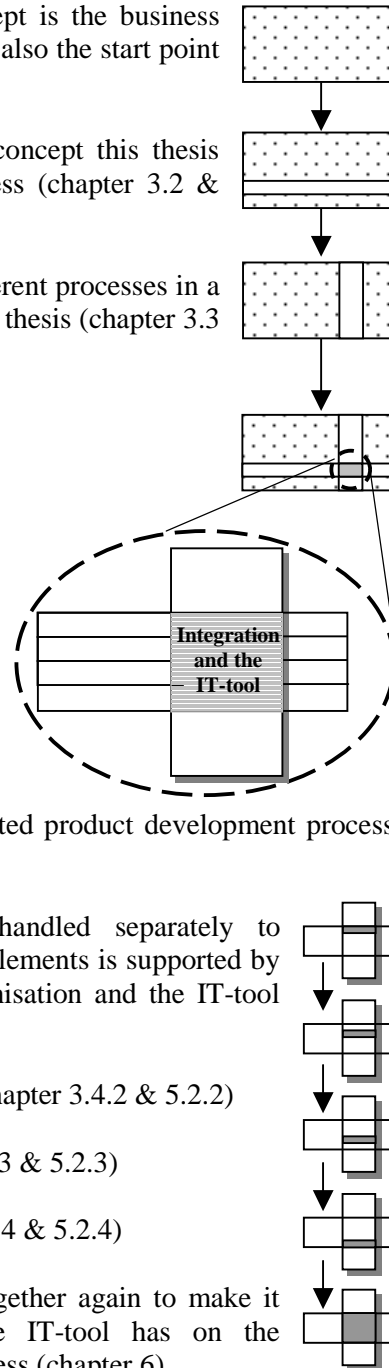
1.5 Target group for the thesis

The target group for this thesis are employees within Tetra Pak and, students and teachers within Technology Management at the Lund University.

1.6 Structure of the thesis

This chapter presents the structure of the thesis and should work as a guide for reader.

1. The basic element in the theoretical concept is the business process (chapter 3.1). Business processes is also the start point in the case study at Tetra Pak (chapter 4.1)
2. In order to further define the theoretical concept this thesis focuses on the product development process (chapter 3.2 & 4.2).
3. An information system can support the different processes in a company and is therefore highlighted in this thesis (chapter 3.3 & 4.3).
4. These two parts, the product development process and the information system, give the coordinates to the core of this thesis within the large field of theory about business processes. By starting in the surrounding fields in both the theory and in the case study has helped to create an understanding of the affects of the IT-tool (chapter 5.1).
5. The intersection point is then further focused to identify the critical elements that the IT-tool must support to help an integrated product development process (chapter 3.4).
6. Thereafter is each identified element handled separately to investigate how well each of these critical elements is supported by the IT-tool. It starts with the project organisation and the IT-tool (chapter 3.4.1 & 5.2.1)
7. Information management and the IT-tool (chapter 3.4.2 & 5.2.2)
8. The framework and the IT-tool (chapter 3.4.3 & 5.2.3)
9. Implementation and the IT-tool (chapter 3.4.4 & 5.2.4)
10. In the conclusion is these elements put together again to make it possible to understand what affects the IT-tool has on the integration in the product development process (chapter 6).



1.7 Presentation of the case company -Tetra Pak

Tetra Pak is one of the world's largest suppliers of packaging systems for milk, fruit juices and drinks, and many other products. Tetra Pak's vision is to "make food safe and available everywhere". Tetra Pak aims to achieve this by "working for and with their customers to provide preferred processing and packaging solutions for food".⁴⁶

Tetra Pak was founded in the early 1950s as a packaging company for liquid milk. In 1991, Tetra Pak expanded into liquid food processing equipment, plant engineering, and cheese manufacturing equipment. In 2002 Tetra Pak were able to provide integrated processing, packaging, and distribution line and plant solutions for liquid foods manufacturing.⁴⁷ Today Tetra Pak is a global company with 59 packaging material plants, 12 packaging machine assembly factories and 77 marketing companies across the world. The company has 20150 employees and the products are sold in more than 165 markets.⁴⁸

Tetra Pak includes four business areas: Carton Ambient, Carton Chilled, Plastics and Processing Systems, *see figure 1*. Tetra Pak has fibre-based and plastic based packaging. Tetra Pak's fibre-based packaging systems fall into two application categories: ambient and chilled. Carton Chilled is working with packages for pasteurised beverages whereas Carton Ambient offers aseptic solutions.⁴⁹ The market companies are divided into two regions; Tetra Pak Europe & Africa, Tetra Pak Asia & Americas.⁵⁰

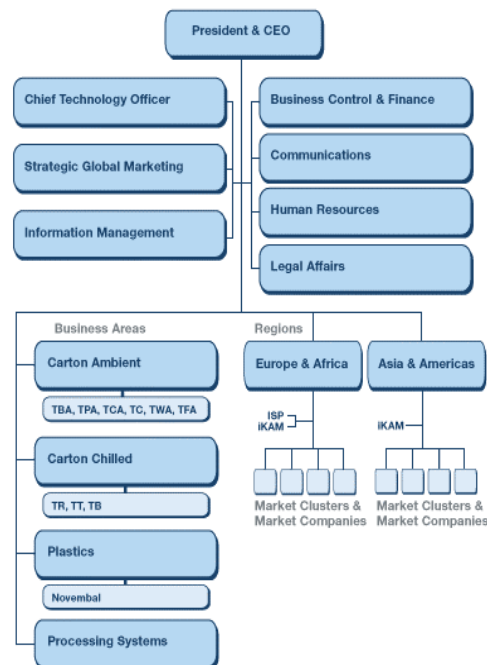


Figure 1: Tetra Pak's organisation⁵¹

⁴⁶ www.tetrapak.com, 2003-03-10

⁴⁷ <http://151.183.2.142/companypres/index.html>, 2003-02-05

⁴⁸ Ibid

⁴⁹ Ibid

⁵⁰ <http://151.183.1.200/director/markets/>

⁵¹ www.tetrapak.com, 2003-02-05

1.7.1 Research and development at Tetra Pak

Tetra Pak regards research and development (R&D) work on new processing, packaging, and distribution systems as an important method to retain its market leadership now and in the future.⁵² At Tetra Pak there is a central R&D organisation and decentralised R&D functions at the different business areas.⁵³ The thesis at hand is focused on product development in two organisations within Tetra Pak, the central R&D organisation, Tetra Pak Research & Development AB (R&D AB) in Lund and the development function at the business area Tetra Pak Carton Ambient (CA) in Modena (Italy). These organisations are therefore further described.

CA develops and manufactures packages and packaging systems for products that can be distributed without refrigeration⁵⁴. R&D AB is supposed to develop products and technologies that have a high degree of innovation, so that it is outside the responsibility of the existing business areas. Also if the products or techniques are developed on a long-term perspective it is done at R&D AB. Smaller variations and improvements on existing products are developed at the different responsible business areas, for example at CA. R&D AB is mainly stationed in Lund but has also functions in Switzerland, Germany and the USA.⁵⁵

The reason for having a decentralised R&D function at CA was that one product in the portfolio expanded to such great extent that the product required almost all of the development resources at Tetra Pak. By having an R&D function at CA in Italy, R&D AB in Lund was able to focus on developing new systems and technologies.⁵⁶

The central R&D function at Tetra Pak can be found under Chief Technology Officer in the organisational chart⁵⁷, *see figure 1*. Today there are three functions with aim to continuously interact through the idea creation process. The two departments Material Technology and Machine Technology are focusing on the technical aspects of package and systems development, whilst the third, Customer and Consumer Understanding & Package Design, is more directed towards the actual usage of the future packages⁵⁸.

⁵² <http://151.183.2.142/companypres/index.html>, 2003-02-05

⁵³ Interview, Kurt Sjödin, Portfolio Management, Tetra Pak R&D, 2003-03-11

⁵⁴ <http://151.183.1.200/director/org/businessareas/cartonamb/index.html> 2003-02-05

⁵⁵ Interview, Kurt Sjödin, Portfolio Management, Tetra Pak R&D, 2003-03-11

⁵⁶ Ibid

⁵⁷ Ibid

⁵⁸ <http://151.183.2.181>, 2003-02-05

2 Research Methodology

In this chapter the research strategy is described and a description of the research process is presented, as well as tactics and methods for data collection, interview techniques and data analysis. This research process does not show structure of the thesis, instead it shows how the research has been carried out.

The research problem presented in the thesis at hand was founded in issues that were identified at a pre-study at Tetra Pak. An initially wide focus gave an overview of the characteristics of the complex subject. By narrowing the focus three major theoretical areas became clear. The three areas were Business Processes, Integrated Product Development and Information Systems. Between them there are many different types of interrelations. By focusing on the point of intersection of the three fields, four important aspects were crystallised and found to be essential for further investigation in order to fulfil the purpose of the thesis.

2.1 Research Strategy and Research Paradigms

This thesis is based on a combination of research paradigms and has been placed between the positivistic and the hermeneutic research paradigm. This type of combination is often referred to as a systems approach⁵⁹. The systems approach is based on the existence of an objective reality, like the positivistic approach, but it is also based on that the relationship between the entities or individuals can add positive or negative effects to the whole, as the hermeneutic approach.⁶⁰

The system approach was a starting point in this thesis. A number of essential components had to be in place in order to establish an IPD process and also that the whole is the sum of the parts. But in contrary to this positivistic approach, every component also has an influence on the whole and that it would be misleading to ignore that different components can effect the system in different ways. In order to understand the interrelation between the different components, hermeneutic approaches were necessary, especially when interpreting interview material.

The principal purpose of a quantitative research method is to divide a phenomenon into components and variables that can be analysed. In this research the aim is to break down the studied object into components that can be measured and interpreted. This is visualised as the point of intersection in the model of the theoretical concept in chapter 3. The principal purpose of the qualitative method is to understand how those components and variables work together, to create an overall picture.⁶¹. By putting the components back together it was possible to study the relationship between them and

⁵⁹ Wallén, 1993, pp.34-37

⁶⁰ Nilsson, 1994, p.8

⁶¹ Merriam, 1994, p.30

by doing so a quality study with a systematic perspective was carried out. To visualise this research strategy the model of the theoretical concept is used in each chapter.

2.2 The Research Process

Tetra Pak has implemented an intranet based support tool to increase the effectiveness and efficiency of their product development process. This type of tool could also be found in other companies but not used to the same extent as in Tetra Pak. Since Tetra Pak is a global company it was founded to be a suitable case company for this thesis. In order to gain understanding in how the IT-tool had affected the process, two product development projects was studied at Tetra Pak that was using the intranet-based tool, TPIN. The Project Management module of TPIN was chosen for the analysis, since it was the most implemented part and was being most frequently used by most people at Tetra Pak.

Since it was important to retain theoretical flexibility in the research, early identification of research questions and possible constructs was only viewed as tentative⁶². During the research process there was constant interplay between empirical data and theory.

To enhance the quality of the thesis the researchers has identified a number of uncertainties that could undermine the validity and reliability of the research if they would not have been acknowledged. By using a method process influenced by Eisenhardt 1989 and other well-known and respected authors within the field. The aim with the process was to secure that the collection and interpretation of data was both valid and reliable.

The model of the research process is divided up into phases in order to help the reader to better understand how both theoretical and empirical data was handled in the research process, *see figure 2*. The aim with *figure 2* is to show the method approach and the research process of the thesis at hand. The model is not aiming to describe the structure of the thesis and how it is written, this is instead done in chapter 1.6. Thus all parts of the research process visualised in the model are not to be found in the thesis, since it would make it complicated and confusing to structure the thesis in the same order as the research process has been carried out.

⁶² Eisenhardt, 1989, p.536

The research process

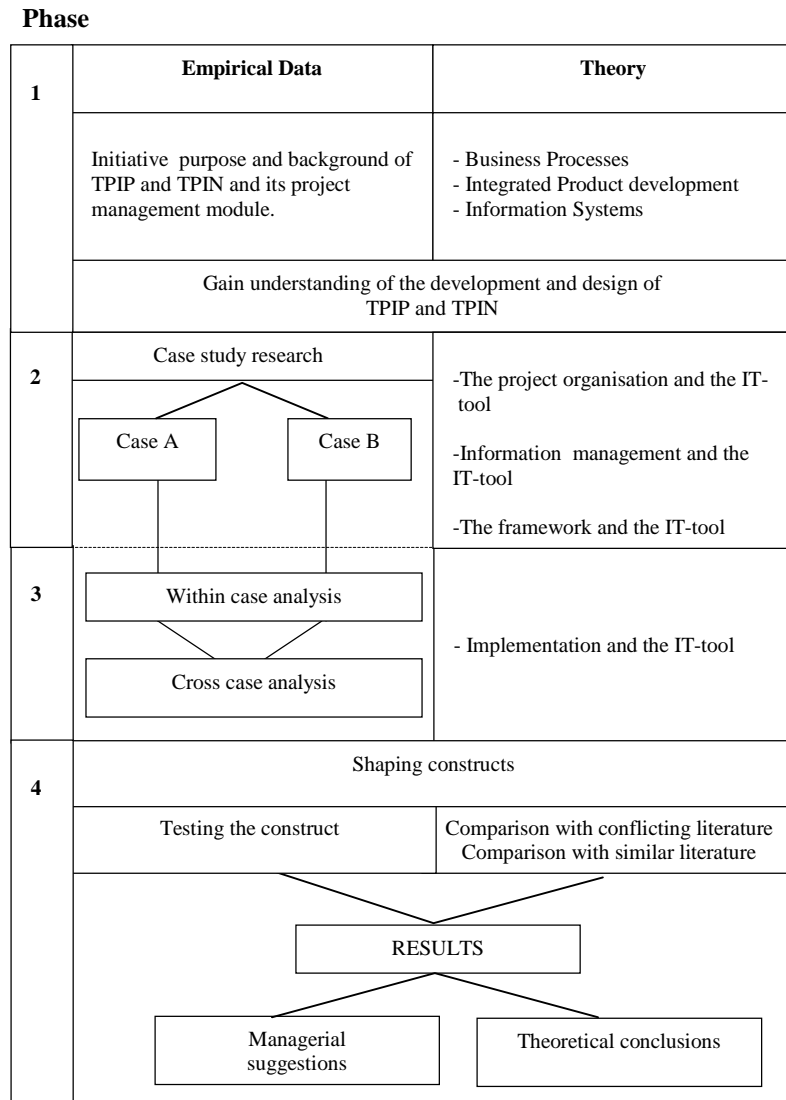


Figure 2: The research process⁶³

⁶³ Derived and modified after Eisenhardt 1989

2.2.1 Phase One – an exploratory study

The first phase of the research was an exploratory study, to become acquainted with the field that was to be studied and the case company Tetra Pak. To be able to establish a clear picture of the initiative purpose and background of TPIP and TPIN, interviews were carried out with management at Tetra Pak. This was also complimented with material from the external consulting firm that created the concept that laid ground for TPIP/TPIN.

