Developing an IT Portfolio Approach to Justify IT Investments

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Abstract

Due to the rapid speed of globalization and evolving technologies, firms rely on IT much heavier than before. They use IT not just to cope with the environment, but also to gain competitive advantages. Therefore, it is important for firms to invest on the right while also critical IT with limited resources. To fulfill this need, this research aims at developing an IT portfolio method to evaluate and determine the priorities of IT investments based on three criteria: IT alignment, business value, and e-readiness. A real business practice serves as a case to demonstrate the applicability of our proposed framework. We believe the final findings are helpful to (1) practitioners who can use this framework to justify their IT investments; and (2) researchers who can build upon this model to further examine the application of IT portfolio methods.

1. Introduction

Today, investments in IT have constituted up to 50% of the annual capital expenditures of large organizations (Willcocks and Lester, 1997; Premkumar and Ramamurthy, 1995). A survey of 400 top IT executives has shown that 60% of them reported an increase in the level of pressure to prove return on IT investment (ROI), 70% believe that their metrics do not fully capture the value of IT, and nearly half lack confidence in their ability to accurately calculate ROI on IT investments (Kirkpatrick, 2002). The results highlight the importance of IT investment decision process. The main question that should be asked is how IT decision to be made. To answer the question, the focus is on the design of the methodologies that can be used for IT investment decision.

Numerous researchers have done great contributions in this area. Among them, IT portfolio approach has gained great awareness. Similar to the portfolio management framework utilized in the financial services sector, IT portfolio approach is a combination of people, processes, and corresponding information and technology that senses and responds to change. The goal is to deliver measurable business value, tangible and intangible, while aligning and improving the business and strategy (Maizlish and Handler, 2005). The uniqueness and advantage of IT portfolio is that it considers various business needs and different IT investment evaluation methodologies to form an ideal investment decision process. But controversially, that is also where its disadvantages reveal.

Traditional IT portfolio approach takes each business concern as single criteria, which in some way we can take it as an extension of the multi-criteria approach. However, are all the criteria, such as IT alignment, risk, value, IT maturity, IT readiness, financial constraints, etc. with the same importance? Is there any criteria that should be paid more attention to than the others? Is there any sequence among all decision criteria? One that should be evaluated first, then comes the rest?

This research aims at proposing a revised IT portfolio approach to solve these issues. We will start from defining important concepts in the IT investment domain, then forming and explaining our methodologies. Afterwards, a case study will be proposed to demonstrate the efficacy of our proposed methodology.

2. Literature review

Since this research aims to apply IT portfolio approach to justify IS investment, it is important for us to know why this approach is useful and how we are going to use it. The literature review will focus on two aspects:

1. Tools that are used to evaluate IT investment and develop IT portfolio.
2. The weighting and scoring methods that have been applied to prioritize and rank investments in the portfolio.
2.1. The IT investment evaluation method

To determine what IT investment should be made, two questions are important: (1) “How is the investment decision made?” and (2) “why is the investment decision made?” The first question links to the decision-making methodology and the second addresses the criteria followed in the process (Escobar 1998).

With regard to decision-making process, Renkema and Berghoutb (1997) have distinguished four basic approaches that can be recognized in many methods proposed:

1. The financial approach− focuses on the incoming and outgoing cash flows as a result of the investment made. Examples include ROI, the payback period, the internal rate of return, the net present value, and so on.
2. The multi-criteria approach− begins with a number of goals or decision criteria, and then assigns each with proper scores and weighting to create one single measure for each investment for justifying the priority of IT investments. One famous method in this category is the “information economics method” proposed by Parker et al (1989), which evaluates an IT investment with criteria from three domains: (1) enhanced ROI, (2) business domain, and (3) technology domain.
3. The ratio approach – pays attention to the possibilities to compare organizational effectiveness by means of ratios. Several ratios have been proposed to assist in IS investment evaluation. Examples of meaningful ratios include IS expenditures against total turnover and all yielding that can be attributed to IS investments against total profits. Ratios do not necessarily take only financial figures into account. IS expenditures can, for instance, be related to the total number of employees or to some output measure (e.g. products or services) (Strassmann 1990 and Nievelt 1992).
4. The portfolio approach– evaluates IS investment proposals on three criteria simultaneously: (1) the contribution to the business domain, (2) the contribution to the technology domain, and (3) the financial consequences, by means of net present values (NPV) calculation. This approach is very similar to the multi-criteria approach; however it differs in the way that this approach tries to adopt a more balanced perspective to consider the criteria “simultaneously,” (i.e. displaying the trade-off between variables) not “separately”, giving each criteria a weighting (see Bedell, 1985).

