

The application of a new research and development project selection model in SMEs

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Abstract

The work reported in this paper investigates Research and Development (R&D) project selection models, focusing on the application of a new hybrid project selection model in a UK based engineering Small to Medium-sized Enterprise (SME). Work is done to enable the new project selection model to be applied in an SME and the model is then field tested. Field test results provide insight into the barriers to the adoption of such a model in an SME, either as a decision support tool or as a knowledge acquisition and learning tool. Insights are gained into the suitability and limits that exist within SMEs for the use of such decision support models. As an outcome of the field test results a simple R&D project portfolio cash-flow tracking method is proposed.

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1. Introduction

The need to innovate is viewed by many companies as central to their survival strategy. Novel and high-tech product development is an effective way to give companies a leading edge over competitors and open new markets. Having a product of technical superiority in the market place can be a significant advantage. Hence the high importance of good research and development for firms involved in technological products.

Research and Development (R&D) is an ongoing process for forward thinking technology-based companies. Development of existing products is advisable to keep ahead of advances that competitors may be making. Further, when a potential customer approaches a firm outlining its requirements for a product, R&D may be required to fulfil the request. More speculative ‘blue sky’ research is also an option for firms. Speculative R&D is a valuable avenue to open new market opportunities and this type of research may lead to totally new products being developed, new markets being entered and thus strengthen the company’s position through diversification.

Where a firm seeks to define the balance between R&D in established areas of corporate knowledge and more speculative R&D a decision has to be made on how to prioritise investment. A choice exists between investing in development within proven markets and product spheres or venturing into new knowledge domains. The situation is analogous to a fleet of fishing trawlers. While most of the fleet will trawl waters known to be frequented by fish, a few boats may speculate by exploring uncharted waters. This can lead to new opportunities being discovered and thus reducing the fleet’s dependence on its familiar areas for catches. Similarly, a technology-based company may guard against being damaged by downturns in its established sectors by seeking new sectors to move into through speculative ‘blue sky’ R&D.

Large numbers of proposed R&D projects may potentially be pursued when considering this R&D philosophy. The ability to consistently select the best projects to fund is therefore vitally important to firms. Extensive academic research has been conducted over the past 35 years or so to produce methods to improve the R&D project selection processes. Many project selection models have been developed over the years taking into account projects’ financial aspects, risk considerations, or ranking projects by using scoring models. Research has shown (Cooper et al., 2001) that the most successful approach is to select projects

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by considering financial, risk and project ranking, using a so-called hybrid selection model.

Despite this scope of previous work, relatively little research has been done to investigate the application of project selection processes within companies, particularly in small firms. This study looks at an individual case of applying a hybrid R&D project selection model within a small engineering company. Such a field test provides an insight into the practicalities of applying a model abstracted from academic research in industry. Insight is also gained into the R&D selection process currently used within a small UK based engineering firm. From this study the factors that determine whether or not such a project selection model is likely to be adopted within a particular company are analysed based on the field test results and reviewed literature.

2. Research project selection model

When an organisation is tasked with deciding which research projects to proceed with, and which projects to reject, the selection process is often inconsistent. This research programme was designed to test the provision of a more formal, consistent and logical management tool to assist in project selection. This work builds on the findings of previous research at Cranfield University (Smout, 1995; Ferguson, 1997; Lockwood, 1999; Coldrick et al., 2002). The test focuses specifically on the requirements of R&D managers in Small and Medium-sized Enterprises (SMEs).

A research project selection model has been developed by Smout (1995), Ferguson (1997) and Lockwood (1999) and is used to form the basis for this work. The previous work has concluded that the hybrid PSM is the type that will produce best results. This previous work has resulted in a theoretical and academic model, as such work has been done in this programme to facilitate the application of this model in an SME. The results reported are of a field test at a small engineering company in the aerospace instrument and telecommunications sectors and the conclusions are drawn on the applicability of such selection models within small companies.

2.1. Use of project selection models in industry

Despite the fact that many models for R&D project selection have been developed by academics, very few seem to have been tested in companies. Similarly, relatively little research has been published on the project selection techniques that are actually used in companies. There are a limited number of surveys that have been published into methods being employed in large firms (Cooper et al., 1997a,b). These surveys are largely based on manager's experiences and are reviewed in the remainder of this section. There is no such information widely available on techniques being used in SMEs. In the absence of statistics

on the application of project selection models in small firms, attention is turned to surveys of methods used in large companies to gain insight. Therefore, this study focuses on R&D in SMEs, and consequently provides novel insights currently lacking in the published literature.

Large firms in the USA that are proven successes in R&D activities have previously been surveyed to establish the management practices they use (Matheson et al., 1994; Menke, 1997a,b). Financial methods of project selection have been found to be the most widely used amongst large firms. However, companies that employ formalised project selection techniques that incorporate risk analysis and a scoring model as well as financial analysis generally outperform companies that rely solely on considering the financial aspects of projects (Cooper et al., 2001).

Ongoing research at McMaster University, Canada (Cooper et al., 1999, 2000, 2001), has surveyed over 300 large companies throughout the world on their R&D portfolio management methods. From this, businesses have been sorted into four clusters based on the quality of their portfolio management technique and whether or not management is satisfied with the current method used. These clusters were identified using cluster analysis (Cooper and Kleinschmidt, 1995) and their definitions are illustrated below in Table 1.

As expected, 'Benchmark' companies were found to perform best in terms of R&D project success, with 'Crossroads' second best. An interesting finding is that 'Duds' outperform 'Cowboys' (Cooper et al., 1999). This suggests that if a company has poorly structured research portfolio management, it is at least better if management are dissatisfied with this state of affairs.

Applying a structured and formal method of managing portfolio has been found to have several benefits. The balance of projects is improved, as is the number of projects in a firm's portfolio. Also, more projects are completed on time and R&D spending better reflects company strategy when good quality portfolio management techniques are used (Cooper et al., 1998).

Surveys have shown that companies that employ formal project selection methods have better project launch success than those companies with no formal project selection technique. Sales and profit objectives have also been found to be significantly better where structured selection techniques are used (Cooper et al., 2000).

Table 1
Company classification by portfolio management technique and their management's view of the technique used

Classification criteria	Cluster			
	Benchmark	Crossroads	Duds	Cowboys
Good portfolio management technique?	Yes	Yes	No	No
Technique fits management style?	Yes	No	No	Yes

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