The interviews in phase one were of semi-structured character, which means that the interviews were a mix of structured and unstructured questions. The structured questions were used to ensure that specific information was collected from all the interviewed persons. The unstructured questions allowed to respond to the situation at hand. By doing so unexpected results at the interviews could be further questioned and understood.⁶⁴ This semi-structured character was created by using questions such as; why, how and when was the new process developed and redesigned.

To be able to define concepts and plan the empirical collection it is essential to be familiar with earlier research and theories within the subject, it also important to be able to interpret results⁶⁵. Therefore the study began with an exploratory study of literature to be able to narrow it down to three theoretical fields. Studying the theoretical fields that TPIP and TPIN derives from helped to interpret the results of the data collection at the case study of Tetra Pak in phase one.

The aim of the literature reviewed in this phase of the research, was to create a perspective on the subject and to understand reasons behind the creation of TPIP and TPIN. Approved authors within the area of Business Processes (e.g. Hammer,2002), IPD (e.g. Wheelwright,Clark,1995, Ulrich, Eppinger,2000, Olsson, 1995) and Information System (e.g Alter S, 1998, Davenport, 1993,) was used. For further collection of data throughout the research, academic databases such as Elin and Lovisa were used. Additional theory data has also been found with the help of Tetra Pak Business Intelligence databases.

2.2.2 Phase Two – the use of the IT-tool

After studying the three main theoretical areas, three important aspects was surfaced that need to be in place in order to create an IPD process. By viewing these three aspects and the affect an information system can have on them a foundation on which the analysis was built.

⁶⁴ Strauss, 1990, p.7

⁶⁵ Merriam,1994, p.79

To avoid misunderstandings, the name of the aspects was modified in order to highlight the purposes of the aspects. These three aspects are:

- The project organisation and the IT-tool
- Information management and the IT-tool
- The framework and the IT-tool

The data in this phase was collected through both quantitative structured question, e.g. how many of the users could describe the purpose with TPIN, as well as qualitative unstructured questions, e.g. why could not the users describe the purpose with TPIN.

According to Yin, case studies are preferred when a “how” or “why” questions are being posed, or:

“when the investigators has little or no control over events, and when the focus is on a contemporary phenomenon within some real life context.”⁶⁶

A case study method was therefore suitable since it help to combine data from both quantitative and qualitative collection methods. As in this case combining quantitative data from structured interview questions with qualitative evidence from unstructured interview questions and observation⁶⁷.

An important aspect when conducting a case study is that the researchers have a high level of tolerance for ambiguity and indistinctness, have good communication skills and are aware of personal values⁶⁸. The authors of the thesis at hand were aware of this and had used similar methods in earlier papers.

The case projects

To test the theory two case projects using TPIN at Tetra Pak was investigated. By doing so a better grounding and understanding of how TPIN was used in reality at different types of development projects was created.

The case study research is grounded in real life situations and is therefore a holistic description of a phenomenon. It is important be aware of that a case study often can be disguised as a way of describing a complete picture while it only really explain a fraction of the complete situation.⁶⁹ To avoid that the constructs were built on insufficient results the reliability was secured by investigating more than one part of the company, but also by only building hypothesis on results that was pointed out of many interview persons. The validity was secured through asking persons that work

⁶⁶ Yin, 1984, p.13

⁶⁷ Eisenhardt, 1989, p.535

⁶⁸ Merriam, 1994, p.65

⁶⁹ Merriam,1994, p.46

intensively with the project management module in TPIN. But also by checking up the results with persons that have a company-wide overview of TPIN.

Case selection is central and should not be done at random. Selection of appropriate population controls irrelevant variation and helps to define the limits for generalizing the findings⁷⁰. That is why it is important to select appropriate cases when building theory from case studies⁷¹.

The two chosen case projects were both comparable and dissimilar in order to analyse important similarities and differences in the use of TPIN. The interview persons that this material is based on are project managers or sub-project managers in the projects. They represent both R&D AB and CA. R&D AB was chosen since they run the centralised product development projects and CA was chosen since they represent the dominating business area in Tetra Pak.

The two cases that the analysis of TPIN has been based on are described in *table 1* below:

Case	A	B
Using TPIN	Yes	Yes
Type of project	Product development	Product development
Current development phase	Concept Development	Concept Development
Machine platform	Modifying an existing CA machine	Modifying an existing CA machine
Package format	Existing	Existing
Critical technology	new material/sealing	new material/sealing
Responsible organisation	R&D AB (Sweden)	CA (Italy)
Test Market Region	The Asia/Americas	Europe/Africa
Start point	Market	Technology

Table 1. The cases companies

The data collection from the cases was made in form of tape-recorded interviews, meetings and on-site observations. The structured part of the interview questions is presented in Appendix 1. The interviews were of semi structured character as in phase one but were focused on how TPIN was used in reality, accordingly and contrary to the underlying purpose. The tape-recorded interviews were later transcribed into text, so that the interpretation of what had been said could not be mistaken or overlooked.

⁷⁰ Eisenhardt, 1989, p.537

⁷¹ Ibid

2.2.3 Phase Three – within case analysis and cross case analysis

The final analysis in a case study is formed during the data collection through continuous analysis. If there has not been continuous analysis during the collection of data the researchers risk ending up with indistinct information and extensive amount of data that cannot be analysed.⁷² Therefore a fourth aspect needed to be taken into consideration. Since the three other aspects together with an IT-tool can result in effects that cannot be describe from using the other three. The fourth aspect was to be called:

- Implementation and the IT-tool

The empirical material collected in this phase resulted in an enormous volume of data. The aim of this phase was therefore to crystallise the difference and similarities between the use of TPIN in the two cases. Therefore a within-case analysis was done. The within case analysis involved structuring and writing down descriptions of the different cases, this way the researchers gained familiarity with the data. Since this particular data is not critical for the reader, it is not to shown in the thesis, instead the results can be found in chapter 5.

“The overall idea is to become familiar with each case as stand- alone entity. This process allows the unique patterns of each case to emerge before investigators push to generalize patterns across cases.”⁷³

By using the data from the within-case analysis a cross-case analysis was carried out. With cross-case analysis it was possible to search for common patterns in the cases⁷⁴. By listing similarities and difference between the two cases the authors of the thesis at hand was forced to go beyond the initial impressions, and to look for the subtle similarities and differences between the cases, the results from the analysis can be found in chapter 5.

2.2.4 Phase Four – shaping constructs

According to Eisenhardt the central idea of shaping hypotheses is to compare theory and data, if there is a fit between them valid theory can be built. The shaping of hypotheses can be divided into two parts. The first part involves refining the definition of the constructs and the second is to build evidence that measures the construct in each case. This can be done by constant comparison between data and constructs so that collected evidence from diverse sources converges to one well defined construct.⁷⁵ When the constructs and the discussion in the thesis at hand were created this construct was tested on persons that were involved in and responsible for TPIN and thereby the construct’s validity could be secured.

⁷² Merriam,1998, p.137

⁷³ Eisenhardt,1989, p.540

⁷⁴ Ibid

⁷⁵ Eisenhardt, 1989, p. 541

When shaping constructs from qualitative data there is a risk of not having enough delimitations or that the material has not been continuously analysed which may lead to that the researchers try to solve everything.⁷⁶ In the thesis at hand the focus has been on the most central issues in the creation of the constructs, and put less relevant findings aside. Relevant findings that was beyond the scope of this thesis was put in the chapter for further research in chapter 6.

Comparing the finding with similar and conflicting literature can also test the constructs. This is important for two reasons. First if the researcher ignore the conflicting findings the confidence in the findings is reduced. Second it can result in deeper insight into both the developing theory and as well as sharpening of the limits for the theory to be generalised⁷⁷. When the thesis at hand was written, very little theory about the specific field was to be found. It was therefore difficult to compare the findings with similar and conflicting literature, and the authors of the thesis at hand had to be very open minded and critical toward the few already existing theories.

After this procedure the result was presented in two parts, the general theoretical conclusions and a specific suggestions to Tetra Pak.

2.3 Terminology

To make this thesis easier to read and to avoid misunderstanding, specific terms will be explained in Appendix 2. It was noticed at an early stage that terms and frequently used expressions within the organisation had varying meaning for different persons. To avoid misinterpretation during the interviews the researchers always clarified the terms beforehand.

⁷⁶ Merriam, 1998, p.137

⁷⁷ Eisenhardt,1989, p. 544

3 Theory

In this chapter the theoretical concept is described. The description starts with the surrounding fields and the intersection point is then further focused. Four different elements are presented within this intersection point. These elements are critical for understanding how an IT-tool affects integration in a product development process. This theoretical concept sets the structure for the rest of the thesis.

The theoretical topic that is put into focus in the thesis at hand is a web based project management tool for an IPD process. Little research has been carried out in this particular area and therefore a theoretical concept to investigate and explain this topic was developed.

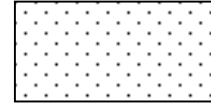
The basic element in the theoretical concept is the business process. In order to further define the theoretical concept, the IPD process and information systems (IS) have been put into focus. The integrated product development process is a process that requires cross-functionality. An information system can support the different processes in a company, thereby also the IPD process. These two parts, the IPD process and IS, gave the coordinates to the core of this thesis within the large field of theory about business processes. How an information system can support the critical elements in IPD processes is thereby the core of the theoretical concept and the point of intersection in *figure 3* below.

By investigating the surrounding fields and especially dig into the intersection point this theoretical concept identify the possibilities and limitations of a supporting IT-tool for managing an IPD process. This mapping makes it possible to further develop and improve the IT-tool and give suggestions on how it should be handled. The theoretical concept also clarifies how the integration in an IPD process is effected by an IT-tool.

The Business Process	IS	
The integrated product development	IT-tool for IPD	

Figure 3: The theoretical concept.

3.1 The business process



A process can be defined as an organised group of activities that together create a result of value to the customers. To create an efficient and effective process two major aspects have to be considered. The first is the “together” aspect, which involves integration between the people. The second aspect is the “organise” aspect, which involves coordination and discipline.⁷⁸

Since a process is focusing on end-to-end sequences of work, processes knocks down the walls of functional silos, eliminating handoffs and the errors, delays, and costs that this may lead to. By focusing on the customer and a common outcome, process thinking aligns everyone in an organisation and avoids the consequences of incongruent functional goals. The problem is that many companies do all the steps in a process but the individuals that do this work do not do it together, each function is instead focused narrowly on its own task. This means that the functions are not integrated.⁷⁹ To be able to increase integration and make people work together, intense two-way communication is essential.⁸⁰ Integration in the thesis at hand is defined as the connection, mutual responsiveness and collaboration between different functions and activities. The extent of integration can be related to the speed with which one respond to another. This speed depends on both the immediacy of communication and the degree that functions respond to the information communicated.⁸¹

Companies also often lack how they organise their processes, there is no coherent structure or any overarching framework and it is therefore likely that the process will be performed differently each time. By organising the process, people know how to come together to achieve the overall goal. Therefore the structure, discipline and design of the process are essential. The process design describes how all the individual units of work must come together to achieve this goal, by specifying what work is to be done, in what order, in what location, and by whom. By organising the process, coordination can be achieved.⁸² This coordination can be viewed as a way of combining a number of functions and actions. Coordination can secure that different tasks are completed at certain time and help making relevant information available to the decision-makers.⁸³

⁷⁸ Hammer, 2002, p.54-55

⁷⁹ Hammer, 2002, p.83

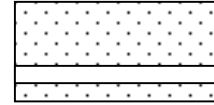
⁸⁰ Wheelwright and Clark, 1995, pp.176-179

⁸¹ Alter S, 1996, p.111

⁸² Hammer, 2002, pp.54-55

⁸³ Simatupang, Sridharan and Wright, 2002

3.2 Integrated product development



In IPD many different parts are involved and complex and jointly decisions have to be made. Because of this it is important to have a generic product development process that helps to facilitate integration.⁸⁴ Several authors refer to a product development process and there are often some slight differences in their processes and definitions depending on their perspectives. In this thesis the IPD process is presented as a result of several dominating authors in the area, such as Olsson, Ulrich and Eppinger, and Wheelwright and Clark, *see figure 4*.

IPD consist of parallel activities that has to be integrated with each other to create an efficient and effective product development process⁸⁵. The timing of the communication is essential; it must be made at an early stage to avoid mistakes in the later stages. By using an integrated problem solving the groups are linked in both time and pattern of communication. The downstream group use the insights to get a flying start on their work. But the classic relationship is that the downstream group does not start until the upstream group is completely finished.⁸⁶ The integration must therefore occur cross-functional to consider aspects from several perspectives. But the integration must also occur up- and downstream in the development process to avoid failures in later phases. To handle this integration in the product development process, both cross-functional and up-/downstream integration has to be considered, *see figure 4*.

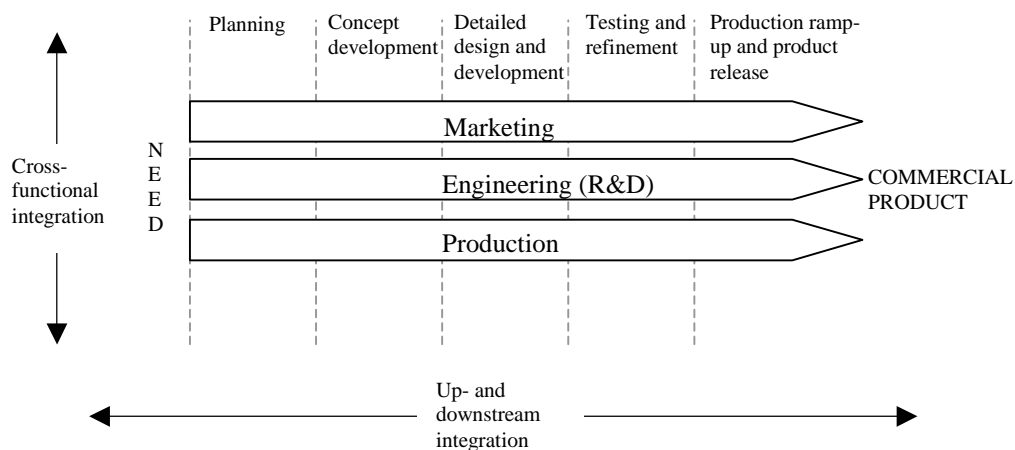


Figure 4: The IPD process⁸⁷

⁸⁴ Olsson, 1995, p.46

⁸⁵ Olsson, 1995, p.44

⁸⁶ Wheelwright and Clark, 1995, pp.176-179

⁸⁷ Modified figure from Olsson, 1995, p.45 and Wheelwright and Clark, 1995, p.173 and Ulrich and Eppinger, 1995, p.16

The integrated approach to product development means that the key activities are executed at the same time but with varying intensity. The integration should start at an early stage and results in shorter lead times in the development process.⁸⁸ But with what intensity and between which functions it should be, the opinions differ. The thesis at hand follows the line that integration between all the main functions at the same time is either counterproductive or not significant in all phases. This is because it is costly and takes much time to integrate and reach consensus between all the three functions. Instead the integration should be established through the focal function in each phase. This focal function can serve as a facilitator and coordinator for integration among the three functions. This integration pattern varies in the different phases of the development process, each phase has a unique productive and counterproductive integration structure.⁸⁹

3.2.1 The concept development phase

The concept development phase demands more integration across different functions than any other phase in the product development process. Therefore the design of the concept development phase must take many different activities into consideration. Customer needs have to be identified and translated into target specifications. Concepts should also be generated, selected and tested and the development team must commit to constraints inherent in the chosen concept. The final specification is thereby set in this phase. Project planning is also an important task in the concept development phase, since it should create a detailed development schedule with a strategy to minimise development time and identify the resources needed to complete the project.⁹⁰

In the concept development phase the integration between R&D and manufacturing is crucial to jointly define a set of producibility rules and agree on procedures and schedules. Integration between manufacturing and marketing is also critical because they often have conflicting goals. The focal function in this phase is manufacturing.⁹¹ See figure 5.