The four approaches that Renkema and Berghoutb (1997) have categorized are not exclusive. Multi-criteria method is widely used in the portfolio approach, and the ratio approach can be viewed as an extension of financial approach with non-quantitative parameters added to it. In this research, we choose IT portfolio method to develop our methodology for the following reasons. First, it is a methodology that combines different aspects of business considerations, gives attention to all business needs “simultaneously”, and more importantly, incorporates different features of IT investment evaluation method, including financial approach and multi-criteria approach. By doing so, the differences, advantages, and disadvantages between each IT investment approach can partly be overcome (Renkema and Berghoutb, 1997). Second, IT portfolio method has been paid attention by corporations (Jeffery and Leliveld 2004). One recent industry survey has shown that 89% of the CIOs polled are very aware of IT portfolio method (ITPM) and 65% believe that the approach yields significant business value (Jeffery and Leliveld 2004).

Past literature has proposed different IT portfolio approaches; however, each with its limitations and focuses only on certain aspects of the portfolio method. For instance, Verhoef (2002) has presented a quantitative approach for IT portfolio management, which focuses mainly on IT project risks, costs, and duration, lacking considerations among intangible values that IT can offer, such as IT supporting the business strategy. Jeffery and Leliveld (2004) review some best practices in IT portfolio management and specify different maturity levels of IT portfolio management, but their work does not provide necessary criteria for justification. Cao et al (2006) have proposed a solution to align IT investment with business, but their method is mostly based on multi-criteria weighting. Dickinson et al. (2004) present a model to optimize a portfolio of technology improvement projects. Although the model attempts to balances risk, overall objectives, and the cost and benefit of the entire portfolio, their proposed measures mainly concern technical improvement projects, which in some aspects are different from the IT projects.

2.2. The evaluation criteria and prioritization of IT investments

One important aspect of IT portfolio approach is to ensure that an IT investment in the portfolio should be in pursuit of both: (a) quantifiable net benefits and (b) explicitly planned business objectives (Bacon 1992). In a research done by Escobar (1998), 86.8% of the firms adopted at least one kind of financial criteria, 100% of the firms adopted at least one kind of management criteria, and 92.1% of the firms adopted at least one kind of development criteria. Drake and Byrd’s
research (2006) have provided means to assess the health and completeness of an IT portfolio by proposing five project portfolio risks—strategic alignment risks, organization and management risks, cultural and climate risks, project relationship risks, and financial risks.

We conclude three domains of criteria that are needed to be considered when justifying the priorities of IT investments: (1) IT alignment, assessing the harmony between IT goals/strategies and business goals/strategies (supporting literatures are like Irani 2002, Wen and Shih 2006), (2) Business value, including both financial and non-financial criteria, as firms need to know and see the value, the benefit, and the cost of an investment (supporting literature includes Kearns 2004, Reyck et al. 2005), and (3) E-readiness, which concerns risk issues related to new IT investments and indicates whether a business is ready for new IT/IS investments. (supporting literatures can been found in Lin et al. 2007, Reyck et al. 2005). The three domains of criteria used in the decision of IT investment prioritization are explained and described in detail below.

2.2.1. IT alignment. IT alignment is generally defined as the alignment of an organization’s IT resources with the objectives of its business unit. Weiss et al (2006) have identified three different IT alignment levels, from bottom-line technical resource alignment, to business enabler, and to strategic weapon. The desired state of IT portfolio is to achieve the stage of “strategic weapon,” or namely “strategic alignment” mentioned in other IS literature, focusing on the linkage of the IT investment strategy with the firm’s business strategy. To achieve this goal, companies should first clearly recognize and indentify their core “business competitive strategy”.

