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Strategic foresight using a modified Delphi with end-user participation: A case study of the iPad's impact on Taiwan's PC ecosystem

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ABSTRACT

Taiwan is a personal computer (PC) manufacturing powerhouse, producing desktop (DT) computers, notebooks (NB), and netbooks (NetB). However, the emergence of tablets such as Apple's iPad, has threatened the PC market's prospects and significantly affected Taiwan's PC ecosystem. This study proposes a modified Delphi with end-user participation to provide strategic foresight for firms in Taiwan's PC ecosystem. The results show that these firms can adopt the following three strategies in response to the impact of tablets: (1) brand and service innovation, (2) focus on cloud technology and marketing products to China, and (3) cooperating with digital leisure and entertainment industry. We believe that this modified Delphi with end-user-participation model is a valuable foresight tool for products with a short life cycle, such as consumer electronics and fashion products.

1. Introduction

In 2007, the Market Intelligence & Consulting Institute reported that 90% of global notebooks were manufactured by Taiwanese OEM (Original Engineering Manufacturer) firms [1]. However, the competitive strategy employed by firms in Taiwan's PC ecosystem is relatively uninteresting, that is, large-scale production and low production costs. With a noticeably low profit margin, firms in this ecosystem cannot conduct much value-adding innovation in research and development (R&D). Recently, Taiwanese OEM firms have faced another challenge, this time from the rise of tablets, such as iPad, leading to a sharp decline in sales and a further drop in profit margins. A report by Goldman Sachs predicted that iPad may endanger 40% of the PC market [2].

In responding to the challenge, this study conducts a strategic foresight for the sake of Taiwanese PC related firms using a modified Delphi with end-user-participation (EUP). An important function of strategic foresight is to analyze multiple possible future realities, that is, using the assumed multiple conditions to predict multiple future realities [3–5]. Strategic foresight has been widely applied to analyze possible impacts of future uncertainty. Regional and national governments use strategic foresight to maintain the competitive advantage of local enterprises [6]. Currently, usage of strategic foresight to improve firms' competitive advantage continues to increase, and numerous studies have explored how to conduct strategic foresight effectively [7,8]. By analyzing the mid- and the long-term impacts of a certain emerging event, enterprises can make appropriate decisions. A study reported that a large European enterprise used strategic foresight to analyze the potential market [9]. Another study stated that Latin American countries used strategic foresight to determine future technological and scientific developments. That study also used Colombia, Brazil, and Mexico as case studies, promoting the use of strategic foresight to reinforce their competitiveness [5].

The most commonly used strategic foresight approach involves constructing certain scenarios and then obtaining expert judgments regarding possible future realities. In this regard, the Delphi approach has been used to forecast the likelihood and timing of future events by eliciting opinions from expert groups and converging one result through anonymity, iteration with

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controlled feedback, and statistical group responses [10,11]. The Delphi approach has been widely applied in diverse fields, including technology foresight and strategic foresight. In addition, the Delphi approach can be applied in various situations, including those with minimal historical information and those with multiple factors [12,13]. A conventional Delphi survey requires experts to act as anonymous panelists [14]. Guided by a moderator, experts conduct forecasts regarding certain issues [15,16]. The moderator compiles the experts' responses and provides feedback in continuous rounds to obtain one forecast result by converging the experts' opinions.

Though been used widely to provide forecasts [14], the Delphi method has become the subject of several criticisms. One study suggested that expert opinions were typically overly optimistic [17]. This phenomenon occurs not only in the field of academia, but also in corporate management. Specialized experts tend to provide more optimistic predictions. One study indicated that the reason experts provide overly optimistic predictions in a Delphi is because of their specialized backgrounds, Delphi statements, and Delphi questionnaires [18]. A study demonstrated that short-term forecasts were comparatively optimistic, whereas long-term forecasts were relatively pessimistic [15]. Another study highlighted the correlation between the experts' proficiency and their degree of optimism. Their results indicated top experts in Germany and Austria were more optimistic than those from other countries [17]. Geels and Smit suggested that overly simplistic predictions in a Delphi hinder future applications of the forecasted results because experts neglect the correlation between society and technology [19]. Additionally, because consumers are typically more concerned with the problems, obtaining consumer opinions in a Delphi enhances the practicality of the forecasted results [20]. One study about the banking industry found that financial experts in a top management team indeed provide superior performance in a stable environment; however, during a financial crisis, financial experts may negatively affect performance. This is because of a lack of heterogeneity and differing perspectives in top management teams [21]. A study integrated the opinions of experts and consumers through a Delphi and suggested that a self-help strategy can be more effective for eliminating depressive symptoms [22].

