



Understanding the dynamics between organizational IT investment strategy and market performance: A system dynamics approach



Yi-Wen Liao^a, Yu-Min Wang^b, Yi-Shun Wang^{c,*}, Yi-Min Tu^d

^a Department of Information Management, Chia Nan University of Pharmacy & Science, 60, Sec. 1, Erh-jen Rd., Jen-te, Tainan, Taiwan

^b Department of Information Management, National Chi Nan University, 470, University Rd., Puli, Nantou, Taiwan

^c Department of Information Management, National Changhua University of Education, 2, Shi-da Rd., Changhua 500, Taiwan

^d Department of Information Management, National Sun Yat-sen University, 70, Lienhai Rd., Kaohsiung 80424, Taiwan

ARTICLE INFO

Article history:

Received 18 January 2014

Received in revised form 15 January 2015

Accepted 24 February 2015

Available online 9 April 2015

Keywords:

System dynamics

IT investment

Market performance

ABSTRACT

In recent years, information technology (IT) companies have faced fierce competition across dynamic environments; as such, ways of enhancing organizational performance and obtaining competitive advantage through IT investment have become important issues for academia and businesses. Further, time delays between IT investment transfers and actual market performance make measuring the impact of IT investment on market performance more complex. Based on the perspective of long-term, non-linear, closed-loop causality, this study develops a computerized system dynamics model to analyze the dynamic relationships between organizational IT investment strategy and market performance within information-intensive service industries. The results of this study provide several important implications for IT investment management research and practice. The proposed system dynamics model also provides IT managers with a useful decision support tool for evaluating different IT investment strategies.

© 2015 Elsevier B.V. All rights reserved.

1. Introduction

Today's businesses have entered a new economic era; in response to a rapidly changing, complex business environment, they are required to have a flexible and diversified capacity to deal with market changes. To adapt to dynamic, highly competitive and globalized market environments, a set of comprehensive integrated business strategies to guide enterprise competition is required. Over the past two decades, IT has become the main driver for economic transformation and organization reconstruction. Expenditure on IT has grown even more rapidly over the past few years, and thereby played an increasingly important role in the organization. However, diverse IT investment strategies have had wide-ranging impacts on companies' market performance. In the current dynamic environment, establishing an IT strategy that is conducive to enhancing organizational performance is a very important topic [1,2].

The quality and quantity of business investments in IT is continuously increasing [3,4]. Businesses will spend more IT

budgets and build new IT strategic capabilities, which are not easily copied by competitors. [5,6]. Within IT-oriented industries, when a new and potential IT emerges, all companies actively consider whether or not they should invest it. Once a company decides to invest the new IT, the IT investment strategy including adoption timing, investment amount, and requisite resources must be developed. However, uncertainties surrounding stability, complexity, compatibility, and cost/benefit induce hesitation. Early adopter companies may gain a higher market share as they dominate early; they may also help set industry standards, become leaders in the industrial technology, and increase consumer brand recognition, even though their costs and risks are higher [7,8]. In this type of highly competitive environment, the choice decision between being an early IT adopter or investing after the market and technology are more developed (i.e., a follower) is both dynamic and complex. Thus, there is a need to research the organizational performance driven by IT investment strategy portfolios [2,9].

One of the most frequently discussed organizational IT strategies by researchers is market entry strategy. That is a strategic decision about when a firm needs to adopt and implement an IT. According to previous studies, time-to-market is an important factor affecting organizational performance [10,11]. However, most studies have focused on a firm's own strategy, while few have simultaneously considered the competitors' investment strategies and their

* Corresponding author. Tel.: +886 4 7232105 ext. 7331.

E-mail addresses: pinkwen923@mail2000.com.tw (Y.-W. Liao), ymwang@ncnu.edu.tw (Y.-M. Wang), ywang@cc.ncue.edu.tw (Y.-S. Wang), ymtu@mis.nsysu.edu.tw (Y.-M. Tu).

dynamic effects on the firm's own strategies and performance over time. Furthermore, current studies on the relationship between IT investment strategy, market entry strategy and market performance are mostly based on linear and one-way causality; they value short-term market performance and profitability changes, but do not focus on the long-term dynamic variation among organizational variables. However, multiple objectives, complexity, dynamic interactions and decision uncertainty exist in the IT innovation projects [1,12]. To identify an investment strategy portfolio that can lead to long-term competitive advantage, it is necessary to employ a long-term and dynamic perspective. Since IT investment has dynamic and delayed characteristics, it also has interrelationships with other organizational variables, such as the amount of organizational financial resources available, IT investment amount/investment cost, human resources available, and other factors, which in turn all affect market performance changes [2,4,9]. As such, this study investigates the dynamic impact of different IT investment strategy portfolios on market performance.

