

**Outsourcing of new product development activities.
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2013, September.**

Introduction

New product development (NPD) is a very knowledge intensive activity that highly depends on the competence of a team of individuals.

At start of a project there is usually a vision about the user needs of the new product, however, there is often no clear understanding about the optimal set of technical specifications that will fulfil these user needs in the most economical way. These unknowns must be filled in during the project and this makes outsourcing of NPD different from outsourcing of production.

Nevertheless, outsourcing of NPD activities did come up strongly in the last decade. According to the Millennium Research Group, the global market for outsourcing is estimated as \$7.1 billion dollars in 2009. Of that volume, the design-engineering segment was valued at 8.6% growing to 14.4% in 2009. As often, the trend to outsource NPD started in the US and is currently coming to the EU.

Although outsourcing of NPD activities is a clear trend, there is little knowledge about the factors that make outsourcing to a success. In this article some important aspects are discussed that should be taken into account when outsourcing NPD activities to a subcontractor.

History of outsourcing

In the ancient days, where people lived in tribes, all resources needed to survive were provided by the families within that tribe. Later, when villages developed, people start to specialize in certain skills, resulting in an increased efficacy.

During the industrial revolution (1800's), companies more or less behaved in the same way as the ancient tribes. The companies were vertically organized, from mining of raw materials to selling their goods in company owned stores. These companies had their own tax department, took care of their own insurance and legal issues and had their own transport and construction department that build their own factories. Outsourcing was a very rare phenomenon at that time.

Especially in the late 19th century all these processes became more and more complex and it was economically simply not feasible to maintain all up to date knowledge in house. Companies reacted by starting to focus on their core business and as a result the first specialized firms started that were specialized in well-defined areas like insurance, tax and legal services.

Outsourcing of manufacturing followed later, especially because of improvement of infrastructure, use of ICT and decrease of transportation costs. Production moved to low wage countries and to companies who invested heavily in up to date production facilities in order to increase efficacy. From the early 2000th on, outsourcing of intangible activities like new product development gained popularity. Currently, technical possibilities develop so quickly that it is difficult to maintain up to date knowledge in house in an efficient way. Because outsourcing of NPD projects is a relative new way of cooperation, many companies are still struggling to make this process effective.

Reasons for outsourcing

There are many articles that describe the main reasons why a company should outsource NPD activities. However companies should not outsource NPD activities just because it is seen as a trend. Jonas Rundquist showed in his PhD study that companies approach outsourcing of NPD activities from 5 different perspectives. For every perspective the factors that support outsourcing and those that support not to source out NPD, differ.

- *Transaction cost based perspective:*

When a NPD project is conducted by a specialized subcontractor that has up to date knowledge and a strong focus, the investment in the NPD project will normally be lower compared to in house development. This is only true when all costs, fixed and variable, are incorporated in the comparison. However, one should not only compare the internal costs of a NPD project with the actual service costs as offered by the subcontractor. A company should also take into account the "transaction costs" of selecting the subcontractor, negotiation, monitoring, managing and transferring the result back to the company.

Cases where the new product is lower of complexity and where the supplier has an established relation with the company will result in lower transaction costs. Products with complex technology and lots of uncertainty will lead to higher transaction costs. Transaction costs will also increase when the firm has no previous experience with outsourcing.

- *Risk based perspective:*

In every NPD project there is risk involved and companies that outsource the development of a

product have to deal with these risks and the company must invest in monitoring the outcome. If the behaviour of the outsourcing partner could be predicted well and clear agreements on deliverables can be made, it would be worthwhile considering outsourcing. On the other side, if it is hard to measure the outcome the result of a NPD project, this may be a reason to conduct the project in house or to start with a small consult to define clear deliverables.

- *Resource based perspective:*

When the company has a lack of in house resources, outsourcing could be a good option, particularly, when these resources are of low strategic importance for the company. On the other hand, when the resources that are required must have a very high quality or have a high level of specialty, outsourcing is also an option. When these resources have a high strategic importance for the company or if they are very hard to substitute it may be a better option to keep NPD in house. Furthermore it is important to consider how dependent the firm will become from the subcontractor.

