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# RECOGNIZING THE NEEDS FOR IMPROVING THE PORTFOLIO MANAGEMENT FOR NEW PRODUCTS IN THE INDUSTRY

F. Larsson, N. H. Mortensen and M. M. Andreasen

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## 1. Introduction

Portfolio management for new products, i.e. the supply of and the assessment, prioritization and selection of ideas for new products is widely regarded as vital to achieve the best business value through successful new product development. Whereas product development is focused on doing projects the right way, portfolio management focuses on selecting and doing the right projects. The lack of sound portfolio management for new products increases the probability that the company's product portfolio will have a potential low business value [Cooper et al 2001]. This is due to an improper composition of too many low-value projects i.e. minor product modifications, product extensions etc. Eventually this can lead to organizational strategic drift [Johnson & Schools 1999]. Simultaneously this might impinge low efficiency in the company due to an unfocused deployment of organizational resources e.g. resources are spread too thinly over too many projects and subsequently the quality of execution suffers.

This paper reveals that portfolio management for new products also seems to be a problem in the Danish industry. However, the authors recognize that the existing models and tools cover many important aspects. In the research presented in this paper it is assumed that existing approaches to portfolio management can be enriched by adding models that explicitly show leitmotif from technology to a business system. It is assumed that the purpose of portfolio management is to support senior management in the process of making "good" business decisions, which will increase the probability of achieving a potential high value of a company's portfolio of new products. Further, it is assumed that a business decision can be considered "good" if it leads to satisfying business results in terms of efficiency and effectiveness. Effectiveness refers to the potential value of a business opportunity and encompasses aspects such as need recognition, ideation, hit rate and innovation. Efficiency refers to how well a company exploits its competencies, resources and capabilities.

The paper aims at forming the foundation of a Ph.D-project engaged February 2003. Initially, this research will present the results of a portfolio management survey in the Danish industry followed by insights offered from literature. Next, the authors assume that it is possible to create models that support and improve the idea selection process by applying a road mapping approach to portfolio management, which considers simultaneous design of product, technology and supply chain. Important aspects to be embedded in such models are identified. Finally, the paper describes the method to be applied in conducting an industrial case study, which will be used to test and further develop the models in the Ph.D-project.

## 2. Methodology

A corporate strategic and management perspective is applied in the research. According to [Cooper et al 2001] the "goodness" of a portfolio of new products is characterized by high value (economic worth), balance (in terms of various parameters) and strategic alignment (reflects the business strategy). These three high-level goals will partly form the basis of this research. The results of the initial framing presented in this paper are based upon explorative interviews with industry professionals in Danish companies combined with a literature review. The purpose is to gain an understanding of phenomena related to portfolio management and to gather an overview of existing methods and approaches. Based on this understanding the first step towards models for portfolio management is then presented as various aspects the authors assume are important to clarify.

## 3. Industrial survey

The industrial survey includes ten Danish companies and manufacturers of mechatronic products ranging from one-of-a-kind production to mass production. It is based on face-to-face interviews on location with staff from senior management such as director of innovation, director of product development, vice president of new business, vice president of product management etc. The research method applied for the survey was semi-structured explorative interviews. In advance of the interviews a set of questions and an interview schedule was prepared with the defined purpose of identifying facts, behaviour and attitudes concerning current portfolio management practices in the company. They were particularly asked to explain what they consider to be most important points of improvement in relation to assessment, evaluation and selection of ideas for new products. The essence of the interviewee's response has been captured by making notes during the interviews. Some of the central statements are described in the next quotings in italic:

**Company A, Manager of technology & strategy:** *The job of my group is to develop project ideas for new products, technologies and services across our 12 strategic business units in order to create new business opportunities by exploiting their resources and competencies and if necessary aquire new alike. Our big challenge is to become better at pointing out ideas, which in the best way exploit synergies across our strategic business areas and the different customer segments they serve. How can we model the ideas we have in our hand? We always end up with the same question: "Is this a good idea?"*

**Company B, Product development manager:** *When we come up with our own ideas the process takes longer time. Furthermore, only very few ideas reaches the market as products. Nobody wants to make the Go/No-go decisions. This is due to the fear of mistakes that we have to finance ourselves. Drawings and proposals from sub-contractors seem to be acquired in a never-ending stream in our efforts to minimize the risk. It would be great if we had some kind of tool, which could help us here.*

**Company C, R&D director:** *Technology projects are started separately based on my intuition. We "buzz" about the ideas for new products on a regular basis. Then I choose some which are presented to our product steering committee. The committee reviews the list of ideas and evaluates the individual ideas. No specific tools are deployed in this work. When the ideas have been chosen the discussion on resource allocation starts. Our industry is characterized by the execution of projects that continuously get more expensive, more difficult and long lasting, and the degree of industrialization increases. Our most important point of improvement relates to the way our product steering committee works. For now it works fine, but what if the market changes?*

