Product Development Projects in Special Vehicle Industry

Aspects on Time-to-Market

ERIK HALÉN DAHLSTRÖM

MG101X Examensarbete inom Maskinteknik
Stockholm, Sverige 2010
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av

Erik Halén Dahlström

MG101X Examensarbete inom Maskinteknik

KTH Industriell teknik och management
Industriell produktion
SE-100 44 STOCKHOLM
Abstract

In today’s ever more competitive market for automobile manufactures, companies have to compete beyond basic means of high quality, differentiation and low cost they also need to apply speed in their product development process in order to meet market demand. The special vehicle companies that base their products on standard automobiles are also highly affected by this competition to deliver their products accordingly. The total time it takes to identify, develop and deliver a product or service to the market is defined as time-to-market.

An increased need for speed in the product development corresponds to a reduction in a company’s time-to-market.

This thesis investigates strategies and means of cutting time-to-market and how these can be applied to a company in the special vehicle industry to gain a competitive advantage.

Through the study of literature in the field of product development with focus on the time-to-market aspect this thesis has investigated what strategic factors and actions that exists and how these can be applied to a company in the special vehicle industry. As empirical object the Swedish company Nilsson Special Vehicles was studied through interviews and access to company material.

The most important results concluded in this thesis as factors and activities in reducing time-to-market are,

- Reduction of bureaucracy and improved fast decision-making.
- Adoption of Integrated Product Teams and Cross-Functional Teams
- Performing Simultaneous engineering in which all interested parties actively participate.

These fundamental structural ways of carrying out work in an organization are the most important ones that a company can adopt in achieving time-to-market reductions.

This thesis also concludes that Nilsson’s product development is effective and already performs many of the activities written about in this study. Although the company could possibly achieve even further reductions in their time-to-market, one improvement would be to increase the amount of activities performed concurrently in the product development.
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1 Introduction

In today’s ever more competitive market for automobile manufactures, companies have to compete beyond basic means of high quality, differentiation and low cost. In order for companies to be competitive they need to, now more than ever, apply flexibility and nonetheless speed into their Product Development Process.

Fast changing trends and shorter lifetime for vehicle models contributes to a more rapid market in the automobile industry. In order for companies to deliver new products in time with market demand their product development process must deliver accordingly.

With an increased need for speed in the product development a concept called Time-to-Market (TTM) has emerged over the years. Time-to-Market is defined as the total time it takes to identify, develop and deliver a product or service to the market. TTM is believed to support companies in reducing time spent on product development.

1.1 Background

The special vehicle industry has since the early days of the automobile been present side-by side by the standard automobile industry performing modifications and improvements on standard products. Special vehicle manufacturers usually build their vehicles based upon existing standard automobiles by changing them in one way or another. These companies are dependent on the standard products and many times they can’t begin their product development until these products are introduced on the market. Although there’re exceptions for the official OEM bodybuilders that normally receive trail series from the companies earlier. Nonetheless players in the Special Vehicle Industry require speed in their product development to meet market demand. The time to market aspect is a crucial competitive factor in this industry.

1.2 Aim

The aim for this thesis is to investigate strategies and means of cutting time-to-market and how these can be applied to a company in the special vehicle industry as well as to give an insight in the competitive environment where these manufacturers operate. Following questions will be answered.

What strategic time-to-market reducing activities exist?

What are the most important factors and actions in reducing time-to-market?

In what terms may time-to-market reductions be crucial to a special vehicle manufacturer?

How can a company in the special vehicle industry apply these?
1.3 Delimitation
In this thesis delimitation has been done to contain the most accurate in product development that corresponds with and connects to the time-to-market aspect.
Since a very wide content and meaning of product development this thesis does not include all aspects but focus on how different factors in the product development can be managed in order to attain a reduced time-to-market.
The organizational structure for performing activities in the product development is in this study assumed to be on a project basis.