- *Knowledge based perspective:*

In every situation a NPD project will generate new knowledge, both for the subcontractor as for the company. This knowledge could be of very strategic value for the company. When the knowledge could be transferred from the subcontractor to the company in a good way, outsourcing could be an option. If this is not possible in an effective manner it may be better to carry out the NPD project in house.

- *Institutional perspective:*

Especially for medical device companies this perspective gained importance over the years. Historically, medical device companies used to do NPD projects in house because of the complexity of the quality system that must be followed to meet the requirements of the medical device directive. However, due to the influence of notified bodies, the development processes of medical device companies become more uniform and specialized subcontractors have implemented their quality system in such a way that they are able to cooperate with their customers in an efficient way. This makes it easier to outsource NPD projects to specialized subcontractors.

A company does not decide to outsource a NPD project based on one simple reason like "lack of resources" or "do not have the expertise in house". In contrary, it is a balanced decision where pro and contra from all the 5 perspectives are considered.

Critical success factors

Once a company made the decision to source out an NPD project it cannot simply give an order to a subcontractor and just waiting for the results. The success of outsourcing NPD projects depends on the following critical success factors: (1) mutual understanding of project objectives, (2) avoid drift in design requirements, leading to "scope creep", (3) be realistic about lead times of various processes like production and testing and (4) plan enough effort to transfer the results back. There are also risks involved when outsourcing NPD projects. In the few studies that are published it is interesting to see that these risks are judged differently, depending whether they are considered from the companies' perspective or subcontractor's perspective.

Companies' perspective

- Not enough capability and experience to manage the subcontractor.
- Aversion of project risks and not allocating contingency budgets
- Unrealistic expectations of the capabilities of the outsourcing partner
- Strong focus on project costs and neglecting quality and time to market
- Change in priorities during the project
- No clear business case communicated to everyone involved

Subcontractors' perspective

- Underestimation of total project costs
- Overselling capabilities and like hood of project success
- Lack for asking proper and honest feedback
- Clear communication of project issues and consequences
- Focus on their expertise without managing the complete project
- Do not maintain design history files in an accurate way

It is important to understand each other concerns about the project risks at start of a NPD project so they can be managed properly.

The control parameters for an NPD project

Critical success factors will influence the success of a NPD project but it does not give guidance how to control a NPD project. In every NPD project, whether it is outsourced or not, there are three important parameters to be controlled: Costs, Quality and Time. The easiest way to maintain control is to simply constrain these parameters. This approach will only lead to satisfying results when the company has a complete list of technical specifications available because these technical specifications highly determine the resources that are needed to develop the product. In reality, a complete list of technical specifications is often not available at the start of a NPD project. Usually there is only a global set of user needs defined like "easy to use", "low cost of goods" and "reliable". As a consequence, the planning of resources can be less accurate and if no measures are taken on beforehand, the project may end with higher costs than expected, a lower quality than required, or the development time was longer than planned.

During a Medical Device & Manufacturing conference in 2004 this topic was extensively discussed. It was concluded that, instead of focusing on controlling all the three parameters Costs, Quality and Time, it is more beneficial for companies to focus on quality and lead-time, and taking adequate measures to monitor the costs. It was concluded that, at the end, this approach brings the most revenues for companies. The reason behind this conclusion is called "opportunity costs".

Opportunity costs

Before starting a NPD project the company must have a business case: the reason why this NPD project should be carried out. In order to achieve the goals as defined in the business case an investment budget is allocated, there is an idea of the quality of the results and a project lead-time is defined.

At start of a NPD project there are still uncertainties how to translate user needs into clear technical specifications. These uncertainties have to be identified and monitored throughout the project. Measures should be defined on beforehand in terms of time buffers and financial resources in order to handle issues accurately when they occur.

When there is not a plan available how to deal with issues this will inevitably lead to time delays and loss of quality. As a result revenues come in later and are lower than expected. These missed revenues are called "opportunity costs" and this loss is usually much higher than the extra budget needed to solve this issue. For example, if a market introduction is three months later than planned this could easily lead to missing turn over in order of magnitude compared to the complete investment in the NPD project!

A company should realize that by focusing on the height of a development budget a NPD project can be controlled easily during the development phase; however, it could also lead to extensive losses of potential turn over (opportunity costs) after the development phase when the product is on the market

Literature

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