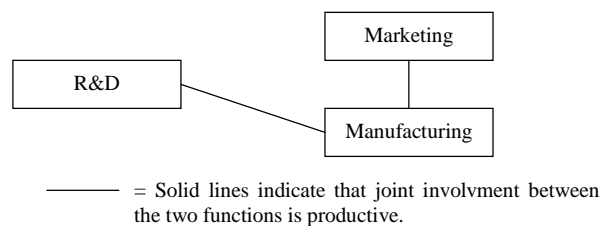


Figure 5: Cross-functional integration pattern in the concept development phase.⁹²

⁸⁸ Olsson, 1995, p.44

⁸⁹ Song and Thieme and Xie, 1998

⁹⁰ Ulrich and Eppinger, 1995, pp.18-20

⁹¹ Song, Thieme and Xie, 1998

⁹² Ibid

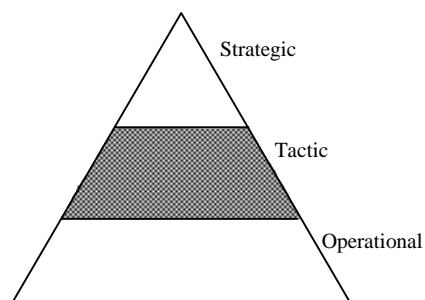
3.3 Information system



An information system is a part of the business process and has to consider the participants, the information and the information technology.⁹³

Information technology is the hardware and software that makes information systems possible. The information system uses information technology to capture, transmit, store, retrieve, manipulate or display information that is used in the business process.⁹⁴ An information system can be viewed at three levels: strategic, tactic and operational, *see figure 6*. On a strategic level the purpose of the information system is to provide management with sufficient information from tactic and operational levels.⁹⁵ The strategic information is then used to measure the organisation's performance and determine business objectives and plans⁹⁶. Information systems are today most common on operational level. On this level the system can reduce costs by standardising the handling of routine processes, for example administration system or CAD/CAM systems.⁹⁷

On the tactical level the purpose of the information system is to create competitive advantage through creating a more effective process, by doing things right, with the help of an information system. A Project management information systems can be found on this level⁹⁸. The information system can support a framework for multi-functional linkages and communication, which is essential for integration.⁹⁹



*Figure 6: Information systems.*¹⁰⁰

An information system can support the spreading of a best practice of how to do the work in a business process.¹⁰¹

⁹³ Alter, 1996, p.6

⁹⁴ Alter, 1996, p.2

⁹⁵ Brandt, Carlsson and Nilsson, 1998, p.69

⁹⁶ Fisher and Kenny, 2000, pp.207-222

⁹⁷ Brandt, Carlsson and Nilsson, 1998, p.69

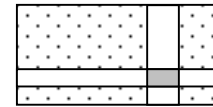
⁹⁸ Ibid

⁹⁹ Thamhain, 2003

¹⁰⁰ Brandt, Carlsson and R Nilsson, 1998, p.69

¹⁰¹ Alter, 1996, p.256

3.4 A supporting IT-tool for managing the integrated product development process



There are a number of models describing the important elements for introducing and maintaining an IPD process in a company. According to Norell there are three critical elements for obtaining an IPD process. The first element is the organisational aspect, which includes the people and their work procedures. The second element is the need of information management, which involves the information sharing between different activities. The third element is the need for tools that can support the integrated way of working and establish a common platform.¹⁰²

To establish a supporting IT-tool for managing an IPD process is a complicated task. The IT-tool has to consider the three critical elements of IPD and how they should interact with each other in a well-functioning way. This means that the IT-tool only works effective and efficient if it supports the three critical elements in obtaining an IPD process. In the thesis at hand these elements are referred to as project organisation, information management and framework.

To be able to understand the IT-tool's role for managing the integration, it is important to understand how and when it is used in the product development process. Therefore it was necessary to highlight the IT-tools affect on the users and how well it was implemented. This fourth aspect is therefore named implementation, *see figure 7.*

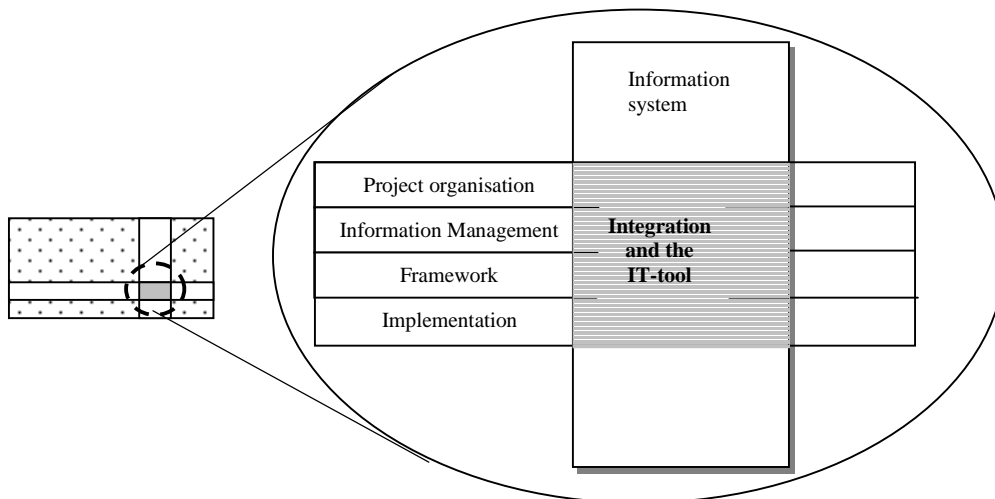
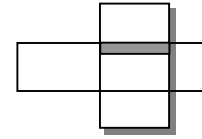


Figure 7: Integration and the IT-Tool

¹⁰² Norell, 1992

3.4.1 The project organisation and the IT-tool



An information system can support either control or empowerment in an organisation. It can supply employees with information that enables them to make their own decisions or with instructions that dictate precisely how to perform each step in the process.¹⁰³ Implementation of an information system depends on whether the users are willing and able to change to the new way of doing things.¹⁰⁴ A product development process is complex and therefore it is important to analyse what affect the IT-tool has on the different organisational roles in the product development process; how much empowerment and control it should give the different participants in the organisation.

The development of the IPD process involves changed working conditions for the employees. When IPD is applied there are more demands for integration between different disciplines and the members of different functional areas.¹⁰⁵ The employees involved in product development processes are often not used to systematic change to increase effectiveness and the effects of the changes are more difficult to measure and reward. This may lead to complicated emotional reactions to the change.¹⁰⁶

The heavyweight project team structure is often suggested in literature as a part of the solution to improve the product development process. This structure improves communication, commitment to the project and focus on cross-functional problem solving.¹⁰⁷ A heavyweight project organisation is a form of matrix organisation, which means that the people are linked to each other according to both the project they work in and the functions they belong to. In a heavyweight structure the project connections are strong and the project managers has a strong management profile and are equal to functional managers. This structure is rare in larger and mature organisations. These organisations are instead functional, which often results in a sequential development process without a well functioning coordination and integration. When companies with strong functional organisation want to improve their coordination between the functions in product development they appoint an administrator or coordinator to be the project manager. This person is responsible for the coordination of the different functions in the projects. This results in a lightweight team structure where the functional managers have more power than the project manager.¹⁰⁸

This choice between strong project links or functional links is a trade-off between deep functional expertise and coordination efficiency. This means that a single organisational structure cannot be used on every form of development project.¹⁰⁹ A heavyweight team structure is in focus in this thesis, since heavyweight creates

¹⁰³ Davenport, 1993, p.105

¹⁰⁴ Alter, 1996, p.31

¹⁰⁵ Hovmark and Nordqvist, 1993, pp.5-6

¹⁰⁶ Rehndahl, 1996, p.30-35

¹⁰⁷ Wheelwright and Clark,1995, p.200

¹⁰⁸ Wheelwright and Clark,1995, pp.192-195

¹⁰⁹ Ulrich and Eppinger, 1995, pp.28-31

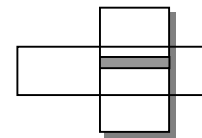
stronger connections than the lightweight team structure between the participants. These strong connections facilitate integration in the project.¹¹⁰ This integration is needed to be able to not just schedule the different activities optimal but also facilitate a mutual cooperation between the functions.

It is not only the project manager that has the responsibility for the coordination and integration in the project, this is also the team member's responsibility.¹¹¹ It is important that there are persons responsible for that the process is followed if the process is going to be common used and spread throughout the company¹¹². To work in a heavyweight team requires more responsibility than a usual functional assignment. The team members have not only the responsibility for their function in the project but also for overall team result of the project. This overall responsibility and the ability to make their contributions where it is most needed in the project is a critical aspect to make the heavyweight teamwork efficient.¹¹³

Cross-functional product development teams and strong leadership through heavyweight project management have proven to be highly effective for developing integration between functions.¹¹⁴ Heavyweight teams require qualified leaders. If the heavyweight team structure should be effective the project manager must take an active role coordinate the functions that are represented in the team. The project managers must also be in motion and visible for the project members and making sure that the translation and communication goes on between the functions, particularly between customer needs and product specifications. The project manager should also be the concept guardian and confront conflicts; not only react and respond to the interest of others, but also ensure that the choices that are made are in line with the basic concept.¹¹⁵ It is also the project manager's role to bring the strategic management perspective down to the tactic level in the project.¹¹⁶

3.4.2 Information management and the IT-tool

The development process can be seen as an information processing system. The process begins with several inputs such as the corporate objectives, capabilities of available technologies, product platforms and production systems. A number of activities process the outputs, which are the development information, formulating specifications, concepts and design details. The process ends when all the information required for supporting production and sales has been created and communicated.¹¹⁷



¹¹⁰ Ulrich and Eppinger, 1995, pp.28-31

¹¹¹ Wheelwright and Clark, 1995, pp.204-212

¹¹² Hammer, 2002, p.83

¹¹³ Wheelwright and Clark, 1995, pp.204-212

¹¹⁴ Grant, 1998, p.289

¹¹⁵ Wheelwright and Clark, 1995, pp. 204-212

¹¹⁶ Tushman and Nadler in Starkey, 1996, p.145

¹¹⁷ Ulrich and Eppinger, 1995, p.15

Spreading the information about what is going on in other departments gives the employees an increased knowledge about other functions situation and work result. An increased information flow helps people to understand and value other's work. It also helps them to think in new perspectives, listen better to arguments and taking more aspects into account.¹¹⁸

One way to increase cross-functional integration is by putting people at the same location and to let them work together for the same manager. But some departmentalisation is usually necessary and that way everyone cannot work for the same manager all the time.¹¹⁹ In order to create integration there needs to be an information flow between functions, a project management information system can be used for improving the communication through documenting information that can be spread across the organisational boundaries.¹²⁰ But even though an information system can make information available and easy to reach for everyone in the product development process, a common situation is that tools and databases are more or less spread in the company, with no or little interaction between them.¹²¹

Communication is the process that facilitates information exchange and makes the information clear and understood by others.¹²² Information management processes should include the whole information "value chain". The value chain starts with definition of information requirements; the following steps are collection, storage, distribution, receiving and use of the information. The information must be considered as a part of the process to strengthen the relationship between the information provided and the decisions and actions that are executed. Information management is often neglected and only the information technology is being seriously managed.¹²³

User friendliness is an important factor for an information system, which is often not taken enough into consideration. The user should be able to use it with minimal start-up time and training. User-friendly technologies are more productive because people waste less time and effort struggling with things that gets in the way of doing work.¹²⁴ To handle the problem with user friendliness much training and information to the employees is needed, as well as participation in the development work of the information system. But these human factors are often missed and the focus is instead on the technical issues and how to get "most functions for the money". This results in a complex system that only a few employees can use correctly. This means that there is a great risk that employees that should use the information system do not use it or us it in the wrong way.¹²⁵

¹¹⁸ Öhrwall Rönnebeck, 1999, p.67-68

¹¹⁹ Cook, 1996, pp.26-27

¹²⁰ Amami, 2000

¹²¹ Öhrwall Rönnebeck, 1999, pp.61-62

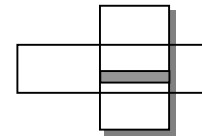
¹²² Öhrwall Rönnebeck, 1999, p.48

¹²³ Davenport, 1993, pp.83-86

¹²⁴ Alter, 1996, p.256

¹²⁵ Öhrwall Rönnebeck, 1999, p.58

3.4.3 The framework and the IT-tool



A well-defined development process is valuable for the cooperation since it coordinates the different members of the development process and tells them when their contributions will be needed and with whom they need to cooperate.¹²⁶ To ensure the quality of a business processes it should be performed by using best practices, the best-known way to do the work. Although individual experts may be able to perform tasks better than anyone else, companies trying to use best practices are not looking for tasks performed in superior manner. Instead the companies are looking for repeatable, structured business processes that reliably generate excellent productivity, quality and responsiveness.¹²⁷ Information systems can help to bring structure to the process. Whether or not the overall process is repetitive, people doing repetitive tasks never has to guess about how to do them. Instead they can devote more of their time and effort to the creative part of their work.¹²⁸

The use of predetermined decision points/levels can also be a good support to have control over the project and decide if the development process should continue and in what direction.¹²⁹ To secure cross-functional integration it is important to view the end of each phase as an integrated milestone that looks at the progress of an emerging system, and not only a product. The emerging system includes for example engineering design, marketing and manufacturing development.¹³⁰

To manage the IPD process as efficient and effective as possible a framework is needed which defines the sequences in the process and explains the information that is required to execute and control the process. Also to structure the organisation and define which tasks the people must carry out. Many companies do not have an effective and commonly understood process. In other companies there are so many detailed procedures that no one understands or can handle all of them. If the framework is too bureaucratic it slows the work down and many persons will then ignore it and do the work in their own way instead. If this happen it leads to confusion, rework and delay but if the framework is operating properly it can have a powerful impact on performance.¹³¹

Most product development processes are complex and therefore need discipline. The product development process involve many decision and many different people with competing interests and multiple objectives. The use of phases, clear criteria for moving forward and testing procedures are an effort to bring structure and transparency to the process. These procedures, phases and rules must be streamlined, appropriate and adaptable so they do not get in the way for creativity and

¹²⁶ Ulrich and Eppinger, 1995, pp.14-15

¹²⁷ Alter, 1996, p.256-257

¹²⁸ Ibid

¹²⁹ Olsson, 1995, p.44

¹³⁰ Wheelwright and Clark, 1995, p.173-175

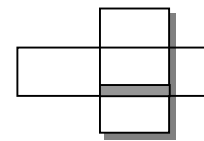
¹³¹ Wheelwright and Clark, 1995, p.133-134

excitement.¹³² The actual operation of business processes often differs from the idealised process. Different participants may perform the same steps different because of different skills, training and motivation.¹³³ But discipline is crucial to achieve the thoroughness and consistency that is required in the development process.¹³⁴

It is essential to establish a fit between the development framework and the competitive, market and technical imperatives that confront the projects. Companies may face several environments and need more than one approach to development.¹³⁵ This fit between the framework and the environment it is used in therefore has impact on how it is developed in different parts of the organisation.