2 Methods
2.1 Literature review
Literature in the fields of product development and management was studied. Delimitation was done to the competitive means of product development. These means were then combined with a management viewpoint of how these could be adopted and apply to an organization. The literature was attained at the library at The Royal Institute of Technology as well as from the Internet service Google Books, among with other databases on the Internet. The most frequent keywords used in the literature search and selection was; Time to market, Product development, Automobile industry etc.

2.2 Empirical study
An empirical study was made on the Swedish company Nilsson Special Vehicles, also referred to as Nilsson. Nilsson is a leading manufacturer of special vehicles on the European market. The company was studied through interviews and access to company records, such as Annual Reports and product development projects.

The interviews were performed face-to-face with Mr. Per Dahlström, CEO for Nilsson Special Vehicles. Interviews were hold on two different occasions during the time of this course, each lasted about two hours. I have personal experience from working in the company that has given me an even further insight in how the company operates.
3 Competition in the automobile industry

Presenting and offering the market new products is central to the competition in the automobile industry. The importance of the automobile in means of transportation in today’s society creates a high potential market for new products.

The global turnover of the automobile industry approaches the €2 trillion mark, equivalent to the 6th largest economy in the world (OICA, 2006). With over 70 million vehicles produced worldwide in 2008. As of 2008 more then 300 000 vehicles were produced in Sweden alone (OICA, 2009).

With an ever-higher competition in the marketplace, automobile manufacturers need to seek an edge in product development in order to attract customers and be competitive. A turbulent environment for the automobile companies has emerged as a result of increased competition, new technology and a new generation of buyers. In this environment the advantage goes to the firm that can offer a greater variety of new products with higher performance and greater overall appeal (Clark, K. Fujimoto, T., 1991).

There’s a wide range of factors, which results in a company’s competitiveness, although the focus in this study is devoted to the critical competitiveness of the product development process itself. The authors of the book *Product Development Performance* (Clark, K. Fujimoto, T., 1991) states that performance of the product development can be measured in the following factors.

- Total Product Quality (TPQ)
- Time-to-Market (TTM)
- Productivity

The aim should be to maximize Productivity and TPQ and to minimize TTM.
4 Product Development

Due to enormous changes in the automobile product development environment, it’s obvious that a strong product development system is a crucial core competence and fundamental to the success of any consumer driven company (Morgan, J. Liker, J., 2006).

Product development in the automobile industry has become more challenging due to the increasing complexity in today’s vehicles. This has come to change the way product development is looked upon, from being just a manufacturing capability to become a strategic necessity. Today a company’s opportunity for competitive advantage is probably the largest in its product development. This is due to the fact that gap in manufacturing performance is getting narrower and companies in the automobile industry will have to compete with other means. The fact that the manufacturing system only can affect quality and productivity, whereas the product development can attain the customers-voice and thereby affect product demand supports the statement (Morgan, J. Liker, J., 2006).

In the product development a company makes strategic choices in terms of performance, time and money (Kmetovicz, R.E., 1992).

New product development is an intellectual process that provides ground rules for determining and allocating resources to achieve success (Thomas, R. 1993).

Business success correlates strongly with enterprises that deliver what the customer wants and needs at the time they want and need it. If a company manages to translate the customer’s requirement into a product that can be offered to the customer in the customer’s right time frame, then the odds for a successful business increase (Kmetovicz, R.E., 1992).

In the book *New product development* (Thomas, R. 1993) the author Robert J. Thomas writes that new product development should be Strategic, Flexible, Interactive, Integrative and Ongoing.

![Picture 1. Time to market vs. product market success.](image-url)
4.1 Product Development Structure

The Product Development process consists of different phases McGrath defines these as the following in his book *Setting the PACE in product development* (McGrath, M.E., 1996).

1. Concept Evaluation
2. Planning & Specification
3. Development and Engineering
4. Evaluation
5. Product release

In order to gain a structured process for the product development, each phase needs to be divided into steps. It is important that each step is well and properly defined since they constitute the basis of scheduling. The steps work as a link between phases and tasks. Each step is divided into a number of tasks that define how that step is done (McGrath, M.E., 1996).