Identifying a company’s business competitive strategy is not an easy task however, because it denotes a large and sophisticated domain of knowledge. Miles and Snow (1978) have proposed a classification of business competitive strategy, which are widely embraced and paid considerable research attention in both the management and marketing strategy literature (Desarbo et al. 2005). Their typology concludes four basic types of competitive strategies on the basis of different business patterns: (1) Prospector, (2) Analyzer, (3) Defender, and (4) Reactors. Prospector are technological innovator, interested in seeking out new markets; analyzers tend to prefer a ‘second-but-better’ strategy; defenders are engineering-oriented and focus on maintaining a secure niche in relatively stable market segments; reactors lack a stable strategy and are highly responsive to short-term environmental exigencies (Desarbo et al. 2005). Various past researchers have applied Miles and Snow’s typology to justify the corresponding IT investment strategy. For instance, Tavakolian (1989) has studied the relationship between the firm’s IT structure and its competitive strategy, with respect to Miles and Snow’s classification. Karami et al. (1996) point out each competitive strategy’s corresponding technological concerns. In Sabherwal and Chan’s research (2001), they have justified the suitable IS strategy for each business competitive strategy, concerning the types of IS systems that should be invested.

Although using the Miles and Snow’s classification can help firms develop a clear strategic goal of IT portfolio, it is still not clear about the process through which the IT portfolio can achieve the goal, or in other words, strategically aligned. As mentioned in Luffman’s research (2003), to achieve IT alignment, there’s a need for effective exchange of ideas and a clear understanding of the whole picture of what it takes to ensure successful strategies. IT organizations should demonstrate their value to the business in terms that the business understands that business and IT metrics of value should be the same. Kaplan and Norton (2003) have provided a process for firms to achieve strategic alignment: strategy maps.

Strategy maps is defined as a diagram that describes how an organization creates value by connecting strategic objectives in explicit cost-and-effect relationship with each other in the four Balanced Scorecard objectives: financial perspective, customer perspective, internal perspective, and learning and growth perspective. Kaplan and Norton (2006) suggest that strategy maps can be used as a tool to increase the alignment between IT strategy and business strategy in a sense to convert intangible IT capitals into tangible business values. To make the conversion even more effectively, Kaplan and Norton (2006) has further classified IT investment in to four categories: (1) transformational applications, systems and network that change the prevailing business model of the enterprise; (2) analytic applications, systems and networks that promote analysis, interpretation, and sharing of information/knowledge; (3) technology infrastructure, the shared technology and managerial expertise required to enable effective delivery and use of information capital applications; and (4) transaction processing applications, systems that automate the basic repetitive transactions of the enterprise.

In this research, we choose strategy maps as our primary tool to aid and ensure IT strategic alignment.

2.2.2. Business value. The past literature has categorized the business value of IT into two major categories: (1) financial benefits and (2) non-financial benefits. The first category focuses on the financial
performance of organizations resulting from investments. Many empirical studies have found support for a positive relationship between IT resources and organization’s financial performance (Santhanam and Hartono, 2003, Sheng et al 2005). Financial benefits can be measured through tangible metrics, such as cost savings, productivity, market share, and profitability. The second category is concerned with intangible benefits provided by IT, focusing on improved business processes and relationships such as better customer services, increased knowledge about customers, improved coordination with partners, superior product quality, and competitive advantages.

In the past literature, cost-benefit analysis is typically used to assess the business value of IT investments (King and Schrems, 1978). In the cost-benefit analysis, the criteria of costs are usually simply straightforward, calculated by the amount of money that a single investment needed, directly and indirectly. The criteria used in evaluating the benefits of an IT investment, however, are relatively more complicated and include either financial and non-financial criteria, or both. For instance, Salemron (2002) values the benefits from three aspects, with both financial and non-financial criteria: information accuracy, executive support, organization support. Mashhour (2008) on the other hand, only considers financial benefit in the calculation. In conclusion, the criteria used in cost-benefit analysis today still remains a bit free-willed, depending on the researcher’s own attitude toward what benefits are expected to be brought by IT investments.