3.4.4 Implementation and the IT-tool

A fourth main factors have to be considered when implementing IPD and that is the implementation itself.¹³⁶



Traditionally organisations are structured around departments that are each focusing on one individual task without caring about related work in other functions. This leads to each function speaking its own language.¹³⁷ It is important that everybody has an overview of the process, because it helps the employees to view their work as part of a whole and therefore simplifies the understanding between people involved, which facilitates cross-functional cooperation.¹³⁸ With a process that is broken into disconnected pieces, each hidden in a separate department, no one is in position to see the end-to-end process. Sharing neither a common vision nor a common terminology the different functions will communicate in an insufficient manner leading to mistakes that later requires rework.¹³⁹ The communication between the earlier and later involved groups is a critical element of the cross-functional integration in the product development process.¹⁴⁰ The transition from an idea to an implemented solution in the operating organisation is a crucial part of the product development process. It is the link between two organisations and requires that the company have a process for transitioning ideas from the innovative organisation to the operational.¹⁴¹

Unless a mechanism, for example an intranet based support tool, is put in place to modify information flow so that it moves from group to group throughout a phase rather than just at the end, nothing changes operationally. Although personnel are assigned earlier to subsequent tasks, they only start tasks if information is actually available. If no mechanism is adopted by which early information gets transferred, no

¹³² Wheelwright and Clark, 1995, p.162

¹³³ Alter, 2003

¹³⁴ Wheelwright and Clark, 1995, p 162

¹³⁵ Ibid

¹³⁶ Hovmark and Nordqvist, 1993, pp.5-6

¹³⁷ Hammer, 2002, pp.56

¹³⁸ Beskow, 1997, pp.18-24

¹³⁹ Hammer,2002, pp.56

¹⁴⁰ Wheelwright and Clark, pp.176-179

¹⁴¹ Tushman and Nadler in Starkey, 1996, p.170

information is available and tasks do not actually commence.¹⁴² If the work is just linked in time without information exchange the groups will only work parallel, which may result in a lot of rework. This is called an early start in the dark and the upstream group communicates only in the end of its work, the downstream group may be surprised by the design and must adjust its work to the upstream group, *see figure 8*. The net result may even be a longer development process than without the parallel work because of the rework. It is first when the both groups are engaged in a two-way communication it begins to move toward real integration. Computer-based presentations are not enough to establish integrated problem solving; it must also include face-to-face meetings, direct observations and prototypes.¹⁴³

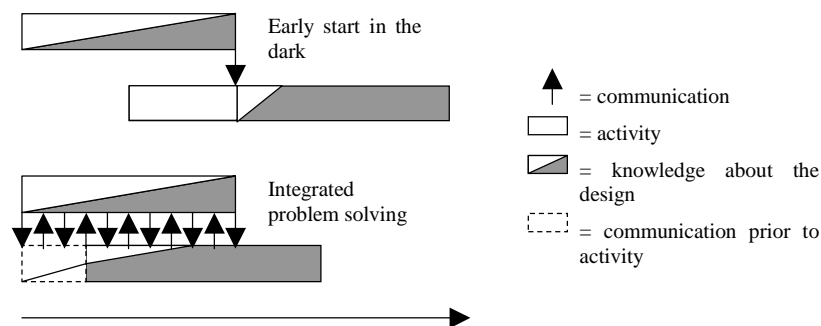


Figure 8: Communication between up- and downstream groups.¹⁴⁴

An intranet solution that is shared in common between marketing, manufacturing and R&D can increase the communication and serve as a platform for the distribution of information. Such a shared platform can lead to the creation of a common terminology that can be understood and used by employees in any company function. But an intranet platform can never be a substitute to face-to-face meetings, only a complement. But on the other hand the intranet platform can increase the face-to-face communication by facilitating job rotation and relocation of people because of the whole company is using the same graphical user interface.¹⁴⁵

An intranet-based tool can therefore be used to create a common platform for up- and downstream communication in the product development process. But to implement an IT-tool company-wide is a complicated task.¹⁴⁶

In order to make an intranet solution work the employee must use it. Implementation activities includes planning, training the users, conversion to the new work methods, and follow-up to ensure the entire solution operates as it should. After participants are trained, the actual conversion to the process occurs. This usually raises issues about

¹⁴² Griffin and Hauser, 1996

¹⁴³ Wheelwright and Clark, pp.176-179

¹⁴⁴ Ibid

¹⁴⁵ Öhrwall Rönnebeck, 1999, p.67-68

¹⁴⁶ Alter, 2001, pp.15-16

how to convert to a new process with minimum pain and how to deal with political questions and changes in power relationships.¹⁴⁷ There is a risk that the purpose with a best practice can be changed or indistinct when it is being applied in different parts of an organisation due to institutionalisation. Thus it will not solve the problems that it was intended to or even being used in the wrong situations. This aspect is important to consider when an IT-tool for managing an IPD process is being used company-wide.

To be able to spread an idea company-wide, for example a common framework in the product development process, it must be separated from its institutional surroundings and be translated into an object such as text, a picture or a prototype, for example an intranet solution. When the object travels through the organisation and meet a new environments it is translated to fit the new organisations and is turned into action locally, thereby it becomes institutionalised.¹⁴⁸

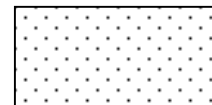
¹⁴⁷ Ibid

¹⁴⁸ Erlingsdóttir , 1999, p.233.

4 The case study at Tetra Pak

This chapter starts with the process orientation at the case company Tetra Pak. Thereafter the innovation process, TPIP, is described with the focal point on project management. Followed by description of the IT-tool that supports the innovation process, TPIN, with focus on its project management module. The aim with the chapter is to give the managers and creator point of view of how the process TPIP and the IT-tool TPIN are designed and the purpose behind the solutions.

4.1 The business process at Tetra Pak



At Tetra Pak the process orientation was at an initial phase when this case study was carried out. By 2004 Tetra Pak has scheduled to start implementing this way of working throughout the whole company. The goal with the process orientation at Tetra Pak is to view the work from a customer perspective and focus on activities that adds value to the customer and thereby increase competitiveness. The value added activities will be measured in terms of cost, quality, time and innovation. Eight core processes have been defined at Tetra Pak¹⁴⁹, see figure 9.

Tetra Pak's initial focus will be on the three Core Process deemed to be the most important to implement; Innovation, Industrialisation and Order fulfilment capital equipment.¹⁵⁰ The innovation process, TPIP, is the most developed core process and has already been in use for some years.¹⁵¹ The innovation process is also visualised and supported with an IT-solution, TPIN.

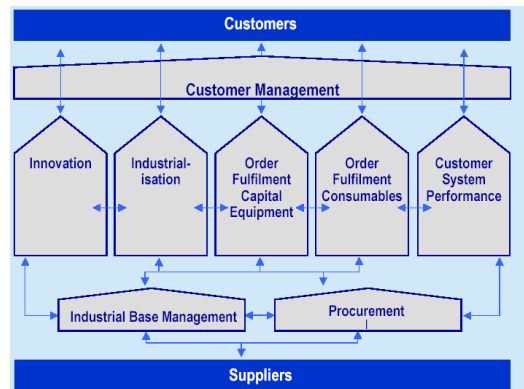


Figure 9: Tetra Pak's eight core processes.¹⁵²

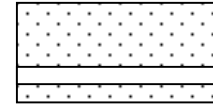
¹⁴⁹ Letter from Global Business Development, "Global Process Owners In Place", January 2003

¹⁵⁰ Letter from President & CEO, "Tetra Pak Process Model", July 2002

¹⁵¹ Tetra Pak Innovation Process Newsletter, October 2002

¹⁵² http://151.183.23.110/globalimsupport/rscs/attached_docs/Global_Process_Owners_In_Place.pdf

4.2 The innovation process at Tetra Pak



In 1998 Tetra Pak developed an innovation process with the aim of securing growth and customer satisfaction. This process was called Tetra Pak Innovation Process (TPIP) and was made to be a cross-functional management process.¹⁵³ The main purpose with TPIP was to establish a more efficient development process that would increase the possibility of developing the right things and by doing so decrease the risks in the different development projects.¹⁵⁴ According to Tetra Pak Innovation Process Newsletter TPIP has produced a number of benefits for the organisation, for example common goals, language and understanding, transparency in planning and execution and a good balance between creativity and a structured way of working.¹⁵⁵

One of the reasons for the development of TPIP was that the organisation was adopting to a more process oriented way of working. During the mid 1990's many ideas around business process reengineering was presented and influenced Tetra Pak. The development process became central

and the need for a structured development process became clear. The idea behind the development process was initiated from senior management in cooperation with a consulting company.¹⁵⁷ The aim with the solution from the consulting company was to help Tetra Pak to align and integrate the key dimensions in innovation management¹⁵⁸, see figure 10. The structure of the process was then refined to better fit Tetra Pak's organisation¹⁵⁹, see figure 11.

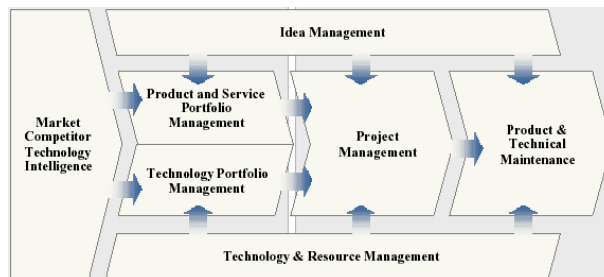


Figure 10: The original innovation process model¹⁵⁶

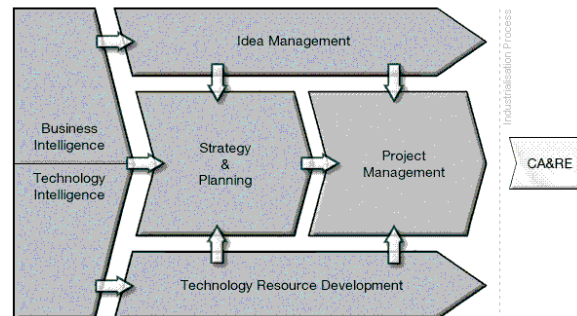


Figure 11: Tetra Pak Innovation Process¹⁶⁰

¹⁵³ Tetra Pak Innovation Process Newsletter, October 2002

¹⁵⁴ Interview Bengt G. Nilsson, Process Owner – TPIP, 030424

¹⁵⁵ Tetra Pak Innovation Process Newsletter, October 2002

¹⁵⁶ www.adl.se, 2003-02-21

¹⁵⁷ Interview Ralph Maleus, Process Owner - Project Management, 2003-03-04

¹⁵⁸ www.adl.se, 2003-02-21

¹⁵⁹ Ibid

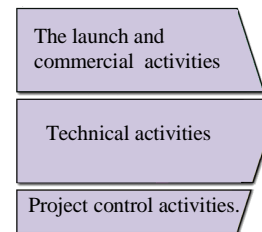
¹⁶⁰ <http://151.183.1.136/>, 2003-02-05

The generic model of TPIP was meant to be universal so it was applicable for all innovation processes at Tetra Pak and at the same time create value for the users. In order to accomplish this Tetra Pak has made TPIP more suitable for many different projects and parts of the organisation. This has been done by creating different versions of the product development process in TPIP, in order to better fit different situations. Some of this has been done on a local level, for example CA has done an own version of the generic TPIP product development process.¹⁶¹

4.2.1 The project management process

When this study was made, TPIP consist of seven sub-processes, the project management process was one of these. The project management module was the executing part of the innovation process. The aim was to execute strategies and planes in an effective way and by doing so create management control. The purpose behind the project management process was to develop a product creation process with the intention of taking many functions into account in the product development process. The purpose was also to provide an overall picture of the process to the different organisational parts.¹⁶²

The project management module's aim was to manage the project effective and to create control. The module was primarily designed for those involved in the projects. This means that all the competences needed in a project, such as technical, commercial, production and project management should use it. Therefore the different phases in the project management module was split into three parts: the commercial, the production/technical and the project management part, *see figure 12*. The aim was to spread a best practice that shows what different tasks that should be included and not to control which organisational functions that should be involved.¹⁶⁴



*Figure 12: Aspects in project management.*¹⁶³

“The aim was not only to use it as a project management tool or to only use it as a management control tool by senior management. The project management module was also meant to create value for all the project members.”¹⁶⁵

The Project management process consists of five phases with defined objectives and transition criteria, *see figure 13*. The process should results in a validated product that is documented and transferred to the receiving organisation or process.¹⁶⁶

¹⁶¹ Interview Ralph Maleus, Process Owner - Project Management, 2003-03-04

¹⁶² Ibid

¹⁶³ Simplified picture of a phase in Project Management, in TPIN.