4.2 Outstanding Product Development

The authors in the book *Product development performance* (Clark, K. Fujimoto, T., 1991) claims that, It’s the overall pattern of consistency in a company’s total development system that discerns outstanding companies in their product development.

Increased expenditures on research and development, new tools and techniques, getting a right project planning system, implementing quality function development (QFD) and installing advanced computer-aided design (CAD) systems are valuable practices and equipment to and effective product development but these are not sufficient.
“Wasted time is the hardest form of waste to eliminate, because it doesn’t lay on the floor where you can trip on it” – Henry Ford

5 Aspects on Time-to-Market

Time-to-market is defined as “Length of time taken in product development process from product idea to the finished product. It is a critical component of time based competition” (Business dictionary, 2010).

The most common motivator for reducing time-to-market it the so-called “market clock”, that is the clock which starts ticking when a new product becomes desirable by customers. The clock keeps on ticking till the product either becomes obsolete or is intentionally replaced (Mascitelli, R. 2006).

The author Cyril Charney states in his book Time to market (Charney, C., 1991) that to make a time-based strategy work, it must be integrated. The components are Planning and evaluation, Goal setting, Simultaneous engineering, Reduced bureaucracy, World class manufacturing and the use of computers in design & manufacturing.

5.1 Planning and Evaluation

To develop any meaningful change in business strategy, senior management needs to evaluate:

- Where it wants to be.
- Where it is now.
- What the gap is, so it can plan to close the gap.
- Ask customers about their satisfaction with the goods and service provided.
- Study competitors.
- Evaluate growth in relation to the market.

5.2 Goal setting

To have key players pulling in the same direction, it is important that each identifies with the same goals. Good goals are characterized by being; Specific, Attainable, Measurable, Challenging and Desirable.

5.3 Simultaneous engineering

Simultaneous engineering provides for the active participation of all interested parties in design. They work where necessary with a common database. The sharing of information and ideas helps to reduce territorialism, and increase energy directed at common goals.

Simultaneous engineering can reduce design time by:

- Involving all key decision makers;
- Provide for instant communications and feedback using a common database;
- Dealing directly with key people instead of following formal organizational lines.
5.4 Reduced Bureaucracy
Decision-making in most organizations takes much longer than needed due to:

- Multi-layer management which prevents decision makers from having access to knowledge at all need-to-know levels;
- Conflicts among departments;
- Unwillingness of managers to trust lower level people to make decisions regarding things that they are knowledgeable about.

Successful organizations empower lower level people to make more decisions. Self-managed work teams have become more common where team members are encouraged to take responsibility for carrying out different duties.

5.5 World class manufacturing Techniques
Make use of established successful techniques with large time saving components, such as the Just-In-Time concept and Statistical Process Control. Just-In-Time techniques will help reduce waste, work in process and cycle times. Statistical Process Control on the other hand provides the measurements to track changes and ensures that time is spent making the product right the first time.

5.6 The use of computers in design & manufacturing
The speed and accuracy new computer-aided working tools offer should be adopted by the organization in order to reduce process time and increase effectiveness in the making. The use of computers allows work to be viewed and modified much easier. Work from earlier projects can with advantage easily be reused and modified.

This literature study has discovered that there exists a whole range of different practices corresponding to Time-to-market, the most frequent appearing are Lean Product Development, Integrated product teams and Cross-functional teams.

5.7 Lean Product Development
The fundamentals of lean product development is to integrate sales and marketing design, purchasing, engineering, manufacturing and suppliers, in product design (Morgan, 2006)
The company *Accelerated Product Development* (Accelerated Product Development, 2010) states three lean product development principles:

1. Work on what’s important
2. Concentrate the work
3. Reuse knowledge
5.8 Integrated product teams
The development of complex new products in the automobile industry requires the cooperation of a wide range of specialists with unique expertise. In order to battle problems which tend to occur when groups with different profession and expertise view the product from its very own perspective, organizations can go through a radical restructuring process known as integrated product teams. By replacing organizational structures which focus on functional specialties with structures that look more to the product being developed. Cross-functional teams are usually adopted to achieve this (Verzuh, È., 2005).