2.2.3. E-readiness. E-readiness is a relatively new concept that has been given impetus by the rapid rate of Internet penetration throughout the world and the dramatic advances in uses of IT in business and industry. The concept is originated by the intent to provide a unified framework to evaluate the breadth and depth of the digital divide between more and less developed or developing countries during the later part of 1990s. E-readiness assessments can also reveal which bottlenecks are worth the investment of time and money to be removed, and which can be worked around (Mutula and Brakel, 2006). Later on, the concept is being transferred to organizations and private sectors, used in decision along with IT investments, and being described in many research works (e.g., Mutula and Brakel 2006 and Fathian et al 2008).

The framework of E-readiness however, remains a bit diverged. From our study of the past literature, we’ve summarized different e-readiness measurements into three major categories: (1) organizational readiness (Fathian et al 2008, Mutula and Brakel 2006), (2) technological readiness (Fathian et al 2008, Mutula and Brakel 2006, Molla and Licker 2005), and (3) environmental readiness (Fathian et al 2008, Mutula and Brakel 2006, Oxely and Yeung 2001).

3. Research framework

Literature review has shown that IT portfolio management has two major issues to consider: (1) the portfolio should align with organizational goals and (2) the portfolio should balance risks and returns, while considering the resource constraints. We therefore propose a methodology following the three major processes: (1) propose a IT portfolio that can align IT investment with business needs; (2) prioritize IT portfolio elements by considering business value and E-readiness simultaneously; and (3) adjust the IT portfolio based on IT budget constraints. The research framework is shown in Figure 1.

3.1. Align IT investments with business needs

In our research framework, we believe that for firms to justify the right IT investments, IT alignment is to be achieved at the very beginning. In other words, business demands should align IT demands closely. Three steps are proposed as follows.

Step 1: Clarify business needs and determine key processes

To clearly justify and understand the business demand of a firm, we adopt the approach developed from strategy map (Figure 2). The process of defining business needs starts from crafting the firm’s core strategy; which ultimately leads to long-term shareholder value and financial benefits. These financial benefits may be achieved by enhancing the customer’s value proposition towards the firm’s
product or service. After realizing customer’s value proposition, firm need to further justify which processes will enhance the value proposition desired by customers, which we call it the key focus processes. Through the entire analysis, the firm’s business needs and the processes that are needed to be strengthened or further improved in order to satisfy those needs are clearly depicted.

![Strategy Map](image)

Figure 2: Using strategy map approach to analyze strategic-focused areas – an example

The next step is to identify effective IT solutions concerning the business needs highlighted in the firm’s strategy maps, which is described as follows.

**Step 2: Matching IT needs with business needs**

As described in Section 2, strategy map approach has categorized three IT applications based on the information processing needs, or shortly put, IT needs: (1) transformational applications, (2) analytic applications, and (3) transaction processing applications. To ensure the proposed IT solutions can align with business needs, we develop a matrix that matches the IT needs with business needs. Table 1 shows an example. Assume the company identifies three major business needs with the targeted business processes: customer selection, customer growth, and product production. They then propose a portfolio of IT solutions that can improve the underlying processes. These solutions may fall into one of the three categories of IT needs. For instance, to improve “customer growth”, there may be more than one candidates of IT solutions, with some related to transformational application (system D), some analytic applications (system E and F), and others transactional processing applications (system J). While these systems are all potential candidates to improve the underlying processes, the next question is how the company decides which is more critical and should be invested prior to others? Since each targeted business process can be enhanced by more than one type of IT solutions, this raises a question “which type of IT is best aligned with company’s strategy?” We integrate Miles and Snow’s strategic classification typology (1978) with strategy map to answer this question. Details are described in Step 3.