¹⁶⁴ Interview Ralph Maleus, Process Owner - Project Management, 2003-03-04

¹⁶⁵ Ibid

¹⁶⁶ <http://innovation.tetrapak.com/mainframe.asp>, 2003-02-26

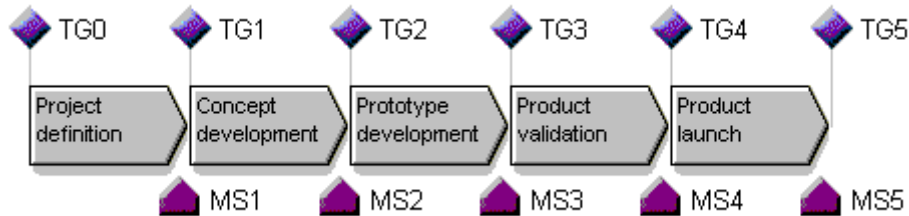


Figure 13: The project management process in TPIP¹⁶⁷

Tollgates and milestones were introduced about the same time as the project management module was presented in Tetra Pak. Before that Tetra Pak did not have tollgates and milestones in different phases, the projects only had a start and a finish and not this type of management control.¹⁶⁸ The tollgates are decision points where it is decided if the project should continue and move into the next phase or if it should be terminated. The decisions are based on a set of predefined criteria. The milestones are crucial points in time in a project where certain targets have to be accomplished and certain decisions has to be taken. The milestones can be independent of project phase transitions and are a project management tool.¹⁶⁹

CA was first out with management control and adopted the concept with tollgates and milestones in 1996. The project management module was then naturally built on these principles.

“Projects that needed to be stopped in an early phase were difficult to identify. Now there is control over the different tasks conducted in the different phases and a go or no go decision can be done in each phase.”¹⁷⁰

In the thesis at hand the concept development phase in the project management process will be further described, since the different commercial, technical and project management aspects and input / output from this phase are crucial for achieving integration in the project.

¹⁶⁷ <http://innovation.tetrapak.com/mainframe.asp>, 2003-02-26

¹⁶⁸ Interview Ralph Maleus, Process Owner - Project Management, 2003-03-04

¹⁶⁹ <http://innovation.tetrapak.com/Help/Wordlist.asp?Search=1>, 2003-02-05

¹⁷⁰ Interview Ralph Maleus, Process Owner - Project Management, 2003-03-04

4.2.2 The Concept Development phase¹⁷¹

The concept development phase starts when the project has passed tollgate 1, *see figure 14*. The objective of the concept development phase in TPIP is:

“To show that the project objectives are achievable. The concept development phase develops the full technical concept, describes the business concept and the final product plan”.

The project planning is carried out in the concept development phase with the aim of describing what should be done in the project, this is done bottom-up, all necessary documents are collected and signed.¹⁷² The phase consists of three parts, just as all the other phases, and the activities in these parts of the phase are:

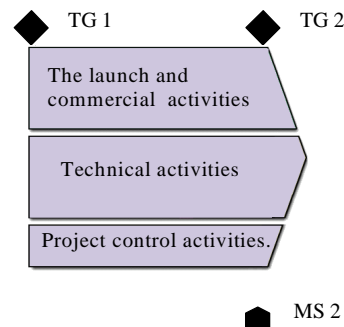


Figure 14: Simplified concept development phase from TPIN¹⁷³

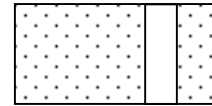
1. The launch and commercial activities: Develop a final product plan and investigate consumer preference and verify market acceptance, a preliminary launch plan should also be developed.
2. The technical activities: Test, choose and develop the product concept and identify capabilities and bottlenecks in the production process. The product and its boundaries should be completely described, including product layout and specification for machinery, material, converting and processing.
3. The project control activities: Plan activities to achieve the milestone 2 definitions and update the project plan. Update project risks including commercial risks, technical risks and project risks.

¹⁷¹ <http://151.183.1.136/>, 2003-02-05

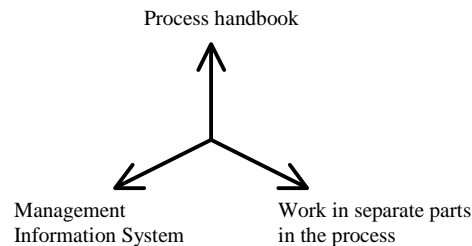
¹⁷² Interview Ralph Maleus, Process Owner - Project Management, 2003-02-04

¹⁷³ Modified concept development phase from TPIN.

4.3 Tetra Pak Innovation Network



To spread the innovation process (TPIP) and make it available for the users an intranet based tool called Tetra Pak Innovation Network (TPIN) was created.¹⁷⁴ The purpose was to create an integrated way of working through TPIP and TPIN was the tool developed for reaching out with this purpose.¹⁷⁵ TPIN provided this through visualising the process and its related sub-processes and activities¹⁷⁶. TPIN's purpose can be divided into three main parts:¹⁷⁷



See figure 15.

Figure 15: The purposes of TPIN.¹⁷⁸

1. A process handbook, which can be used as a quality manual and a way to show the interrelation between the parts in the process.
2. A Management Information System that provides strategic information about the ongoing projects such as cost and time.
3. Provide a way to work in a separate parts of the innovation process.

“In some cases you don’t even have to know what the process looks like to be able to follow it. You do not have to look through several binders describing the process to understand what you are supposed to do at a certain moment. Instead you can click onto TPIN and start working right a way.”¹⁷⁹

TPIN allows senior management to get an overview of the project while the project managers and project members can increase their understanding of how work is being done outside the project.¹⁸⁰

TPIN was tested on eight pilot projects. By doing so both problems with the process was surfaced as well as problems using the information system. Both the process and the information system were then changed simultaneously. The objectives were then set, for example what and how much information that should be taken into

¹⁷⁴ www.adl.com, 2003-02-05

¹⁷⁵ Interview Bengt Nilsson, Process Owner – TPIP, 2003-04-24

¹⁷⁶ Tetra Pak Innovation Process Newsletter, October 2002

¹⁷⁷ Interview Johan Eriksson – System owner for the innovation process, 2003-04-16

¹⁷⁸ Ibid

¹⁷⁹ Interview Per Nilsson and Anders Johansson- Management Consulting, ADL 2003-04-05

¹⁸⁰ Interview Johan Eriksson, System owner for the innovation process, 2003-04-16

consideration in TPIN. Here the objective varied across different parts of the organisation.¹⁸¹

There was a slight difference in how fast the different parts of Tetra Pak adapted to TPIN. The business area CA adopted early, while R&D AB adapted a bit later. In 2002 it was decided that there should be a local process owner of TPIN at each organisation, instead of being centrally controlled. This was done to prevent TPIN from vanishing and that the implementation would continue on a local level and being adjusted to the specific local requirements.¹⁸²

Tetra Pak is continuously improving TPIN. According to a newsletter at Tetra Pak the work within the area of information systems for innovation processes and innovation management are insufficient.¹⁸³

“As existing solutions on the market are not developed enough to offer a single industry standard or “out of the box“ solutions covering the necessary aspects for Tetra Pak, our development of TPIN contributes to the pioneering of this area.”¹⁸⁴

4.3.1 TPIN in the project

In general terms TPIN is a management support tool, with the purpose of increasing the communication with involved stakeholders in the project, including the receiving organisations. By putting TPIN on the intranet it became easy to access.¹⁸⁵ In doing so everyone who is involved in the project should use TPIN and have access to it. In that way the transparency increases and everyone shares the same picture of the goal of the project.¹⁸⁶ The project management process should symbolise the easiest way to do things.¹⁸⁷ If all projects follow the process it is also possible to measure how the projects are proceeding in terms of time and cost.¹⁸⁸

In the project management module in TPIN there are two levels of information that is supposed to be communicated, *see figure 16*. In the upper level it is the strategic multi project information that is used to check the status of the projects. On the other level there is the single project information, which is specific documents about the project.

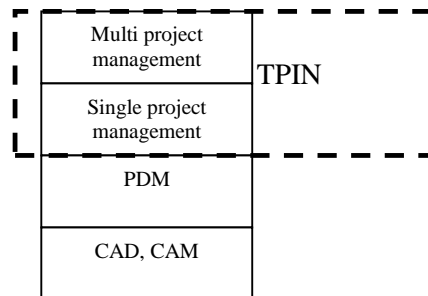


Figure 16: Information levels on TPIN.¹⁸⁹

¹⁸¹ Interview Ralph Maleus, Process Owner - Project Management, 2003-03-04

¹⁸² Interview Ralph Maleus, Process Owner - Project Management, 2003-02-04

¹⁸³ Tetra Pak Innovation Process Newsletter, October 2002

¹⁸⁴ Interview Ralph Maleus, Process Owner - Project Management, 2003-02-04

¹⁸⁵ Interview Bengt Nilsson, Process Owner – TPIP, 2003-04-24

¹⁸⁶ Interview Ralph Maleus, Process Owner - Project Management, 2003-02-04

¹⁸⁷ Interview Per Nilsson and Andres Johansson, ADL 2003-04-16

¹⁸⁸ Interview Johan Eriksson, System Owner - Innovation process, 030416

Many of these documents can be called “key documents” and involve project plans, product plan, milestone reviews, meeting protocols, analysis and decisions points. These documents leads to key input and key output between the phases, these outputs should be clear and accessible for those involved.¹⁹⁰ There are also other supporting information systems within Tetra Pak for example Product Data Management, and more operational systems as CAD and CAM. These systems are not connected to TPIN.

The aim is that at least the project managers should use TPIN, but the purpose is that the project members should be able to become self-propelled with the help of TPIN. The project members are able to look at the checklist of what needs to be done and download templates that can be filled and put back into TPIN.¹⁹¹ The objective is to have everything at one place: the process, the checklists, and all relevant documentation. The aim is that information should be put on TPIN continually, otherwise cross functionality can not be achieved.¹⁹²

The information that is supposed to be put on TPIN are important documents that needs to be ready at certain time, and it is the project managers’ responsibility to secure that they are put on TPIN.¹⁹³ That way the project managers are able to use these documents to create presentations. Interested stakeholders of the project are also able to look into the project and find valuable information. By putting documents on TPIN the information is archived, which enables people to go back and look at why certain decisions were taken.¹⁹⁴

All projects at Tetra Pak are today using the project management module in TPIN, but the use of it varies.¹⁹⁵

“Tetra Pak is more market driven now then ten years ago and will probably not have to close as many projects at a late stage, due to that the market circumstances have changed and taken us by surprise.”¹⁹⁶

¹⁸⁹ Interview Johan Eriksson, System Owner - Innovation process, 030416

¹⁹⁰ Interview Ralp Maleus, Process Owner - Project Management, 2003-02-04

¹⁹¹ Interview Johan Eriksson, System owner for the innovation process, 2003-04-16

¹⁹² Interview Per Nilsson and Anders Johansson- Management Consulting, ADL 2003-04-15

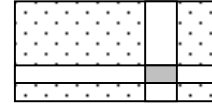
¹⁹³ Interview Bengt Nilsson, Process Owner – TPIP, 2003-04-24

¹⁹⁴ Interview Johan Eriksson, System owner for the innovation process, 2003-04-16

¹⁹⁵ Ibid

¹⁹⁶ Interview Ralp Maleus, Process Owner - Project Management, 2003-02-04

5 Discussion



This chapter starts with the authors' reflections on the process TPIP and on the IT-tool TPIN. These reflections are based on the creators' description in the previous chapter and the theoretical concept. After these reflections TPIN is discussed from a user perspective, based on interviews with TPIN-users in two product development projects. This part of the discussion (TPIN in reality) is analysed simultaneously according to the four critical elements from the theoretical concept.

5.1 Reflections on TPIN

To make an organisation work in a process-orientated way is a complicated task. This type of change involves almost every employee by affecting the way they carry out their work, hence it is not accomplished overnight. Especially when it comes to instructing employees to work, communicate and share information with other functions that already have differing work structures and terminology.

The innovation process at Tetra Pak, TPIP, is one step for Tetra Pak on the committed way to become a more process-oriented company. The base model for TPIP is appropriate since it takes into consideration both the market and technology perspective. If used correctly the model should become successful. But if it is redefined too much, it may lead to future misinterpretation and the intentions of the base model become unclear and displaced. Therefore, Tetra Pak has to be cautious when simply adjusting the original model to better fit the different parts of the current organisation. Tetra Pak must also ensure not to force the organisation to use the model in situations where it is not suitable. As a result it is essential that the model in use and the organisation are well adapted to each other.

The project management module in TPIN being divided into three parts highlights the cross-functionality in the product development process. This can help to create a balance between the functions, so that in the end the developed product will be good enough to create value for the customer, and at the same time be possible to produce at a lowest possible cost. It is therefore important, TPIN communicate and visualise the importance that all aspects depend on each other, and subsequently that they need to be integrated.

The easiest way to achieve integration is by putting every member in the product development projects together at the same location. But in a global company like Tetra Pak, this can often be complicated, since the R&D function is centralised - but the production and market companies are globally spread. The global aspect makes the essential cross-functional integration in the concept development even more difficult, due to geographical distance, the different languages and cultures. To handle this complicating factor, an intranet based tool as TPIN might be a valuable support.

To be as effective and efficient as possible in the concept development phase, it is important that Tetra Pak's R&D organisation creates a close relationship with the manufacturing organisation, in this case division CA. CA on the other hand, needs to be closely integrated with the market companies, because the market companies have the closest relationship with the customers and information crucial for the concept development phase. In other words, the manufacturing organisation is the central function during the concept development phase, since it must be able to balance not only what the market companies want but also what the R&D organisation can develop.

TPIN can be of help in visualising the process, bringing structure and more discipline to the process. The whole idea of visualising the entire innovation process and related sub-processes is logical. That way, everyone get an overview of the process helping employees to view their work as a part of the whole, which simplifies the understanding for the people involved.

Based on these reflections, TPIN could be a good support to increase the integration between the different parts throughout the product development process. It was therefore regarded of significant importance to interview the users and to analyse how TPIN was used in reality.

5.2 TPIN in reality

Almost all of the interviewed persons found it difficult to define the purpose of TPIN, how it was different from TPIP and project management, and even referred to it as being the same thing. Many persons explained the purpose of the IT-tool TPIN like this:

- *"A basic structure for how to work, at a checklist level, so everything is remembered and done in the right way and all the right documentation demands are fulfilled during the project."*
- *"A communication tool; to have somewhere to file all your documents to make them available for everyone in an easy way."*

According to several interview persons it is a common mistake that people confuse TPIN with TPIP. Some persons thought that TPIN is the common tool to support the common process, TPIP, and that TPIN was appropriate for project management to take the pulse on the project, as well as to show where the project is situated in the process. Other users saw the process and TPIN as two separate things, with hardly any connection. They were of the opinion that TPIN does not represent the process, that it was only a separate toolbox.

Many users of TPIN having difficulties in defining the purpose of TPIP/TPIN maybe were not surprising, because the purpose of TPIP/TPIN really is fuzzy. One reason for this uncertainty is that the purpose tries to covering too much, therefore losing focus.

The tool is intended to be a support for both handling the project portfolio and the actual work within the project. The benefits of using TPIN to managing the project portfolio were clear and easy to understand, but the benefits for the users within the project were more complicated and not so clear. The fuzziness about the purpose was an important reason why different persons used TPIN in different ways. The uncertainty about the IT-tool also resulted in persons within the projects having difficulties in seeing the reason of using it.

