

Computer assisted decision making for new product introduction investments

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Abstract

Business strategy is currently largely defined by the way that an organisation interacts with its stanapproach for supporting new product introduction (NPI) investments. The proposed methodology combines the existing concepts of directional policy matrix and real options are combined to establish the novel real options matrix (ROM) that enables strategic decisions regarding NPI. ROM consists of nine regions based on company's competitive capabilities and business sector prospects. To address the fuzzy boundaries between the ROM regions a fuzzy expert system is developed and validated based on a historical case study of a petrochemical industry. The results indicate that ROM can provide a reliable guide within the particular context as the strategy that the company followed matched with the ROM recommendation. The results are encouraging and support further consideration of ROM regarding NPI decisions.

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1. Introduction

The way an organisation interacts with its stakeholders through its current and planned range of products defines its business strategy. Therefore, the development of new products and their introduction to market plays a major role in shaping an organisation's strategy and achieving its goals. The development of a sustainable competitive advantage in new product introduction (NPI) is considered as a forward-looking business strategy. However, strategic development and financial analysis are crucial for NPI because the capital invested cannot be accurately evaluated in terms of future profitability [23]. Since organisations operate in uncertain and competitive environments, they need to come up with ways of developing an effective strategy that enables the investigation and evaluation of profitable investments regarding NPI. Real options – the method of extending the decision making period for an investment without binding to a particular choice – can prove suitable in providing the necessary insight by building a model for the uncertain factors involved in the decision making [24].

This paper proposes a novel business strategy for NPI based on real options. The proposed strategy is applied to a case study within petrochemical industry.

2. Related work

A brief description of the main concepts involved in the development of the proposed framework is provided. The proposed framework is aimed at NPI (Section 2.1) and tries to relate the concepts of real options (Section 2.2) and directional policy matrix (Section 2.3). The last sub-section (Section 2.4) discusses similar applications and examples of real options.

2.1. New product introduction (NPI)

New product introduction is the basic element and focus of the proposed framework. NPI refers to the development of new products by companies in order to survive and prosper under an increasingly demanding and competitive business environment. Provided that NPI is based on a carefully designed strategy that is an established process, it can significantly contribute to gaining competitive advantage for an organisation [1]. NPI has become one of the strategic and crucial activities for every company that wishes to survive facing the continuously

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changing market requirements. Surveys regarding NPI demonstrate that NPI-related projects still have a significant failure rate despite the technological advances and the progress on business and marketing strategies [2]. Developing an IT-enabled strategy can improve the NPI decision making process by implementing an intelligent system to define, analyse and support the main elements involved. A series of papers deals with different new product introduction aspects. An attempt to accelerate the selection of new product ideas regarding NPI and improve the quality of decision making in the process under uncertain conditions can be found in [3]. To make the most appropriate NPI-related decisions, these authors propose an integrated approach based on fuzzy logic, neural networks and multi criteria decision making. A new product development self-assessment methodology which helps in the recognition of performance symptoms and the identification of their management and organisation causes has also been developed [4].

2.2. The real options perspective

Options are known from financial markets. Purchasing an option represents the right (but not the obligation) to buy or sell a stock at a fixed price within a fixed period. Leslie and Michaels [5] claimed that the concept of financial options in stock markets can be extended to opportunities in real markets especially in strategic and financial analysis sector because traditional evaluation tools such as net present value ignore the value of flexibility. Real options are described as the means that allow the extension of the decision making period for an investment, without binding to a particular choice [6]. Real Options prove a strategically life-saving approach for organisations that have to deal with alternative choices on big investments regarding new products or services. Organisations aim at realising those investments that will result in the highest return on investment (ROI) from the new product or service introduction. Real options methodology provides the necessary time frame and guidance to the investors to select the most suitable option by calculating the actual impact of an investment. Real options concept builds on a model developed for financial options [7,8]. Leslie and Michaels [5] carried out extensive work on the value of information, after an observation that the Black-Scholes model for stock markets [7] could be used for evaluating investment opportunities in real markets. They developed the real option value (ROV) formula based upon the same principles as financial options but aiming specifically at markets for products and services. ROV formula calculates the current real option value and involves six flexibilities (or six levers) that have positive or negative impact on ROV, as shown in Fig. 1. Organisations in every industry sector have to allocate resources to competing investment opportunities [5]. Regardless of existing businesses or new ventures for new products, organisations have to decide whether to invest now, to take preliminary steps reserving the right to invest in the future, or postpone and even drop the investment. Because each of these decisions creates a set of payoffs linked to further choices, all management decisions can be thought of in terms of options. These types of decisions can be tackled with real options that provide sufficient information towards

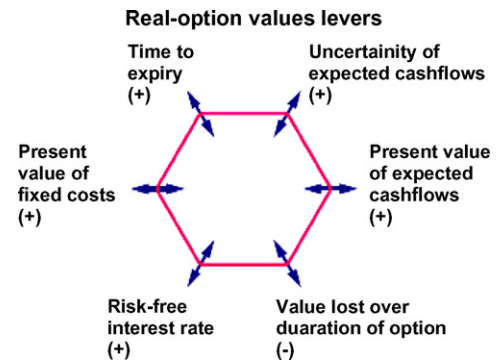


Fig. 1. The six levers of real options [5].

investment alternatives, thus enabling an organisation to gain time and save money for the available investment options.

2.3. Directional policy matrix (DPM)

In order to develop a strategy for NPI, organisations must have sufficient information of alternative plans and investment proposals to build a solid strategic plan. Relevant information might include historical data on the company’s past performance in relevant products or services. In 1970s, Shell chemical company developed the directional policy matrix (DPM) for systematic analysis of all the available information regarding NPI. DPM is a two-dimensional matrix that identifies and proposes the type of strategy to be followed by the organisation based on two criteria: (a) the business sector prospects (BSP) that defines whether a particular business sector is attractive or not and (b) the company’s competitive capabilities (CCC) that inspects the company’s position in the wider sector. The matrix consists of nine different regions associated with different levels of BSP and CCC. Each of these nine regions contains instructions for different strategies that are appropriate to the organisation’s position within the matrix [9].

Fig. 2 depicts the DPM showing all the different combinations of BSP and CCC levels. The keywords in each

		Business Sector Prospects (BSP)		
		Unattractive	Average	Attractive
Company's Competitive Capabilities (CCC)	Weak	Disinvest	Phased Withdrawal	Double or Quit
	Average	Phased Withdrawal	Custodial	Try Harder
	Strong	Cash Generation	Growth	Leader

Fig. 2. Directional policy matrix [9].

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