Exploring the Effectiveness of IT Application and Value Method in the Innovation Performance of Enterprise

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ABSTRACT

In this study, the authors used the variable-benchmark data envelopment analysis method to study the innovation performance of an enterprise. In the proposed model, information technology, value proposition, value study, and team activities were the input factors, and product model change, product function upgrade, and production cost reduction were the output factors. A total of 176 effective enterprise samples collected from five industries were analysed, and the results showed that the use of a value method and information technology had a synergistic effect on the innovation performance of enterprises; however, the synergistic effect on different industry sectors was not identical. Furthermore, the innovation performance of large enterprises was quite similar to that of small and medium-sized enterprises in most industry sectors, except the service and nonprofit industries. The theoretical and practical implications of these results are discussed.

KEYWORDS

Confirmatory Factor Analysis (CFA), Data Envelopment Analysis (DEA), Innovation, Value Management

1. INTRODUCTION

Innovation increases the competitive advantage of an enterprise. Spithoven (2013) stated that innovation in an enterprise results from knowledge spillover in the organisation, research cooperation, appropriability, and human capital development. Normally, for realising an effective innovation process, innovative methods and computer-based support are required.

Value engineering (VE) is a systematic method for improving the ‘value’ of products and services by optimising the combination of output performance and costs. It is a structured innovative process in which group creation methods and quantitative evaluation tools are used for generating innovative alternatives for improving the product or service value. In the VE process, the problem is first fully identified, and subsequently, team brainstorming generates many alternative ideas, which are the sources of innovation. Today, information technology (IT) plays a crucial role in most aspects of a company’s business, from the development of new products to the provision of sales and service support, and from the provision of market intelligence to the development of tools for decision analysis supply. It is critical to have the capability to acquire information from multiple systems and make it broadly accessible to managers and employees (Martin et al., 1999).

High innovation performance helps enterprises achieve high performance. Previous studies have shown that value methods and IT individually improve innovation performance (Dallas, 2006). Although different enterprises focus on different technologies, all of them continually seek to increase
performance. Almost every large (L) enterprise has grown from a small unit, and although L enterprises have more resources than small enterprises do, the innovation performance of L enterprises is not necessarily higher than that of small enterprises. Data envelopment analysis (DEA) is a data analysis tool. Benchmarking is a process in which the performance of a decision-making unit (DMU) is defined and effectively measured through comparison with other DMUs on the basis of their relative performance for determining peer DMUs and for ultimately establishing a standard of excellence. DEA can be regarded as a reference tool, which is a frontier recognised standard of excellence experience (Zhu, 2003). In this study, after computing basic statistics and performing factor analysis, DEA was used to analyse the innovation performance of enterprises on different scales.

The next section presents a literature review. Section 3 describes the model, data, and results. A discussion on the theoretical and practical implications of the present research and a comparison of the present research with previous research reported in the literature is provided, and the conclusions and suggestions for future research are elaborated in section 4. Then references are listed in the final section.

2. LITERATURE REVIEW

This section reviews relevant studies, including those on the innovation and performance of enterprises, the relationship between IT and the innovation performance of enterprises, enterprise innovation performance determined using a value method, and DEA.

2.1. Innovation and Performance of Enterprises

Innovation is rooted, combined, and present in current, relevant, valuable new products, processes, and services. Generally, innovation is divided into two types: incremental and radical innovation. Incremental innovation is the use of an existing form of technology for upgrading existing features, reconfiguring existing forms of technology services, or other purposes. By contrast, radical innovation is the creation of a new form of technology, far removed from existing technologies or methods. Innovation has long been considered a creator and sustainer of enterprises (Luecke, 2003). Damanpour and Evan (1984) argued that innovation is a response to a changing environment. Innovation involves the development of new technologies and creating new management philosophies. Entrepreneurial innovation is fundamentally different from creating organisations. It refers to the development of products markedly different from available products and the provision of higher value than that offered by existing products, processes, and services (Maital and Seshadri, 2007). In process-based and product-based innovation, value creation metrics are critical criteria that can be used for identifying successful and less successful strategies for overcoming specific challenges. Successful process ventures exploit the radical and generic nature of their technology, whereas successful product ventures have a narrower market focus (Maine et al., 2012). The innovation policy of a firm stimulates the internationalisation of the firm’s innovation activities and modifies the organisation of innovation activities. It is imperative to consider systematic measures of innovation in the evaluation of the impact of innovation programmes on a firm’s behaviour (Fernandez-Ribas and Shapira, 2009). Innovation is a breeding process in which an innovative concept coevolves with the knowledge of the actors involved in the process. The core of innovation improvement consists of a problem–solution modelling formalism for providing consistent views on a problem and a formal argumentation schema for conducting dialogue among team members (Adamides and Karacapilidis, 2006).

Innovation can have various sources. It may originate from individuals or independent inventors, or be designed for satisfying a need. Innovation can originate from universities, government laboratories, development centres, and private nonprofit organisations. Innovation is not only being creative; it is the implementation of ideas in a new device or program. For combining creativity and innovation, it is necessary to integrate resources and expertise, while providing a unique opportunity and challenge. Innovation requires speed, skill, and accuracy and is a powerful means of achieving
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