**Table 1. Matching IT needs with business needs**

<table>
<thead>
<tr>
<th>Categories of Proposed IS/IT solutions (IT needs)</th>
<th>Customer Selection</th>
<th>Customer Growth</th>
<th>Product Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational Applications</td>
<td>System A</td>
<td>System I</td>
<td>System K</td>
</tr>
<tr>
<td>Analytic Applications</td>
<td>System B</td>
<td>System J</td>
<td>System L</td>
</tr>
<tr>
<td>Transaction processing Applications</td>
<td>System C</td>
<td>System G</td>
<td>System H</td>
</tr>
</tbody>
</table>

**Step 3: IT alignment assessment**

Based on the literature review in Section 2, Miles and Snow (1978) have classified the firm’s competitive strategies into four types: prospector, analyzer, defender, and reactor. Sabherwal and Chan’s research (2001) has further suggested that companies with different competitive strategy should adopt different information applications. In their research, they have studied the alignment between business and IS strategies, focusing on three strategic types proposed by Miles and Snow, “prospects”, “analyzers”, and “defenders.” They disregarded reactors, because they consider it to be an organization that either lacks a viable strategy or is in transition from one of the three ideal strategies to another. For IT strategies, Sabherwal and Chan have concluded three types of information systems, which happens to be very similar and related to the three categories of information application identified by Kaplan and Norton (2006) in terms of definition: (1) Operational support systems (similar with Kaplan and Norton’s transaction processing applications), (2) Market informational systems (similar with Kaplan and Norton’s analytic applications), and (3) Strategic decision support system (similar with Kaplan and Norton’s transformational applications). For each of the strategy types concerning Miles and Snow’s strategy classification, Sabherwal and Chan have pointed out different levels of awareness and attention one should pay to the three kinds of informational systems, ranked from High, Medium, to Low (shown in Table 2).

**Table 2. IS strategy profiles of defenders, prospectors, and analyzers (Sabherwal and Chan 2001)**

<table>
<thead>
<tr>
<th>IS classifications</th>
<th>Defenders</th>
<th>Prospectors</th>
<th>Analyzers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic decision support systems</td>
<td>High</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Market Information systems</td>
<td>Low</td>
<td>High</td>
<td>High</td>
</tr>
<tr>
<td>Operational support systems</td>
<td>High</td>
<td>Low</td>
<td>Medium</td>
</tr>
</tbody>
</table>
By combining the research result of Sabherwal and Chan with the strategy maps, we are able to determine the IT solutions that best aligned with business needs under different category of competitive strategies. We first classify companies into one of the three categories (Defenders, prospectors, analyzers) based on Miles and Snow’s typology, and then highlight the IT solutions that should pay the highest attention and put them into our initial IT portfolio. An example is shown in Table 3. For the company that is identified as defender, the systems that belong to transformational applications and transaction processing applications are highlighted with the color of “dark gray,” meaning that they belong to top priority investment, based on the suggestion of the results by Sabherwal and Chan (2000). In contrast, analytic applications are not highlighted with any color, meaning that they are with lowest priority. According to Sabherwal and Chan (2000), there is no solution that should be ranked as medium priority for defenders. In short, throughout this step, we can assure the portfolio of IT solutions with highest IT-business alignment. Furthermore, we’ve defined the levels of alignment with each different information systems, ranking them from high priority to low priority.

Table 3: Initial IT portfolio for defenders

<table>
<thead>
<tr>
<th>Categories of Proposed IS/IT solutions</th>
<th>Customer Selection</th>
<th>Customer Growth</th>
<th>Product Production</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transformational Applications</td>
<td>System A</td>
<td>System B</td>
<td>System D</td>
</tr>
<tr>
<td>Analytic Applications</td>
<td>System C</td>
<td>System E</td>
<td>System F</td>
</tr>
<tr>
<td>Transaction processing Applications</td>
<td>System I</td>
<td>System J</td>
<td>System K</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>System L</td>
</tr>
</tbody>
</table>

However, simply using the degree of alignment to justify IT investment priority is not enough. For instance, although an intended IS investment is highly aligned with the business strategy, it may be poorly in readiness; employees may not have adequate knowledge in handling the system, and the basic technology infrastructure of the firm may not be ready yet. On the other hand, if an IS investment is considered to be medium-priority investments, but this IT investment is ready in every way, and in nature it is a cost eliminator, reducing production cost in a very significant way and creating great value to the company, should this investment still be ranked in the second place? The two examples show the insufficiency to only consider IT alignment in IT investments justification. Therefore, in our research framework, after prioritizing IT investments according to their degree of alignment, we will make some adjustments based on the assessment of two criteria “e-readiness” and “business value”.