5.9 Cross-functional Teams
Cross-functional team is a group of people whom poses different functional expertise which work toward a common goal. Mr. Glenn M. Parker describes in his book Cross-functional teams (Parker, G.M., 2003) six important competitive advantages cross-functional team possess.

1. **Speed.** Cross-functional teams reduce the time it takes to get things done, especially in the product development process.
2. **Complexity.** Cross-functional teams improve an organization’s ability to solve complex problems.
3. **Customer focus.** Cross-functional teams focus the organization’s resources on satisfying the customer’s needs.
4. **Creativity.** Cross-functional teams increase the creative capacity of an organization by bringing together people with a variety of experience and backgrounds.
5. **Organizational learning.** Cross-functional teams tend to have members that more easily can develop new technical and professional skills, learn more about other disciplines and learn how to work with people with different background and team-player styles.
6. **Single point of contract.** The cross-functional team promotes a more effective cross-team effort by identifying one place to go for information and for decisions about a project or customer.
6 Competition in Special Vehicle Industry

This chapter is based upon my own experience of the industry, there’s a lack of literature covering this subject.

The special vehicle industry has a lot in common with standard automobile industry. What differs between the two industries is that the special vehicle industry is supplying a more specialized demand. This has complications, first the customers are much more demanding, second the marketplace is much more limited.

Special vehicles are defined as vehicles that differ from other vehicles with its purpose to serve various special needs. These needs are mostly functional such as the ability for a fire truck to transport and deliver water to a fire. The need for special vehicles in today’s society is large and can best be illustrated with the need for emergency vehicles. There’s however a wider market for special vehicles, such as that for limousines, hearses and other functional orientated vehicles.

Functionality is usually the key importance and a major determine factor among customers. The need to incorporate the voice of the customer in the company’s product development is therefore very crucial to success in this industry.

With a much more limited market for special vehicles it is difficult for companies to reach volumes and profit. Since of limitations in demand for special vehicles on the market, companies in this industry tend to expand their presence onto markets in other countries.

One should note that when it comes to the manufacturing of special vehicles it’s almost never done by the Original Equipment Manufacturer (OEM). The production of special vehicles is mostly performed by specialized companies in this industry.

For OEM to perform development and production of special vehicles along with their standard products is a rare occurrence. Since stretching, special modifications among with armoring are processes in need of high specialization, independent companies in the special vehicle industry mostly tend to perform them. There’s not enough volumes and to much need for specialization in developing and producing special vehicle and therefore commonly not done by mass production automobile manufacturers.
7 Empirical study - Nilsson Special Vehicles

Nilsson Special Vehicles is one of the leading special vehicle manufacturer in Europe. They produce and sell limousines, ambulances and hearses. Their largest markets are Scandinavia and United Kingdom, but the company also sells to other markets outside Europe such as Asia, Africa and the Middle East. Nilsson currently employs 50 people in different fields of expertise and was founded in 1946.

The company has an effective production-process for special vehicles that are to be stretched and modified to serve in different fields (Nilsson Special Vehicle, 2010). Currently the products are mainly based on cars from Volvo, models S80 and V70.

7.1 Product Development Structure

Product development at Nilsson’s is performed in projects, and the product development process is structured into the following stages.

Stages in the process *(Total time frame 9–12 months)*

1. **Market Analysis including customer demands and requirements**
   Analysis of market trends and market potential. Analysis of customers’ needs and demands are performed. Requirements and demands are categorized and evaluated.

2. **Concept Evaluation**
   Decision concerning general concept e.g. type of vehicle.

3. **Planning & Specification**
   Decision regarding specification as well as when and how processes are to be performed, time frame, in-house or externally?

4. **Development and Engineering**
   Design and technical specifications operations are carried out. Problem solving is a key in this stage were different operations might need to be re-engineered for one reason or another to live up to the requirements.

5. **Evaluation**
   Evaluation of solutions concerning design and technology as well as functionality.

6. **Final product concept**
   Decision on which composition the final concept should consist of.

