Investment Strategy for Integrating Wireless Technology into Organizations

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INTRODUCTION

Firms rely on IT investments (Demirhan et al., 2002; Tuten, 2003), because a growing number of executives believe that investments in information technology (IT) (i.e., wireless technologies) help boost firm performance. The use of wireless communications and computing is growing quickly (Kim & Steinfield, 2004; Leung & Cheung, 2004; Yang et al., 2004). But issues of risk and uncertainty due to technical, organizational, and environmental factors continue to hinder executive efforts to produce meaningful evaluation of investment in wireless technology (Smith et al., 2002). Despite the use of investment appraisal techniques, executives often are forced to rely on instinct when finalizing wireless investment decisions. A key problem with evaluation techniques, it emerges, is their treatment of uncertainty and their failure to account for the fact that outside of a decision to reject an investment outright, firms may have an option to defer an investment until a later period (Tallon et al., 2002).

Utilization of wireless devices and being connected without wires is inevitable (Gebauer et al., 2004; Jarvenpaa et al, 2003). Market researchers predict that by the end of 2005, there will be almost 500 million users of wireless devices, generating more than $200 billion in revenues (Chang & Kannan, 2002; Xin, 2004). By 2006, the global mobile commerce (m-commerce) market will be worth $230 billion (Chang & Kannan, 2002). Such predictions indicate the importance that is attached to wireless technologies as a way of supporting business activities. Evaluating investments in wireless technology and understanding which technology makes the best fit for a company or organization is difficult because of the numerous technologies and the costs, risks, and potential benefits associated with each technology.

The purpose of this study is twofold: first, to identify and discuss different investment options; and second, to assist in formulating an investment strategy for integrating wireless technologies into organizations.

This article is organized as follows: Section II contains major uncertainties and risks in the field of wireless technologies. In Section III, wireless technology and IT investment tools are examined. In Section IV, formulating a wireless technology investment strategy is discussed. The conclusion of this article is presented in Section V.

MAJOR UNCERTAINTIES AND RISKS IN THE FIELD OF WIRELESS TECHNOLOGIES

Businesses today face several uncertainties in effectively using wireless technology (Shim et al., 2003; Yang et al., 2004). One of the first uncertainties for managers investing in wireless technology is that standards may vary from country to country, making it difficult for devices to interface with networks in different locations (Shim et al., 2003; Tarasewich et al., 2002).

Another uncertainty is that wireless networks lack the bandwidth of their wired counterparts (Tarasewich et al., 2002). Applications that run well on a wired network may encounter new problems with data availability, processing efficiency, concurrency control, and fault tolerance when ported to a mobile environment. Limited bandwidth inhibits the amount and types of data that can be transmitted to mobile devices. Significantly improved bandwidth is clearly needed before new types of mobile applications such as Web access, video, document transfer, and database access can be implemented. Bandwidth is expected to increase rapidly over the next few years with the introduction of a new generation of wireless technologies. It is uncertain, therefore, how fast firms will follow the increased bandwidth evolution.

User interface is another uncertainty related to the development of wireless technology (Shim et al., 2003). Mobile devices provide very restrictive user interfaces that limit possible employee and consumer uses of mobile technology. The ideal mobile user interface will exploit multiple input/output technologies. The employee should be able to switch effortlessly from text-based screens to streaming audio/video to voice-powered interaction. Mobile users require different input and output methods in different situations. It is necessary to create a range of standard interfaces that can be reused in different mobile devices. As wireless technology development promises to improve this interface with such features as voice recognition, voice synthesis, and flexible screens, increased usage likely will result. New and more powerful user interfaces are essential to 3G (three-generation) wireless success. Finally, security is another uncertainty related to wireless technologies (Shim et al., 2003).

Where uncertainties exist, they are viewed as risks that will reduce the potential payoff of investment in wireless technology. Thus, organizations may be hesitant to invest in a particular technology, because they are afraid of high costs associated with potential obsolescence of technologies in which they may have invested.

Given all these uncertainties and risks, past research on IT investments should be analyzed to provide a basis for understanding investment in wireless technology.

WIRELESS TECHNOLOGY AND INFORMATION TECHNOLOGY INVESTMENT TOOLS

IT investment justification models can vary from intuition-based cost-benefit analysis, regression analysis, payback rules, accounting rates of return, and financial and economic models such as Net Present Value (NPV), to Real Options analysis (ROA) (Kohli & Sherer, 2002; Walters & Giles, 2000).

Cost-Benefit Analysis

Cost-benefit analysis often requires substantial data collection and analysis of a variety of costs and benefits. However, most IT investments and their benefits involve great complexity and require a detailed cost-benefit analysis. This analysis involves explicitly spelling out the costs and benefits in a formula such as an equation for an investment that improves productivity (Kohli & Sherer, 2002).

Regression Analysis

Some authors use statistical analysis (e.g., regression analysis) to understand the relationship between the IT investment and payoff. They usually examine the correlation table, listing the strength of relationship between the investment (independent) variables, and the payoff (dependent) variables.

Payback Rules

Payback rules track how many periods IT managers must wait before cumulated cash flows from the project exceed the cost of the investment project (Walters & Giles, 2000). If this number of periods is less than or equal to the firm's benchmark, the project gets the go-ahead (Walters & Giles, 2000).

Accounting Rates of Return

An accounting rate of return is the ratio of the average forecast profits over the project's lifetime (after depreciation and tax) to the average book value of the IT investment (Walters & Giles, 2000). Again, comparison with a threshold rate is sought before investment goes ahead (Walters & Giles, 2000).

Payback rules and accounting rates of return do not take into account uncertainties and risks. Therefore, they are not adequate to analyze investment strategy in wireless technologies.

Net Present Value (NPV) Analysis

The time value of investment is represented in NPV. The NPV rule assumes that either the investment is reversible, or, if the investment is irreversible, the firm can only invest now, otherwise it will never be able to do so in the future (Tallon et al., 2002). While NPV provides information about the time value of the investment, it does not take into account the risks or opportunities created by stopping, decreasing, or increasing investment in the future (Kohli & Sherer, 2002). In fact, the NPV has been criticized widely