3.2. IT investments priorities adjustment

To make adjustment among the prioritization of IT investments, we assess an IT investment from two aspects of considerations: (1) business value and (2) e-readiness. Based on the literature review in Section 2, we assess the business value of an IT investment with five criteria, including two financial criteria: (1) operating cost saving, (2) productivity improvement, and three non-financial criteria: (3) competitive advantage, (4) improved coordination with partners, and (5) customer satisfaction. As for e-readiness, we will measure the degree of readiness from three important aspects of considerations we have identified: (1) organizational readiness, (2) technological readiness, and (3) environmental readiness. Through calculating the scores of each aspect, we will get scores to show the levels of business value and e-readiness for each portfolio element. We will then use a two-axis diagram to show the corresponding position of an IT investment. Figure 4 provides the two-axis diagram.

The reason of using this two-axis diagram instead of assigning weightings to each factor is that we cannot judge whether business value or e-readiness shows more significance. In a matter of fact, there exists some trade-off and connection between these two criteria. As can be seen from Figure 4, each desired IT investment is plotted in the diagram according to their corresponding position with regards to business value and e-readiness. The area colored in “dark gray” is where both business value and e-readiness are scored highly; for area colored in light gray, it refers to a medium score on both; and as for area remained uncolored, it means poorly in either business value and e-readiness or even both.

The next step is to adjust the rankings of our initial IT portfolio. For those IT investments that are located at the “dark gray” area, their original ranking will shift one level higher; however, for investments that is already ranked in the “high-priority investments”, will stay the same; as for IT investments that are located at the “light gray” area, their ranking won’t be needed for any adjustment; at last, IT investments located in the uncolored area, their ranking will shift one level lower, however, for investments that is already ranked in the “low-priority investments”, will stay the same.

We can use the following example to explain the adjustment process. For instance, one IT investment is being justified as highly aligned with the business strategy, and being ranked as “high priority investments”, however, from the assessment of e-readiness and business value, it shows poorly in both,
therefore we shift its ranking from “high priority investments” to “medium priority investments”. On the other hand, an IT investment might be ranked as “medium-priority investments” due to the poor alignment with the business strategy; however in the assessment of e-readiness and business value, it shows both highly ready and valuable, we then shift its ranking from “medium priority investments” to “high priority investments.”

Figure 4: The value-readiness matrix

At last, we are able to finalize our priority list. The priorities are sequenced as “high priority investments” first, then “medium-priority investments”, and at last “low-priority investments”. In addition, with the investments ranked at the same level, priorities among them are considered first by their degree of IT alignment. If there are projects remaining the same priority, we use the score of business value and e-readiness to justify the ranking, the one with higher score will be chosen first.

4. Application

According to The ICCA (International Congress & Convention Association) reports, there are more and more international conventions held in Asia countries rather than European or North America countries (Chung, 2004). In this trend, of all the international conventions held in 2006, Taiwan ranked 9th in all Asia countries, and Taipei city ranked 8th in all Asia cities. The output value of MICE (Meetings, incentives, Conventions and Exhibitions) industry in Taiwan will exceed 10 billion NT dollars. Due to the high growth potential of MICE industry, Taiwan government initiates a series of policies to assist the development of MICE industry through constructing a new Taipei World Trade Center Exhibition hall located in Nangang, Taipei city, while also assigning TAITRA (Taiwan External Trade Development Council) to form a new department – “Exhibition Department”, specialized in setting up the industrial strategies.

It is being noticed by the TAITRI exhibition department that the future trend of MICE industry will certainly be more internationalized. The exhibitions held are no longer to satisfy local companies, buyers, or visitors. Also, branding and marketing will be further stressed, which means the type of exhibitions will shift from multifunctional exhibitions toward specialized product or industry exhibitions. It is obvious that MICE industry will become more “Informationalized”, using IT to lower activity cost, increase the exhibition’s efficiency, and fasten the response to global market. TAITRA exhibition department recognizes the need to set up a new internet-based MICE system platform, and wishes the system can process all the necessary works and services online in order to provide the Taipei World Trade Center Nangang Exhibition hall a stronger competitive advantage.