The authors of the thesis at hand therefore believe it is important to make it clear for the users that TPIP is the process and TPIN is the IT-tool that illustrates the process by graphics and shows what is supposed to be done, as well as what has been done, in a project. Thereby, it is assumed possible for all users to follow this process.

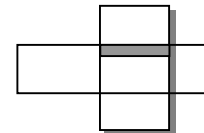
Many of the opinions about TPIN were indirectly referring to TPIP since TPIP is spread through TPIN. What appears when opening the TPIN, is TPIP, and what you use in TPIN are different parts of TPIP. The important thing is to get people to work after one overall process (TPIP) and the IT-tool is just a part of the solution to make this happen. The IT-tool exists to help the process. In the project management part, TPIP and TPIN are so integrated with each other that it becomes confusing to separate them in the discussion. Therefore, TPIN is used as the term for both the process and the IT-tool in the following parts of the thesis, and not referring to the whole innovation model but only the project management module.

In order to make it clear how TPIN is affecting the different aspects in IPD, these aspects were highlighted separately as: organisation, information management, framework and implementation.

5.2.1 The project organisation and TPIN

The team members

Most users of TPIN are of the opinion that it is always the individual project member that has the responsibility for sharing information about his/her part of the project. But also, that it is the project manager that has the ultimate responsibility that information is spread in the project and between its different parts.



One user said that it is important that there is someone who is responsible for spreading the information. He said that the projects in R&D AB do not have any communication coordinators; and this is a problem because it takes a lot of time from the project managers to write reports, do presentations and TPIN-documents. He said that it is important to have a communicator in the projects because it benefits the projects:

“Communication problems are not sufficiently taken into consideration. The problem is not the communication, communication problems are only symptoms; the kind of people that do not communicate is the problem. This is often forgotten.”

It is important for the integration of the project that sub-project managers in the project team realise their responsibility is not only about their own function, but also about the overall result of the project. Instead of trying to just make the best possible material or machine, main focus must be on whole package solution.

This is of course to a great deal the project manager's responsibility. It can also be good to have a person in the project that is responsible for the technical aspects and one person for the commercial aspects in a big project, to relieve some of the workload from the project manager. This also ensures that both aspects get same attention. If the project is going to be transferred into another organisation later on in the process, it is advisable if the commercial person is from the receiving organisation and can be a part of the project as early as possible.

The project manager

To be able to handle the integration in the project, the project manager must take an active role in integrating the different functions and to bring in the customer needs. The project manager must be visible to all project members and make sure that there is a communication flow between the functions. The project manager should also be the concept guardian and make sure that the different choices that are made, due to different interests are in line with the basic concept. One interviewed person said that TPIN was mainly a tool for the project managers and if it should increase the integration in the project it must support the project managers in their tasks.

The outcome of the interviews defined the role of the project manager as the person that has the total responsibility for the project and is responsible to hold the team and all of its parts together. The role was also defined as the person who should set the direction of the project and make sure that meetings are held and that decisions are communicated and written down, and that the phases in TPIN is followed. As part of the role, the internal and external reporting responsibility was mentioned, especially in phase transitions at steering group meetings and milestone reviews. The project manager should also keep the functional managers updated.

Both the consultants behind TPIN and the users of the system in the case projects believed that it was important to have strong project managers.

“The really important thing is to have a strong project manager with a general project management profile. The better the project manager can understand all the different functions and persons in an organisation, the better they can run the project.”

TPIN can support the project manager in his/her heavyweight management, but it must not diminish the weight of the project manager because then the project manager

becomes a lightweight administrator. The thin line between creating heavy- or lightweight project managers with TPIN was mentioned during the interviews. The

users said that if TPIN is too detailed and contains too many mandatory templates it hinders the project managers to act as a heavyweight manager.

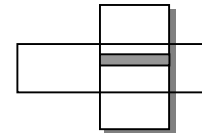
“The project manager’s role was to be a general manager; he was very important with high ability, responsibility, and freedom with accountability. Then suddenly you give a new mission to the project manager about a formal process that should be followed step by step with numbered days from that to this and mandatory templates that must be filled. The project manager then goes from being a general manager to a template administrator.”

It is important to be careful with how detailed and mandatory the different steps in TPIN should be, otherwise TPIN might obstruct the integration instead of supporting it. It must not be a tool that decreases the power of the project managers and decreases their activity among the project members. Some administrative work is required from the project manager but it should not be the main task, instead he/she should manage the team. If the projects are large, it might be required to appoint an administrator to the project. Main tasks of this person should be to write reports, do presentations and make/update TPIN-documents. This gives the project manager more time to perform those general management tasks facilitating integration and teambuilding in the project. TPIN therefore, should be considered as a decision support for the project managers that ensure that no critical aspects are missed, but not be too detailed. The project manager’s role must still consist of much freedom and strong leadership in order to create integration between the different functions in the project.

5.2.2 Information management and TPIN

User-friendliness

Most of the interviewed persons did not believe that it would be better if there was more information put into TPIN because it was already apprehended to be clumsily structured as an information-handling tool. The users were of the opinion that TPIN requires too much administration and takes too much time. They were also of the opinion that it was not completely user-friendly and that TPIN needs to be “clicked down” on too many levels. For communication, many persons found it to be much better to use servers or e-rooms. They also thought it would be an advantage if these systems could interact with TPIN.



“It is hard to find things in TPIN, even those things you have put on TPIN yourself. If you try to find what you put into the system a month ago it can take a long time to find.”

“I find it not so user-friendly. When I update things I always do it on the server and then I copy this to TPIN. This means that there are two systems with the same information.”

One interview person said that TPIN is a good idea but there is still some cleaning work to do to make it really efficient. He said that a big cleaning is needed to secure that the same document cannot be uploaded on several places in the tool. He said that a structure that makes it easier to navigate in the tool must be developed.

“Even if you think that everything should be at the same place there is room for improvisation in the documents, which sometimes makes it difficult to find information in it. TPIN is difficult to navigate and the rules for how it should be used must be more strict so it is used more homogeneously in different projects.”

TPIN not considered user-friendly, is one of the reasons why TPIN is not utilised to its full extent. It is complicated and requires a lot of training to understand and use in a correct way. This human factor of the system is often missed in the development of information systems, more details are simply added to the system. During the interviews, the authors of this thesis have seen the same pattern in the development of TPIN. To avoid this, it is important to pay a lot of attention to the users instead of making the system more extensive. It is much better to have a simple system everyone uses and understand, than a complex system, only a few persons are capable to use, that can do everything. One way to increase the user-friendliness and understanding of TPIN is by having user meetings where the users can discuss changes and give suggestions about TPIN.

If the users are not involved in the development of TPIN the user friendliness will not increase and the users will just see TPIN as an administrative task that must be fulfilled. If the users are not involved and understand why the documents must be put on TPIN the quality of their documents will be low.

Document handling

Many interview persons said that TPIN was used for storing critical documents, and for making templates and presentations available. A number of key documents must therefore be uploaded and updated on TPIN and it is the responsibility of both the project manager and the sub-project managers to do so, depending on delegations and organisation of the project. They also said that TPIN is used for collecting documents from the steering group meetings, core team meetings, and advisory groups and make these documents available for everyone that have access to this project on TPIN.

Not all interview persons shared the same opinion about TPIN's role in document handling. Some persons meant that TPIN should be much better at document handling because it would be helpful to have the background information on how decisions were made. Other persons were of the opinion that TPIN should not be considered a document handling system and that it is a major disadvantage that many persons think so. They said that this must become clearer, and a decision must be taken whether it is a document handling system or not.

“If it is supposed to be a document handling system it must become better and if it is not a document handling system it should show very clearly in TPIN that this is not the purpose.”

Several users highlighted the issue about what should be presented on TPIN, should it be all the work documents or only the final presentations?

“An important issue is if TPIN is a tool where you have your work documents or where you have your report documents.”

All interviewed users of TPIN mentioned that TPIN is not suitable for daily document handling. They said the reason for this is that TPIN is not used as a document handling system during ongoing work, but instead used as an archive. Most of the information is put on servers that are shared in the project. When the documents are finalised and wrapped up, it is put on TPIN.

“TPIN is effective when people need to look for best practices, but as handling information it is just a final archive. All background facts are handled on servers and are not put on TPIN. The idea is that it should be at TPIN, but in reality it is not what happens.”

The majority of the users agreed that TPIN is not a good system for handling daily documents and meant that it is only suitable to handle finalised documents. They found servers, e-mail and e-rooms much better to handle daily documents. The documents are first put into one system and then it is stored into TPIN, which results in double work. TPIN therefore creates extra non-value work when it comes to document handling. An additional problem is that the users did not see any point in putting documents on TPIN because the people that need the information have already been informed by other ways.

The positive side of storing documents on TPIN is that every project has the same interface and this makes it much easier to understand and get information about other projects. But it can be difficult for the individual users to understand this advantage since they do not receive the benefits from it. The same problem can be seen with several of the advantages with storing documents on TPIN, since most of the information is needed by the senior management and not by the individual user.

The individual users have other information systems that are more suitable for handling their daily documents, but at a management level the structured information in TPIN is much more unique and have a high value.

It is critical to highlight the purpose of storing documents on TPIN. First of all the benefits for the local users must be pointed out, for example that it gives the users a structure to present their work, a common interface in the different sub-projects, and that no critical information is forgotten. The whole development process can be seen as an information processing system, which needs the right inputs to create the right

outputs. The documents that the users, the producers of information, must put on TPIN are the outputs. These documents have a direct effect on the decisions that are made at a senior management level, the consumers of information, and thereby the quality of the input to the next phase in the project. This information “value chain” must be clarified for the user. The users will probably be more positive to it, if they have a clear picture of how critical this information is for decisions at management level.

Another benefit with TPIN is that it makes it possible to store the information in a common and structured way, which is not possible with e-mails and e-rooms. This can be critical if the project must change track or to understand former decisions to be able to proceed in the best way or even terminating the project.

But the relationship between the producers and consumers of the information is not enough, the information “value chain” must start with a definition of the information requirements. Each document must be carefully chosen so no documents not necessary, or more suitable for other systems, are forced into TPIN. TPIN must not be considered as a system that should handle all the information in the project. It should instead be considered as an archive where the finalised documents are put, in order to make it available for senior management in a structured way. If TPIN is intended to solve everything within information management the users will just see it as a non-value adding burden. If TPIN instead is used for just the finalised documents it is easier for the users to see the distinction between TPIN and other more operative systems, such as e-mail, e-rooms and servers. These operative systems are used for producing the information, TPIN is used to distribute this information to the consumers of it. If all the information should be stored at TPIN the purpose will continue to be fuzzy and people will drown in more information, already having difficulties finding things in it today.

Cross-functional integration and the user pattern

Several users mentioned the problem with a deficient information flow between the different functions during the development phases.

“It is a little bit as every function does their own thing and it had been better with more information sharing between the different functions. Issues must be highlighted at an earlier stage, for example the consequences for the other functions if there are changes in the material. But this is hard; people have so much to do with their own things so they do not have time to think about all the other functions in the project.”

Many interviewed persons meant that using TPIN has not increased the integration between the functions. Most of them said that the face-to-face communication and working together are essential for integration and that this can never be replaced by TPIN. The interviewed persons said that most information between the different functions is spread at meetings, by searching the server or by asking persons directly to send over the documents.

“Some documents might be found on TPIN but it is difficult trace other peoples documents, it is too much information, it is easier to just call the person that you need to talk with and he can send you the information. TPIN can help to show who is responsible for the area you need to know more about, but this is not clear enough today. Today e-mail is the most frequently used way to spread information.”

Several users also saw a risk that people think it can replace this communication just by placing information on TPIN. One person mentioned a risk that person-to-person (phone) contact can be diminished if the employees rely so heavily on looking for information in a computer system.

“Everyone knows that there is information to get on TPIN, but it is the personal contact and project meetings that are the primary sources to spread information. People must not think that TPIN is solving all the communication problems, it is more important to work as a team than to use TPIN. But it is a good document container.”

The requirement of ensuring key documents ready for the phase transitions have impact on the user pattern of TPIN. Before these transitions the key documents must be updated and put on TPIN and therefore all the users said they are using TPIN much by the end of each phase.

At these phase transitions almost everyone said that they were using TPIN on a daily basis, otherwise during the phases it was as little as once a month for many of the users. The concentrated usage of TPIN before the phase transitions was considered a problem by several users.

“Before the last phase transition it felt like panic that every template had to be fulfilled, then it was not a support, instead it lead to extra administrative work, which I could not see the meaning of.”

“TPIN has not been the joining factor in the work but it has been the joining presentation factor. I am not using TPIN as a tool for how to do the work but as a tool for how to present my work.”

The integration cannot be established by putting computer-based presentations on TPIN, since integration requires two-way communication. Face-to-face meetings, working together, telephones and e-mail are instead creating the integration. It is therefore the wrong strategy to create more computer-based presentations within TPIN, this might instead harm the integration. If TPIN is extended with more functions and tasks it will be considered as a detailed control mechanism by the users, which will harm the project in many ways, for example decrease the power of the project manager, create more administration and decrease the face-to-face meetings.

The user pattern was another reason why TPIN was not supporting the cross-functional integration within the projects. The use of TPIN was much more intense at the end of the product development phases, *see figure 17*. This is because a number of templates must be fulfilled before the tollgates. The common structure TPIN creates is essential to manage a product development project in an efficient and effective way. This shows that TPIN is a tool that creates control and presentations and not a tool that facilitate integration during the phases.

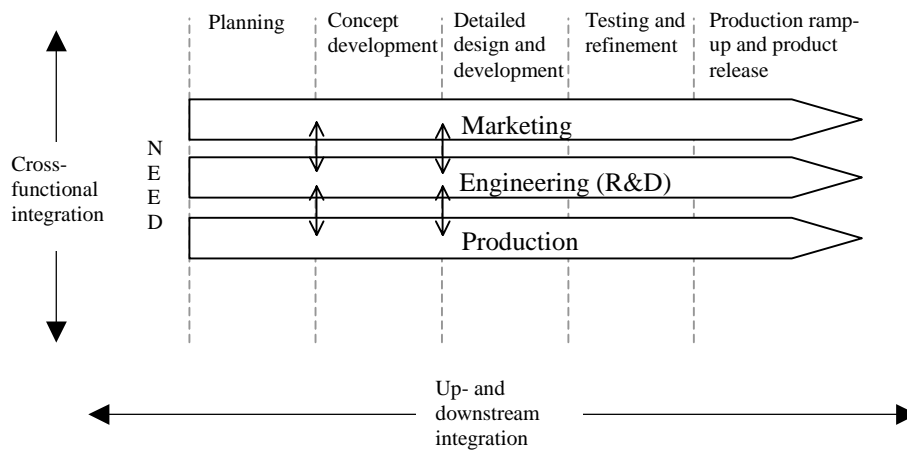
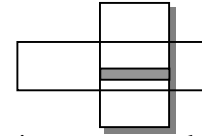


Figure 17: Information flow in TPIN between the functions at the concept development phase.