**Company D, Director of innovation:** *We do have an innovation steering group, which focuses on a 4-7 years perspective. And our product decision forum makes Go/No-go decisions on the specific projects. However, the way we select ideas today seems very subjective and random. It needs to be improved, e.g. in terms of better risk distribution and diversity among the ideas.*

**Conclusion:** Due to the small sample the survey cannot be regarded as representative for the Danish industry in general. However, the result is underpinned by the authors' experience from professional experience, consultancy etc. The initial framing has revealed several challenges related to portfolio management, which seems to comprise a major obstacle to Danish companies. Only one out of ten companies presented specific tools and an initiative (not yet implemented) towards systematic portfolio management. Other managers expressed that they feel uncomfortable about applying a systematic approach to the idea selection, because they are afraid that it might *kill the creativity*. At the same time, several managers recognize the need for *a way to handle* the idea selection. In general, **we do not see companies following a systematic approach**. Further, the interviews indicate a low knowledge of existing portfolio management tools among the participating companies. Only two models were mentioned, a financial model (Net Present Value) and a strategic model (SWOT - strengths, weaknesses, opportunities and analysis). In general, **few or none formal methods or tools are utilized.** Finally, the majority of the companies in the survey describe their idea selection as a subjective, political and random process with unclear criteria. In general, the **assessment, prioritization and selection of ideas seem unarticulated and too random** despite the fact that several approaches to portfolio management exist. This may partly be due to the industry's lack of theoretical insights [Blessing & Yates 1999] and/or because the models and tools proposed in the literature are insufficient.

## 4. Insights offered from literature

[Liyanage et al 1999] refer to more than 200 quantitative and qualitative methods for selecting R&D projects. They have identified the following main classes and scope:

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| Financial models: | Conventional investment decision. |
| Probalistic financial models: | As above but modified to handle the risk element present in product development in a better way. |
| Scoring models / checklists: | Benefit measurement techniques. |
| Behavioral approaches: | Systematic ways of integrating the collective wisdom of a decision making group. |
| Mathematical Optimization Procedures: | Search for optimal solutions applying operations research. |
| Decision support systems (DSS): | An interactive system based on a mathematical model that helps people make decisions. |
| Mapping Approaches: | X-Y plot where various parameters are plotted against each other e.g. "reward from each project against the probability of success". |

[Cooper et al 2001] have done extensive research into the correlation between portfolio management practices and performance results. They found that the businesses which have implemented a systematic and formal portfolio management system are clear winners. Further, the businesses with the best performance results tend to use not one, but a hybrid approach being strategy, financial and scoring models together. The term "strategy" refers to two general approaches. "*Strategic buckets*" is an approach that companies use to decide on and to allocate resources or funds in splits between technologies, markets or project types based on company vision, goals and strategy. The other approach is *road mapping*, which has been widely adopted in the industry. A product technology road map displays the type of developments and their timing, which should be carried out in order to realize the intended business strategy. A myriad of various road maps has been developed. According to [Phaal et al 2001] and [Albright 2002] the generic road map is a time-based chart comprising a number of layers that typically include both commercial and technological perspectives. The road map enables the evolution of markets, products and technologies to be explored together with the linkages between the various perspectives. [Phaal et al 2001] has identified eight categories of technology road maps based on purpose and eight categories based on format. The authors recognize that the existing models and tools cover many important aspects. In particular the road mapping approach combined with other

mapping approaches bringing strategy, financial and scoring models together will partly form the foundation of this research.

**Conclusion:** Existing methods for portfolio management support the procurement of information concerning market potential, practicability of ideas and alignment with existing product portfolio and strategy. In general, these dimensions are treated separately. The linkages between these dimensions are frugal which makes it difficult to explicate and understand the linkage from technology to a business system. Thus **methods do not make design degrees of freedom to portfolio visible and explicit.** The road mapping approach attempts to overcome this shortage by applying *drivers* linking markets, products and technologies. However, road mapping is focused on developing the physical artefact and thus do not consider the development system as well as the system of daily operations. In general, we see a **lack of methods containing explicit leitmotif from technology to a business system.** The financial models merely support estimating the economic effect from the projects. The mapping approaches support evaluating new projects effect on the portfolio balance on a limited number of dimensions, e.g. risk/reward, product/market, internal/external impact etc. In general, **methods do not support the synthesis of portfolio design but mainly the analysis of effects.**

In order to execute good business decisions one has to consider the evolution of a company's business system in general as stated by [Andreasen & Hein 2000]. Thus it is not enough that a company is capable of developing a proposed product from a technological point of view with its physical attributes, performance etc. which fulfil the customers need. This is supported by [Fine 1998] who found that not only superior market and technological forecasting ability, but also superior supply chain design are critical functions for an organisation. A supply chain is widely regarded [Tatikonda & Stock 2003] to be defined as a network of organizations involved from the beginning to the end in transforming and transporting materials and information in order to ultimately create and deliver valued products to end-users. [Fine 1998] points out that when firms do not explicitly acknowledge and manage supply chain design and engineering as a concurrent activity to product and process design and engineering, they often encounter problems late in product development, or with manufacturing launch, logistical support, quality control and production costs. In addition they run the risk of losing control of their business destiny.