In summary, four problems that occur in a Delphi have been documented: First, expert groups may exert social pressure on group members to agree with the majority [23]. Second, improperly designed questionnaires may lead to ambiguous Delphi results [24]. Third, questionnaires may contain excessive statements and response variables. Questionnaires with overly lengthy and complex questions are difficult for experts to complete, decreasing the quality of the Delphi output [18]. Fourth, Delphi forecasting requires significant time and cost, which results in difficulties explaining the Delphi results from a current perspective [25,26].

None-the-less, the Delphi approach is extremely useful for forecasting potential needs, particularly when applied to strategic and technology foresight [27]. Moreover, scholars from Korea, Japan, Germany, and India have used this approach to conduct national forecasts [28]. One study used an Internet-based Delphi to collect a greater volume of opinions from experts to improve supply chain flexibility [29]. Additionally, a study integrated a Delphi method, scenario analysis, and substitution model to forecast the development of organic light-emitting diode televisions (OLED TVs) [30]. In another study, the Delphi approach was combined with an analytic hierarchy process (AHP) to identify key areas in the information technology (IT) industry [31].

However, another issue has been raised towards the current practice of foresight. One study argued that studies on foresight have focused less on understanding effects and responses to environment uncertainty [32]. Environment uncertainty refers to a lack of accurate information in a firm's micro and macro business environment, which subsequently hinders the firm's ability to detect changes and effects [33–35]. Conversely, the firm's uncertain environment is argued to be the primary indicator for managers to detect emerging opportunities and react in a timely manner [36–38]. This led to a series of studies on environment scanning, which suggests that managers should scan the environment to detect and respond to emerging events and changes [39–41].

To cope with the increasing environment uncertainty in our attempt to use the Delphi approach, in this study, we also adopt environment scanning by seeking advice from various experts. Additionally, we notice that the life cycle of electronic products is shortening and the age of end users is becoming younger. For example, the recent popular innovative applications of information technology, such as Facebook, Skype, and YouTube, were not initiated by seasoned experts at all, but by young and creative college students. We thus infer that experts may well verse in technical knowledge but prone to neglect consumers' sentiments. To address these problems, we further extend our sources of opinion to include that from an important group of end users of PC related products, namely college and graduate students.

The rest of this paper is organized as follows: Section 2 describes Taiwan's PC ecosystem. Section 3 details the process of conducting strategic foresight using a modified Delphi with end-user participation. Section 4 reports the results of the strategic foresight for the firms in Taiwan PC ecosystem. Finally, Section 5 presents the discussion and conclusion of this study.

2. Overview of Taiwan's PC ecosystem

A business ecosystem is a loose network comprising suppliers, dealers, outsourcing companies, and numerous other organizations that directly satisfy the needs of global consumers through integrated software, hardware, and services [42]. Whether the organizations in a business ecosystem are strong or weak, they ultimately share the same fate as that of the total network. A business ecosystem can be categorized into various business domains, and a domain may be shared by other ecosystems. The performance of a domain can influence the efficiency of its eco-domain.

The PC ecosystem in Taiwan has numerous firms that manufacture original components for various electronic products and a number of firms that are developing their own brand [2]. Fig. 1 shows the global PC output from 2005 to 2010. PC include desktops (DT), notebooks (NB), and netbooks (NetB). Since 2007, the DT market has been eroded by NB and NetB. Until 2010, DT