If TPIN should be a presentation and control tool and at the same time be a tool where the operational data continuously should be stored, it will probably not be suitable for any of the purposes. This is proven since the users found it too administrative and unsuitable to handle daily documents in TPIN. They also found it difficult to know how accurate the documents put on TPIN really are. Therefore it is better that TPIN focus on the key documents and presentation of them to make possible the coordination of different stakeholders. To be able to improve the daily integration other ways have to be used, for example to organise the project in the right way and increase the possibility for the project members to meet face-to-face.

It seems as if a lot of discussions have taken place about what TPIN should do - but what it should not do is not discussed enough. The unique characters of TPIN must be made clear for the user. It is important to realise that TPIN cannot solve everything, if it attempts to do so there is a great risk that it is not solving anything well enough.

5.2.3 The framework and TPIN



The checklist

The major advantage with TPIN according to almost all of the users is that it works as a checklist for the project. During the project users apply TPIN to see what is supposed to be done in the relevant phases. The interviewed persons especially use TPIN before entering a new phase to be sure that everything that is supposed to be done is done before the phase transition.

Many of the interviewed persons considered TPIN as a way of securing a higher quality in the development process by using a framework to help the project to keep the right pace, and to be able to check the list of activities that are supposed to be carried out.

The users said TPIN has provided the project managers with a structure how to manage the projects to achieve the best result. That way there is no discussion about what needs to be done and no essential parts can be forgotten. This is helpful since different managers often have different views on what is important. One interview person gave this example; if a project manager does not think that a market research is necessary in the concept development phase, TPIN makes it clear what tasks that needs to be done in the different phases before it can be passed. Before TPIN it was up to the project manager what he wanted to present.

Having a certain amount of structure in the product development projects, makes it possible to create a best practice in how to run the projects in the most efficient way. When the best practice, how to run the product development projects, is done repeatedly, it will naturally become the common structure to do work at Tetra Pak. That way the average quality of the projects can be increased, since obvious mistakes can be prevented such as forgetting to consider important aspects. Since TPIN shows what needs to be done in a certain phase, it can help the project manager by showing how to coordinate the different members in the project and inform them when their information will be needed. By doing so the project members in the project knows when their work has to be ready and to whom they should deliver. TPIN can thereby help coordinating the projects by providing a clearer structure to the development process. This commonly structured and defined product development process can then help the project manager to keep control of the project and the information flow within it.

The structure the project management process in TPIN provides can be seen as a framework. But there is a fine line between how generic or how detailed the framework should be. It is important to realise that if TPIN gets too detailed it will slow down the work and many persons will stop using TPIN. The level of detail and the usability of TPIN must therefore be balanced.

One user viewed the milestones and the tollgates in TPIN as an opportunity to think twice about how to proceed. Another user said that the milestones and tollgates in TPIN show what information is needed to make a decision and everyone agrees on

the basic data for the decision, all the way up to the senior management. This reduces the discussions about what needs to be accomplished during the concept development phase, but there is still some room for interpretation about how much that needs to be proven. One person said that a process like TPIN can never be one hundred percent correct because every product development project is unique and cannot be fully prearranged.

“How things are done depends much of the circumstances in the project. It is important to point out that TPIN does not have a solution, it gives an idealised picture of the development process that in reality will never be followed exactly”.

The use of clear decision points, such as milestones and tollgates in TPIN, is a good way of keeping control over the projects and helping the project members to focus on essential parts in the specific phase. But between the decision points there needs to be room for flexibility so the framework can be applied on many different types of product development projects.

All the parts that are repetitive in the projects should be in the framework and be followed every time, for example bringing in both the commercial and the technical side. The product development process is varied and complicated and a detailed framework would therefore only fit a small number of projects. Therefore the framework should be rather generic and always used by all the projects, instead of being precise and only suitable for a few.

Some users explained the framework as a way to give the project the major guidelines and secure that nothing essential has been forgotten, not as a tool that tells everybody exactly what to deliver on a day to day basis.

“Just by knowing what the general checklist items are stupid mistakes can be avoided, like forgetting an important task in a phase.”

Several persons mention TPIN is too detailed. One user said that the focus at the whole was lost and that only the current phase was in focus. The same person also said that it is a risk to minimize the thinking process and just go by checklists. He said that it must not be seen as a replacement for common sense.

The balance between how general or how detailed the framework and the checklist should be is difficult, most of the interviewed persons were of the opinion that TPIN should not be too detailed and not contain too much information about what should be done. Instead the interviewed persons wanted guidelines that tell them what is supposed to be done before milestones and tollgates.

Discipline

The tollgates should not feel like an examination, instead the tollgates should be considered as a part of the process and a chance to bring in the senior management to help the project with questions the project cannot solve or are not authorised to deal with by themselves. This process orientation needs to be embedded in mindset of the project members, instead of trying to make them work in an integrated manner by using detailed checklists and a few big control points.

A product development process is complex, and even though the phases in the project development process should allow room for flexibility and not be too detailed, it is important that there is discipline in the process. Otherwise different projects will perform the same phases too differently. In the concept development phase it is important that the project can secure that the concept is working and that all the functions that are involved in the new product can agree on the concept.

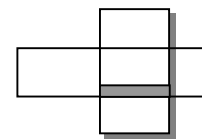
Especially during the concept development phase one of the case projects has followed TPIN stringently, which has made it clear for the persons in the project that the use of TPIN is serious and something that is expected of them to use. But most of the interview persons said that the awareness of TPIN and its functions could be approved. One interview person said that he became more committed to the tool when he received his last training in TPIN. Several persons mentioned that training of the users was an important factor for improving the understanding of TPIN and its benefits.

The project manager therefore has a great affect on the use of TPIN. He/she must be stringent that everyone should be using TPIN and make it clear that the use of TPIN is serious. The key documents that are expected to be stored in TPIN, should actually be stored in TPIN and no other place. But people cannot be forced to use the tool, to get them to use it in their work they must get an extensive education in why they should use it, and the meaning of the process behind it.

5.2.4 Implementation and TPIN

A common structure and terminology

Many interview persons mentioned as a big advantage with TPIN that TPIN creates a shared and common image of the product development process described by a common terminology. By creating an overview of the activities and describing them in the same way with a common terminology, the users thought that it helps giving them a clearer picture of how the project is going and where they are in the project. But they also mentioned that the problem with creating a common terminology is that Tetra Pak has so many employees and that these employees are spread globally. The users said that the definition of terms and how they are changed is critical in the creation of a common terminology.



“If we do something we must have a company wide definition of words, so everyone understands what we talk about, otherwise it will be a fiasco. Everyone must be trained in what terms should be used and what they mean. It is also a problem if the terminology is changed too often, because it confuses people and makes them frustrated. It is important how the organisation is informed about changes and to understand that a best practice is never finite.”

“Some parts of the organisation were very aware of the changes, while other parts did not understand because they had not been able to influence these changes. This mistake resulted in changes in the terminology caused more confusedness than improvement. These changes should also be communicated on paper to all employees and not only through TPIN, since this only reaches the persons that already use TPIN.”

Several users also said that it is important to be more precise and clear about the terminology, and how the terms are supposed to be used. They expressed their worries about the unclear purpose with the tool, and how critical this clarity is for a tool that should create a common terminology. They mentioned a great risk that different parts of the organisation start making their own processes. They considered this as going back to square one again and losing the common terminology now has been created.

TPIN helping to create a common terminology at Tetra Pak can be seen as a major strength, since Tetra Pak is a global company that earlier had many different definitions of the same words in the product development process. If a common terminology and definitions of the phases are applied in different parts of the organisation, these different parts can easier become coordinated.

TPIN has helped communicating the process and definitions of phases and decision points to the different parts of the organisation. The creation of a common terminology in a company is a powerful thing, but it takes time to implement changes, especially in a product development process.

TPIN has created a common framework and a common terminology, which make the communication between the organisations more achievable. As long as the different organisations are working according to a common framework and are using the same terms for the different tasks it helps the members in different organisations to understand or explain to each other where they are in the process. When the different organisations have the same structure for product development, the interface between them gets much clearer and everyone can have the same picture of what is going on. Many conflicts can therefore be avoided, since the conflicts often arise because different organisations do not understand each other or have different goals for the development work. By minimising these conflicts the coordination and transitions between the different organisations become more efficient and effective.

Different purposes with TPIN

When carrying out the interviews a different understanding of TPIN's purpose was found at R&D AB and CA. The users at R&D AB meant that the process shown in TPIN symbolises the process of how to work according to a best practice. Most of the users at CA saw a different purpose behind TPIN, they did not see it as a common process for the whole company, instead they referred to it as a toolbox where they can find templates and checklists of what needs to be done. Instead of using TPIN as a way to show the common process, CA was using their own process flowcharts. Since TPIN did not fit in CA's already existing processes they decided to adjust TPIN to better fit CA. By doing so the purpose of TPIN was changed. Since there are many persons involved and affected by TPIN there are of course many opinions and suggestions that needs to be taken into account when implementing TPIN.

Almost all of the interviewed persons thought that it was a disturbing factor that different organisations have different roles for and descriptions of what should be done. Therefore the users were worried that CA would have their own way of working and use their own templates, their own best practise and their own learning

“It's a great tool but how do we avoid different systems are being developed in different parts of the organisations.”

Many persons also mentioned these differences are caused by the unclear purpose of TPIN:

“In the beginning they said that this was a process, but then people with experience in process work said that it is not a process; at best a toolbox. The way I see it we are not using the same language, the semantic aspect of it is that we must know what we are doing, especially with this type of tool, we must define very well what we are talking about This has resulted in that two parts of the organisation have developed from the same base into different ways of working, which can be confusing. It is worrying if there is a divergence in the best practices. The best practice is always a living material that has to be reviewed. The question is how will this live in different boxes? It will have its own life. It will become more and more different; and at last be totally different things.”

One person mentioned the problem of making the tool suitable for every situation. He said that a fixed structured can of course become unsuitable for things that does not fit the structure, and with this need of flexibility of the tool the users at CA motivated their own version of TPIN.

“By having our own process it means that we do not have to go out and ask the whole company to accept our change and create consensus for it. It allows some flexibility that the rest of the organisation do not necessary have to agree with. Sometimes we spend so much time aligning everyone, you do not have any time to work.”

Some interview persons viewed TPIN as a good basic structure for innovation. It is providing a fixed reference frame that needs to be refined to fit the purpose locally:

“At CA, TPIN is now being approved through use and adjusted to better fit CA. It is therefore good that TPIN is flexible and can be adjusted.”

The idea with TPIN is that it should be a structured way of working that makes it possible for everyone in the same phase to know what should be done by the different parts of the organisation, thereby improve the information flow between these parts. But there is a risk that the purpose can be changed or blurred when it is being implemented in different parts of the organisation, then it will not solve the problems that it was intended to, or even be used in the wrong way.

Since Tetra Pak is a global company it has been difficult to spread and implement this structure of working in the same way in all parts of the organisation. In Tetra Pak, the idea about a structured way of working in the product development process has been spread throughout the company since it has been transformed into an “object”, the intranet based tool TPIN. In the new practice, when TPIN has been received in different parts of the organisation, the purpose of TPIN has been translated into action locally and therefore it has also been institutionalised in different ways in the different parts of the company. This has resulted in the two studied parts of the organisation, TP R&D AB and CA, use TPIN in two different ways. This displacement of the purpose in different parts of the company is a great danger for a tool like TPIN that is supposed to create a company-wide structure for the product development process.

If the different organisations have a common overview of the process it can help the employee to view their work as a whole. That way it can simplify the understanding between people and increase the information flow between members in different organisations and then the receiving organisations do not have to “start in the dark”.

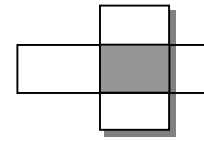
If TPIN is used in the same way in different organisations it creates coordination between the organisations in the product development process. This makes it possible for the receiving organisation to start early, but the risk of redoing existing work is still there. Because it is not enough to be coordinated in a process, the parts must also be integrated through two-way communication. Therefore there is a risk for “starts in the dark” if the projects rely too much on TPIN, they must also make sure that they have an intense communication with the receiving organisation during the phases and not only at the transition points. If there are different versions of the process and TPIN in the different parts of the company, nobody is in the position to see the end-to-end process that is supposed to be symbolised by TPIN. If this happens the coordination TPIN can establish between the organisations is destroyed and the development work is back to a sequential way of working with no up- and downstream communication.

Since many of the interviewed persons were very positive to the common structure and terminology that TPIN provided, especially when they needed to interact with

other organisations, it is ineffective to change it. The fact that CA has a different version of TPIN can easily lead to misunderstanding between the organisations and hinder communication.

CA is a dominating organisation in Tetra Pak, and if they do not use TPIN in the intended way there is a risk that the purpose behind it will disappear. It is therefore important to look at why CA changed TPIN. CA meant that TPIN was not flexible enough for all their different types of projects. Instead they “cleaned up” in TPIN and made a version with fewer templates to instead make sure that the most important things were done. Since the level of detail is crucial in TPIN, the changes that CA has done should be alarming. Do these changes depend on whether the detail level is too high in TPIN today or do the changes depend on whether CA has another purpose with TPIN? It is important to dig into the reasons of the changes that have been made and use it to further improve TPIN. It is important to remember that developing TPIN might not be about adding functions, it might just as well be about decreasing the functions and make its purpose clearer.

6 Conclusion



This chapter starts with theoretical conclusions about an intranet based support tool for project management. Thereafter a table is presented of the possibilities and limitations with Tetra Pak's intranet based support tool for project management. Finally a number of recommendations are presented about how Tetra Pak can manage the project management module in TPIN.

6.1 Theoretical conclusion

These theoretical conclusions are the more general conclusions of this thesis. They give valuable insights to how this kind of IT-tools affects the integration in a global company intending to create a company-wide IT-tool for project management in the product development process. These insights are:

1. The integration is not increased
2. Facilitates coordination but not integration
3. An IT-tool cannot create an IPD process by itself

6.1.1 The integration is not increased

- An intranet based support tool for project management does not increase the integration in the product development process. Integration is created by intense two-way communication between people that work together and an IT-tool for project management does not provide this.

Most of the literature that was used in this thesis indicates that an IT-tool, which can create a common terminology and structure, are able to facilitate integration between people and functions. Therefore the result of this thesis is a bit surprising, that the integration does not increase, due to the way an IT-tool for project management is used. This result is somewhat conflicting with earlier literature because it shows that the integration does not increase even though there is a common terminology. Because the people that should be integrated in their daily work do not use the tool when they do the actual work, they only use it to present the final results.