7.2 Product Development Strategy

The main goal in the company’s strategy is to satisfy customer and market demand. Mr. Dahlström says, “Our most important goal is to produce a quality product that will live up to and satisfy customers expectations, and deliver it to them at the time they want it”.

For Nilsson suppliers and partners are extremely important both in construction and design and they affect the way the development structure is defined and carried out.

As a good example of how the customers voice is regarded in the product development Mr. Dahlström explains how they chose the base material in the company’s new ambulance project. “Customers and operators are asking for a higher load capacity in our ambulances, and therefore we have chosen to solve this by choosing a light weight profile for the base material, in order to satisfy customer demand. This will not only give an improved loading capability but will also yield positive operational result such as environmental and economical benefits”.

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Nilsson is applying a modular platform for different reinforcements like stretch of floors as well as for the b and c pillars in the chassi construction. Mr. Dahlström says, “Modular platforms for certain components save us time in development and production”.

Nilsson constantly evaluates and studies their projects. For the work to live up to the projects time frame, process are evaluated to meet requirements. By continual evaluation of projects problems and difficulties are acknowledged and can be dealt with in time.

7.3 Time-to-Market Perspective

There is a more demanding need for a shorter time-to-market in the development of Nilsson’s limousines compared to that of their ambulance. This is because the limousine is much more affected by trends and fashion, Mr. Dahlström ads “the customers of our limousines has larger need of having the latest models and trendiest design”.

When I ask Mr. Dahlström about the key to Nilsson ability to have an time effective product development process he says that “fast decision making, direct solutions and integrated project groups with steering control are our key strengths in being fast”.

At Nilsson the product development is carried out very integrated among the employees and the different expertise and knowledge that they possess. A necessity for success Mr. Dahlström ads is the importance of working with cross-functional teams.

The total time frame for a new product development project is about 9-12 months. A major time consuming activity is the side by development of production related tools. Which are produced by Nilsson itself as well as by suppliers. Also necessary vehicle testing has to be performed such as endurance, collision and other types of certifying tests, these are time consuming activities Mr. Dahlström says.

Mr. Dahlström says, “Evaluation of the project helps us to find failing links and activities we can do better and faster. Our goal is to always improve our performance and to strive for a shorter time-to-market when its possible and wont negatively affect other processes”.

Nilsson has good cooperation with Volvo Cars that enables the company to retrieve information regarding coming models as well as trails series before Volvo introduces the products on the market. Mr. Dahlström says “Our cooperation with Volvo is crucial for us so that we can deliver our products in time with market demand”.

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8 Discussion

First it should be said that product development is a complicated process that consists of and build upon a range of parameters and factors. Time-to-market is one of the important factors a company can compete with, although it must be understood that no time-to-market reductions will help gain competitiveness unless the product itself will live up to basic demands such as functionality, quality and price.

Product Development

The structure of the development process Nilsson applies differs from McGraths described in chapter 4.1. McGraths structure has no market analysis express prior the concept evaluation. It must be acknowledge that no product development will ever make sense unless it is based upon some kind of market demand.

If the steps in the development process are not well defined then the company will have difficulties in improving the time-to-market. This is because it will be much more difficult evaluating a process which is hard to identify of its contents and purpose. Evaluation is essential and the key to improvement.

An important overall strategy in the product development is to have an effective problem solving, which directly will correspond to the development time.

Time-to-market

Reductions in time-to-market can enable a company to offer the market its product when so fits and thereby become more strategic enabled. There are many advantages with having a short time-to-market, were possibly the most common is that the company can be among the first to launch its products on the market.

Since the fact that no one business is the other alike, there is not an exact plan or model of how reduce time-to-market. What improvements a company may choose will depend on how they are structured and what their organizational values are.

Nilsson’s key to a short time-to-market is based on fast decision-making, direct solutions and integrated project groups with steering control. The later identified as cross-functional teams with high decision-making ability. The bureaucracy is low which means decision-making is very direct and doesn’t have to go through many layers. Cross-functional teams contribute to decision-making at lower levels which speeds up processes.