Traditionally, enterprises wishing to measure organizational performance focused predominantly on the assessment of financial indicators and lagging indicators. However, in recent years, IT investment and business processes have become the main factors affecting organizational competitive advantages; as such, measurements of organizational performance based solely on financial performance indicators often lead to deviations in organizational focus, and cause companies to overlook the value of intangible assets, which has a significant impact on future financial performance [3,13–15]. In view of this, Kaplan and Norton [16] proposed a new method to measure organizational performance—the balanced scorecard (BSC). In addition to existing financial measures, this method included the customer, internal processes, and learning and growth to represent the leading indicators for the future financial performance of enterprises, so as to achieve a balanced outcome of organizational performance. The current study, based on a combination of the balanced scorecard method and a whole perspective of system dynamics, developed a simulation model of organizational IT investment strategy portfolios, and discussed the establishment of an effective investment strategy portfolio for long-term competitive advantage within a competitive marketplace environment.

Further, this study aimed to explore the long-term dynamic effects of enterprise IT investment strategy portfolios on organizational market performance through a system dynamics approach. The system dynamics approach is very suitable for modeling problems at a strategic level [17]. The strength of this approach lies in its ability to account for non-linearity in dynamics, feedback, and time delays [12]. The existing literature was reviewed to establish a basis for the development of the model; then the system dynamics approach was employed to construct a qualitative model (i.e., causal loop diagram), a quantitative model (i.e., stock and flow diagram), and execute simulations for different organizational IT investment strategy portfolios. Finally, the long-term dynamic effects of different enterprise IT investment strategy portfolios on market performance were discussed. The results of this study provide important practical implications regarding investment strategy portfolios, and can help companies develop more effective IT investment strategies.

2. Literature review

To cope with the research aim, this section reviews related literature of IT investment effects, IT investment strategy portfolios (i.e., timing, amount, and resources), and four dimensions of BSC

(i.e., finance, customer, business process, and learning and growth). Then, important variables and their relationships are presented to be the foundation of developing a system dynamic model.

2.1. IT investment, IT investment strategies, and organizational market performance

2.1.1. IT investment effect: Organizational market performance

The effect of IT on the enterprise value is always an important issue within the MIS domain. Business must invest and implement IT if they are to survive in the long-term [18]. In the past, many research results showed that IT investment has diverse effects on organizational performance [3,19]. In terms of organizational performance measurement, Rodríguez-Pinto et al. [20] considered market share as the most common indicator for measuring the competitive position of businesses. Buzzell [21] also found a positive correlation between market share and profitability. Profitability and market share are usually adopted to be the measure of IT economic benefits [13,22]. Therefore, the current study employed these two factors as the indicators to measure organizational market performance. Measuring organizational market performance is of the finance perspective of BSC.

2.1.2. IT investment strategy portfolios: Investment timing and investment amount

The timing of adopting a new technology (i.e., market entry time) is important to organizational survival and performance [8]. Many past studies explored the relationship between IT investment timing strategies and organizational performance (e.g. [4,23,24]).

Early entrants are defined as firms that launch products or services earlier than its competitors to obtain competitive advantage [71]. Although some studies proposed that early entrants enjoy better performance and profitability than followers [20,25], in today's dynamic and competitive environment, this may not hold absolutely true. Emerging technologies are often immature. Early adopters always have to overcome more barriers and take more risks [2]. In established markets, a late technology adopter (i.e., follower) may have difficulty overcoming competitors' advantages in installed bases or learning curve effects [8]. However, followers may benefit from lower technical and market risks [72]. Followers require less time and costs to copy early entrants, and thereby gain benefits in terms of R&D, customer education, and infrastructure development, while avoiding potential faults committed by the early entrants. Rather than simply emphasizing speed to market, companies must time entries in accordance with the evolution of technologies and customer requirements [8]. In addition, as IT investment costs vary with market entry time, IT investment amount will be influenced by the investment timing. Therefore, there are complex, dynamic, and interaction relationships among IT investment time, investment amount, and organizational performance [2]. Therefore, a company must determine whether to adopt an early entrant or follower and how much amount should be invested in its IT investment strategies. Therefore, this study incorporates these variables and relationships into the simulation model.

2.1.3. The impact of financial resources on IT investment

Most researchers have suggested that IT investment has a positive impact on organizational performance. In addition, financial performance also affects the level of IT investment. When a company has good performance, it also has robust financial resources. The company has relative better abilities to invest more

متن کامل مقاله

دریافت فوری ←

ISIArticles

مرجع مقالات تخصصی ایران

- ✓ امکان دانلود نسخه تمام متن مقالات انگلیسی
- ✓ امکان دانلود نسخه ترجمه شده مقالات
- ✓ پذیرش سفارش ترجمه تخصصی
- ✓ امکان جستجو در آرشیو جامعی از صدها موضوع و هزاران مقاله
- ✓ امکان دانلود رایگان ۲ صفحه اول هر مقاله
- ✓ امکان پرداخت اینترنتی با کلیه کارت های عضو شتاب
- ✓ دانلود فوری مقاله پس از پرداخت آنلاین
- ✓ پشتیبانی کامل خرید با بهره مندی از سیستم هوشمند رهگیری سفارشات