The only way this kind of IT-tool can affect the integration is through supporting the project managers. By using the framework that an IT-tool can provide, the project managers can make sure that they do not miss any key aspect and can instead spend more time on leading and building the project team. In that way the integration in the product development projects is strengthened. But if the detail level in the framework is too high and too mandatory it will instead force the project manager to become an administrator that only follows the templates and have no time to be the heavyweight manager that is needed to create integration in the project team. The organisational

aspect has therefore the greatest impact on integration and TPIN can only support the project manager in their work, it must not try to create integration by itself. Therefore it is more important to focus on the implementation and how people use it than it is to add more details that might have undesired effects.

6.1.2 Facilitates coordination but not integration

- To establish the right level of details in an intranet based support tool for project management it must be clarified that it is not an IT-tool that facilitate integration. It must be clear both for the creators and the users of the IT-tool that it should facilitate coordination - not integration - in the product development process.

To have a tool that facilitates integration, everyone in the project must use it every day. This was not how an intranet based support tool for project management was used according to this case study. The tool was only used by the project managers at the phase transitions, when the key documents should be distributed. Integration occurs where the information is produced, during the development work in the phases. An IT-tool for project management only supports the distribution of the produced information that is needed to coordinate stakeholders of the project.

An IT-tool that handles the production of daily documents must be highly detailed and adapted to the users, in order to make integration possible. This makes it necessary to have unique versions for each project because every project has different tasks and users. But every product development project does also have essential aspects that always must be taken into account. These aspects are what an IT-tool for project management must hold on to. In order to create coordination, these recurrent aspects create a common structure that should be followed in disciplined way.

The two different purposes, to create integration or to create coordination, therefore require different levels in detail and adjustment. Coordination requires that there is just one generic version that creates a company-wide structure. Integration, on the other hand, requires that each project can have their own detailed systems where all daily documents can be handled.

It is this differences that makes it counterproductive to try to solve both the coordination and integration aspect with an IT-tool. By trying to do both, the purpose becomes unclear and the users do not understand the aim with the IT-tool. The documents will also be much more unreliable because it is difficult to know if it is a work-document or a final document. And allowing the users to chose the functions that suit them would damage the common structure and discipline. If the purpose is unclear it also makes it harder for the users to understand the reasons of using it or using it in the right way.

An intranet based support tool for project management strengthens the coordination through creating a company-wide structure and terminology. The interface between

the parts becomes clearer because they know what and when they should deliver to the project. This common structure and terminology has also significant benefits of how the portfolio of product development projects is managed.

If a company should receive these benefits from the IT-tool they must make sure that the tool is used in the same way and with the same purpose in the whole company. The risk of displacement of purpose and development of diverging versions of the IT-tool increases in global companies due to geographical distances and cultural differences. This increases the risk that the IT-tool will be adjusted to the local wishes and the common structure is then destroyed.

6.1.3 An IT-tool cannot create an IPD process by itself

- An intranet based support tool for project management cannot make the people within a project to start working in a process orientated way.

This kind of IT-tool cannot solve the “together” aspect in a process, it can only strengthen the “organise” aspect. This result in that people will continue to do their work within the functions, not integrated with each other. It is a good start to be able to establish a well-defined product development process, but it only takes you half the way. The other half requires that you work together and with a process orientated mindset.

If companies rely too heavily on web based tools there is a risk that they forget to work with the parameters that really can create the process orientated mindset, for example how people are organised and that they receive training to handle and understand this new way of working. Therefore this kind of IT-tool is not enough to create an integrated product development process at a company. The tool can only bring a certain structure to the process, but to make people work together must be handled in other ways.

6.2 Possibilities and limitations with the project management module in TPIN

The project management part of TPIN has several possibilities but also a number of limitations, and it is important to be aware of these in order to further improve TPIN for project management. Its greatest benefit is that it spreads a common process that organise the product development process. But TPIN does also have some major limitations in handling the cross-functionality that is essential for a process. TPIN helps the coordination between functions but it does not integrate them. TPIN cannot do this because it cannot create integration during the work, it can only make sure that the work follow the common structure and uses the common terminology. During the analysis of TPIN the following possibilities and limitations have been identified:

Possibilities	Limitations
<i>Creating coordination</i> - gives a company-wide process that helps the coordination of different levels and parts of the company during the projects.	<i>Does not provide integration</i> – since it is only used in the phase transitions and of the project managers. It does not make people work together.
<i>Supporting the project managers</i> – provides a checklist so nothing essential is missed in the projects	<i>Creates template administrators</i> – is sometimes too detailed and mandatory, which hinder the project managers to create integration in the project team.
<i>Handling finalised documents</i> – provides a common and structured way of storing, distributing and presenting key documents.	<i>Not suitable for daily documents</i> – other systems are more suitable for this, it only damages the handling of key documents.
<i>Providing control</i> – the common checklist and phases makes it possible to manage and evaluate the projects in a common structured way.	<i>The purpose is fuzzy</i> – users and creators of TPIN do not have the same opinion about what TPIN should do, which results in different ways of using it.
<i>Clear benefits for senior management</i> – the distribution of structured information makes it possible to better manage the project portfolio	<i>Not user-friendly</i> – the users and their training do not been in focus enough, instead more functions have been added, which increases the complications in the tool.
<i>Spreading a common product development process</i> – through organising the process it creates a common structure and terminology	<i>Different versions of the project management process</i> – in different parts of the company have different versions been developed, which damage the coordination and control.

6.3 Suggestions about the project management module in TPIN

It is important to remember that TPIN is just an intranet-based way of spreading the common product development process. That this process is the focal point must not be forgotten. If TPIN proceeds to develop to a more and more expanding tool that should solve everything it is easy that the process comes in the shadow of the IT-tool. To avoid making TPIN into something that does not help the users to follow the process, a number of suggestions are made. These suggestions are based on the possibilities and limitations with TPIN that has been identified above. The five suggestions are:

- 1 Strong project managers instead of template administrates
- 2 No daily documents
- 3 Make it clear that it is about structure and control
- 4 Increase the mind set, not the details
- 5 Only one product development process must exist

6.3.1 Strong project managers instead of template administrates

TPIN cannot create any integration, integration requires that the people within the project talk to each other and is mainly an organisational issue. For the integration in product development the project manager has a central role. By supporting him/her TPIN can have indirect affect on the integration. TPIN should only provide a checklist over the main aspects to help the project managers to not miss anything essential. If the checklist is too detailed and consists of too many mandatory templates it hinders the project manager to be able to have an active role in the team, which is required from the project manager in order to support the integration. If this happens the project manager becomes a template administrator instead of a general manager that provides the project with strong leadership and teambuilding.

There is a thin line between helping the project manager to create the essential integration in the projects or hinder him/her. In large projects it can be a good idea to have an administrator in the project that handles the templates on TPIN. By having this it is ensured that both the structure and coordination are established from TPIN, as well as that the project manager has time to work with the integration.

6.3.2 No daily information

TPIN should not handle daily documents, it should only handle the key documents when these are final and wrapped up. That TPIN has no affect on the integration during the phases became obvious when the user-pattern was analysed. The different functions proceeded to work separated and mainly spoke to each other in the end of the phases when they must deliver a result before the tollgate. TPIN's main focus is to distribute information with a common structure and common terminology. It is suitable for this and makes it possible for senior management to get a much better

overview of the project portfolio. But the daily information has no reason to be spread company-wide, it will only create an information overflow that will confuse more than help.

The integration between the functions is insufficient during the phases, but TPIN is not the cure for this. The daily information needs to be spread within a small group and it is therefore better that these persons use a way that suits them and their project, for example face-to-face meetings, e-mail and e-rooms. If too much information is put on TPIN it will only become more difficult to find relevant information on it and the system will become even more complex. This is already today a problem for the users and if it gets worse many of them probably will stop using TPIN.

6.3.3 Make it clear that it is about structure and control

TPIN creates a common structure and works as a control system with a number of control points. TPIN does also create a common structure for presentation that makes it possible to distribute the information to senior management. This creates a much better structure and overview of the different projects and is a unique and important benefit with the use of TPIN. This control and coordination function must not be hidden, it is instead something that should be made clearer to the users.

The purpose with TPIN must be much clearer to make it possible for the users to utilise it in the best way. It must be defined what should be done with TPIN and what should not be done. If this clarity is not established about the tool everyone will use it in their own way and a lot of different versions of TPIN will be developed, even though they look the same. TPIN cannot create cross-functional integration during the development phases and thereby it cannot create an integrated product development process by itself. It is important to understand that coordination through a common and disciplined structure is the role for TPIN and not try to make it solve everything, because that will make more harm than good.

6.3.4 Increase the mindset, not the details

That TPIN spreads a checklist and a common structure is found positive among the users because it prevented them from missing anything essential during the product development process. But it is an important balance how detailed this checklist should be. TPIN should only consider the main aspects that are the same for all product development projects.

It is important to be disciplined about the structure and always follow it stringent. Thereby the process becomes a common mindset and methodology that always is followed and not a detailed IT-tool that just must be fulfilled. It is therefore much better to increase the training than the details. It is important to remember that the training is not just about understanding the IT-tool TPIN, it is just as much about understanding the common product development process, TPIP. The users cannot be expected to understand a process-orientated way of thinking just by seeing it on the

intranet. They will then only consider it as an IT-tool and not a common product development process.

6.3.5 Only one product development process must exist

The common structure and terminology is considered as the main advantage with TPIN because it creates an overview and understanding of the process. It also helps the necessary coordination of different organisations along the process, for example between the developing and receiving organisation. But if the organisations are not using TPIN in the same way and with the same purpose or has developed their own version, the advantage of TPIN gets destroyed. It is therefore crucial that the whole company is using the same version of TPIN.

This does not mean that TPIN should stop developing, it is important to learn from the users and the suggestions for changes. For example is it critical to find out why a certain organisation wants their own version. They might be on the right track and these changes should maybe be implemented company-wide. But it might also be a displacement of the purpose that makes TPIN to something else than it was supposed to. TPIN must not develop into several tools because then it is losing its essence, to create a company-wide product development process.

6.4 Further research

An intranet based support tool for project management brings coordination to the product development process through a common structure and terminology, but it does not increase the integration. This have been seen in two different parts of Tetra Pak, but it is of high value to investigate how other global companies with similar IT-tools handle the integration problem. This thesis gives some valuable insights on how the integration is affected of this kind of IT-tool, but more research must be made within this area. Otherwise companies will continue to develop their IT-tools without having a clear picture of the affects.

When the authors of the thesis at hand searched for literature about the affects on the integration the search results was insufficient. Much literature was found about the potential that IT-tools had for facilitating integration, but not about the affects at a user level. This thesis shows that the affects might not be the same as intended for the users. It is therefore critical to further investigate this aspect.

Tetra Pak needs to improve their integration, but TPIN is not the solution for this problem. The thesis at hand has only analysed how TPIN has affected the integration, but to reveal this a great deal of material was gathered about how different functions and organisations was integrated in the product development process. But this material was not further analysed in the thesis at hand, since the integration was out of reach for the focused IT-tool. How the integration can be increased in the product development process would therefore be a suitable aspect to further investigate, for

example how the integration between the developing and receiving organisation could be improved.

In this thesis it was also distinguished that an intranet based project management tool is not suitable for handling daily work documents, but how should these documents be handled in the projects? Is it OK that each project has their own way of handling them? And how should a tool for daily documents be connected to the project management tool? And how can a tool for daily documents increase the information flow between different functions during the development phases?

By saving key-document in a company-wide structure does also provide the company with a archive over old projects that can be valuable in the future, but how should they utilise this archive? How can they use it to learn from old projects? And thereby use solutions that have already been tried and avoid doing the same mistake? How should this archive be designed to make it easy to find relevant information?

In the thesis at hand the difficulties with implementing a company-wide solution in the same way in the whole company was pointed out. The gathered material showed that the differences in how a solution was considered could vary a lot between different organisations within the company. But to improve the findings about displacement of the purpose with the IT-tool and further understand the cause of them, more parts of the company have to be analysed. Otherwise it is not possible to distinguish the cause behind the differences in the use of the tool. For example if the differences in the use depend on the project type, the organisation type, the culture, insufficient training or politics.

To find the cause is essential, otherwise only the symptoms will be treated. This results in that the users will be forced into something that do not fit them and the management does not understand why the tool does not fit them.

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Appendix 1. Interview questions

1. What is the purpose with TPIP?
2. What is the purpose with the project management process?
3. What is the purpose with TPIN?
4. Who are the customer or/and the receiver of your solution?
5. How is the customer / receiver involved in the development work?
6. How is the project organised?
7. What is your role and responsibility in the project?
8. What are the other core members' responsibilities?
9. How do you define the project managers tasks and responsibilities?
10. What is the purpose with the concept development phase?
11. What functions are involved?
12. In what way are production aspects considered and integrated in the concept development phase? (where can this be found in TPIN)
13. In what way are market aspects considered and integrated in the concept development phase? (where can this be found in TPIN)
14. Who in the project uses TPIN?
15. How does these persons use TPIN?
16. How do you use TPIN? How often?
17. To what extent do you follow the procedures in TPIN?
18. What effect does TPIN have on the handling of information in the concept development phase?
19. In what way can the integration of different functions be strengthening by the information that is communicated through TPIN?

20. How is information spread among the different functions in the concept development phase
21. How is responsible that the information is accessible and spread to all the projects stakeholders
22. Are all involved persons in organizational functions well aware of the project management process and what is supposed to be carried out in this phase?
23. In what way can TPIN help visualizing the process?
24. What is the major advantage of TPIN?
25. What is the major disadvantage with of TPIN?

Appendix 2. Terminology

Best practice – the best known way to do a specific type of work.

Coordination – a way of combining a number of functions and actions. Coordination can secure that different tasks are completed at certain time and help making relevant information available to the decision-makers.

Framework – a brief set of ideas for organising a process about a particular type of situation.

Information management – handling the flow of information in organisations.

Information system (IS) – a system that uses information technology to capture, transmit, store, retrieve, manipulate, or display information used in one or more business process

Information technology (IT) – is the hardware and software that makes information systems possible

Integration – the connection and mutual responsiveness and collaboration between different functions and activities. The extent of integration can be related to the speed which one responds to events in the other. This speed depends on both the immediacy of communication and the degree that functions respond to the information communicated.

Integrated product development (IPD) – consist of parallel activities that have to be integrated with each other to create an efficient and effective product development

Milestone – crucial point in time in a project, subject to certain targets to be met and / or decisions to be taken. Can be independent of project phase transitions. Milestones are a project management tool.

Process – an organised group of activities that together create a result of value to the customers. The process has a beginning and an end and is always the same.

Project – an activity or field of activities carried out with a defined objective, during a limited period of time, with specified resources, requiring a temporary, well-defined organisation.

Tollgate – predetermined decisions points where it is decided if a project should go on or not.

CA – Carton Ambient

IPD – Integrated product development

TPIN – Tetra Pak innovation network

TPIP – Tetra Pak innovation process