Nilsson has a culture for solving problems as they appear and won’t let any problems be pushed away nor to disrupt the ongoing work. By making use of knowledge attained in other projects the company can more effectively learn from similar problems and mistakes and help avoiding repeating them. Good communications between projects speeds up engineering and problem solving.

One obvious major strategic action for reducing time-to-market is to provide the project more resources, in terms of budget and personal. Nilsson could if manageable try to relocate or hire more personal to work during the intense periods in the product development process. The cost of acquiring more manpower should be measured against the gain in attaining a reduced time-to-market.

The use of computers in the design process nowadays enables Nilsson’s to work faster then before.
Nilsson’s product development process is effective and can be regarded as fast in relation to the development time of cars in standard automobile industry. Although the existence of this fact there is always ways and potentials for improvements, were time-to-market may be one. Concrete suggestions are expressed in the conclusion.

Its important however to understand that in many business-cases fundamental change of the way an organization work is required in order to reduce the time-to-market. Among many people the implementation of change is met negatively, though it may be crucial and necessary for improving the time-to-market.

An important aspect not studied in this thesis, is to develop products with aspect on shorter and easier production. This can be achieved by applying techniques such as Design for assembly and manufacture. Also different process that can lead to improved quality in the final product can be imposed, such as the Six Sigma and Quality Functional Deployment (QFD). It should also be mentioned that the labor efficiency has very much to do with how fast different processes can performed. This thesis does not bring up this aspect on human resource management.
9 Conclusion

As this thesis has shown it exists a range of different activities that a company can adopt and pursue in order to reduce their time-to-market.

As of the literature study as well as based upon the study of Nilsson it can be stated that the most important factors to a short time-to-market strongly has to do with the company’s organizational structure. The most important factors and actions in reducing time-to-market is,

- Reduction of bureaucracy and improved fast decision-making.
- Adoption of Integrated Product Teams and Cross-Functional Teams
- Performing Simultaneous engineering in which all interested parties actively participate.

These fundamental structural ways of carrying out work in an organization are the most important ones that a company can adopt in achieving time-to-market reductions. These are crucial because they make up the ground and base in a successful product development structure enabling a free flow of information, fast decision-making and cooperation between knowledge and skills.

The integration between people and knowledge from different divisions and layers in the organization is one of the keys to a fast working business. The adoption of integrated product teams and cross-functional teams can be said is crucial in achieving this. This will enable decision-making as well as exchange of information and knowledge to take place much easier and faster. Nilsson applies and practices this very well which allows them to have speed in decision-making and other process were integration is required to manage the development process.

For a special vehicle manufacturer time-to-market reductions can be crucial. This is due to their dependency on standard products on which they base their own products. Since they cannot begin their development process whenever they like, its extra crucial for these companies to have a fast working development process. Reductions in their time-to-market can enable them to gain a competitive advantage by supplying demand much earlier.

After having studied Nilsson and its product development there is actions that could result in an even further reduction of their time-to-market. Due to the company’s high quality goal and strategy this cannot be affected by a possible time-to-market reduction. So the recommendations I give Nilsson based upon this study for further improvements in the company’s time-to-market are,

- Increase the amount of activities performed concurrently in the product development.
- Create a database in which better communication between projects is made possible so that knowledge and solutions are made available for all participating personal.
- Seek improvement in the cooperation with Volvo Cars to enable an even further exchange of information as well as earlier access to new products and trials.

At last there should exist no doubt about the importance of evaluation. In order to achieve any type whatsoever of improvement it is crucial for an organization to be able to evaluate its processes and work. Improvements can only be made as a result of evaluation. For enabling the possibility for the company to manage the evaluation of its processes easier they should be well defined.
10 References

Books


Publications from websites


Pictures
11 Thanks

I want to thank Mr. Per Dahlström CEO of Nilsson for his time and effort in giving me valuable information and insight in the company. I also would like to express my thanks to my instructor Pernilla Ulfvengren at the institution of Industrial Management for giving me good advice and assisting me in the making of this thesis.