The authors assume that the existing approaches to portfolio management can be enriched by adding models that explicitly show a leitmotif from technology to a business system. This should also make design degrees of freedom to portfolio visible and explicit, and thus enable the simulation of decisions in order to assess their potential consequences for the company.

## 5. Aspects to clarify

The first step towards models for decision support in portfolio management which considers simultaneous design of product, technology and supply chain is presented here. The list of identified aspects is necessary, but not necessarily complete. The authors assume that the following portfolio management aspects are inherent in the "good" decision:

**Business content:** What is the potential impact of this idea on our business performance and results? Is the idea scaleable? What other opportunities might this bring us to?

**Strategic alignment:** Will this idea bring us in a direction consistent with our strategy? Will it expand our competitive advantage? Finally, will the idea help us maintain and expand our market position?

**Practicability:** Do we have the necessary development system and the necessary system of daily operations (resources, competencies and capabilities) to develop this product? If not, can we develop or aquire this?

**Risk:** What is the market and technology oriented risk associated with the idea?

Models related to the following perspectives have to be developed to provide insights and answers to the aspects above:

**Vision and goal:** In order to clarify what tasks the individual product idea as well as the portfolio are supposed to leverage for the company, the model should support the synthesis of the required future situation for the organisation. This includes setting new product goals, defining strategic focal points in terms of technologies, markets, product categories and spending allocations. The ultimate goal is to maintain and strengthen both short and long term competitive advantages whilst satisfying stakeholders.

**Competitive assessment:** The model should support an understanding of the organisation's current competitive position, i.e. the relationship between the different macro forces affecting the performance of the development system and the system of daily operations. Thus the model should incorporate the assessment of the nature of the environment, environmental influences and trends, competitors and the competitive environment.

**Organizational assessment:** With regard to the development system and the system of daily operations the model should support the audit of the organisation's resources, competencies and core competencies, as well as the assessment of current portfolio of projects and products. Finally, the model should support identification of key issues (major strengths and weaknesses and their strategic importance – also known as the SWOT analysis).

**Portfolio planning:** The models are supposed to support the developing of a new product portfolio master plan where every project is displayed with drivers of effectiveness and efficiency, which are broken down with regard to the product, the development system and the system of daily operations and thus explicitly show leitmotif from technology to a business system. This should also make the design degrees of freedom to portfolio visible and explicit, and thus enable the simulation of decisions in order to assess their potential consequences for the company. Further, roadmaps and a prioritized list of projects with project descriptions is expected to be elements of the output.

**Approach:** The models should be practiced in the shape of an event led by a facilitator [Albright 2002]. The event is characterized by group involvement combined with situational analysis and a road map creation which fits Scandinavian companies. The models should aim at a holistic and flexible approach to portfolio management in terms of instant knowledge sharing among key personnel in the company and a clear allocation of responsibilities and roles in the management group.

## 6. Conclusion & further research

Based on the preliminary survey of the industry and the literature study, we see a strong need for further research within the area of portfolio management for new products. The research will be continued in order to develop models to support portfolio management. Aspects described in the previous section will be further developed into explicit models. The next step in this research will be to carry out a case study in a Danish company, which is a manufacturer of mechatronic products. The case study will last for a period of 6 months, and a detailed case study plan with research questions is to be developed. The study will be divided into three phases and the following approach will be applied:

**Phase 1: State of the current situation (exploratory approach):** The scope of this phase is to conduct an internal audit of current practices in the company in order to clarify how portfolio management is carried out presently at the corporate level and the strategic business unit level. This will be done on the basis of interviews, simulation of idea selection process with key personnel

combined with a study of literature and company documentation (reports, presentations etc.) on portfolio management.

**Phase 2: Mapping patterns of causality (explanatory approach):** On the basis of the parties' new collective knowledge on idea selection gained from phase one, "old" decisions and projects will be analyzed. The idea is to map whether we can see causality between the historical decisions and the concrete results the projects delivered afterwards. If it appears not to be possible to identify causality, it means that with our newly gained collective knowledge we cannot explain the present product portfolio. Should this be the case the research approach applied will be reconsidered.

**Phase 3: Experiment (explanatory approach):** Concurrent with the two previous phases a model for portfolio management will be developed. In this third and last phase the model will be applied to concrete ideas. The research results will be verified by acceptance and logical verification in compliance with [Buur 1990].

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Flemming Larsson, PhD student
Technical University of Denmark, Department of Mechanical Engineering
2800 Kgs. Lyngby, Akademivej, building 358, Denmark
Telephone: +45 45255641
E-mail: fla@di.dk