Since the platform consist of different applications, it is quite impossible to invest and implement the whole platform at once. It is necessary to cut down the project into different phases and build the platform sequentially. The proposed methodology is implemented and the following is a summary of this particular example.

4.1. Initial IT portfolio

This part of the proposed model is divided into three phases. The first phase focuses on the clarification of business needs and determination of key focused processes. The second phase focuses on the matching of IT needs with business focus. The third phase focuses on the assessment of IT alignment. As seen in Figure 5, the financial goals of TAITRA are “expanding revenue opportunities” and “enhancing customer value.” Customer’s value propositions are more toward functionality, service, partnership, and brand. Three internal processes are proposed to enhance customer value: (1) “before exhibition” — including the processes of buyer invitation, vendor invitation, marketing and promotion, and the management of exhibition time period and space, (2) “during exhibition” — including the processes of visitors’ check-in, exhibition information announcement, and meeting arrangement, and (3) “after exhibition” — including the processes of the management of visitor and vendor information and final reporting.
Next, the suitable IT applications that can fulfill the needs of the three targeted internal processes are proposed. In order to determine the most appropriate IT applications for a targeted process, TAITRA conduct focus group discussions. Table 4 shows the results. Currently, TAITRA does not identify any transformational applications.

Table 4. The matrix of IT/business needs – TAITRA case

<table>
<thead>
<tr>
<th>Categories of Proposed IT Solutions (IT needs)</th>
<th>Before Exhibition</th>
<th>During Exhibition</th>
<th>After Exhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transaction processing Applications</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(1) Exhibition time period management system</td>
<td></td>
<td>(1) Identity recognition technology</td>
<td></td>
</tr>
<tr>
<td>(2) Exhibition space management system</td>
<td></td>
<td>(2) Instant visitor counts technology</td>
<td></td>
</tr>
<tr>
<td>(3) Vendor management system</td>
<td></td>
<td>(3) Instant exhibition information announcement system</td>
<td></td>
</tr>
<tr>
<td>(4) Online Seminar/activity reminder system</td>
<td></td>
<td>(4) Online seminar/activity reminder system</td>
<td></td>
</tr>
<tr>
<td>Analytic Applications</td>
<td></td>
<td>(1) Marketing activity and commercial news release</td>
<td></td>
</tr>
<tr>
<td>(1) Press release and marketing application</td>
<td></td>
<td>(1) After exhibition statistic reporting system</td>
<td></td>
</tr>
<tr>
<td>(2) Marketing activity management system</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(3) Buyer management system</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

At last, we apply the strategic classification typology developed by Miles and Snow (1978) to examine the role TAITRA exhibition department in Taiwan’s MICE industry. Since TAITRA takes the role as market leader and innovator in Taiwan MICE industry and is willing to adapt new technologies and new business model, their strategic role is defined as “Prospector.” We also use Miles and Snow typology classification tool to confirm this classification.

Then, according to Sabherwal and Chan (2001), the main focus of IT for prospectors should be on transformational applications and analytic applications (Both ranked as high priority), while transaction processing applications is considered to be not so important. Therefore, the initial IT portfolio for TAITRA is proposed below:

- **High-priority investment:** (1) after-exhibition statistic reporting system, (2) buyer management system, (3) marketing activity management system, (4) marketing activity and commercial news release system, (5) online match making system, and (6) press release and marketing application
- **Medium-priority investment:** NONE
- **Low-priority investment:** (1) exhibition time period management system, (2) exhibition space management system, (3) identity recognition technology, (4) instant exhibition information announcement system, (5) instant visitor counts technology, (6) online seminar/activity reminder system, and (7) vendor management system.

### 4.2. Priority adjustment

To further improve the initial IT portfolio, a scoring chart with seven-point likert scale² is developed to assess benefit value and e-readiness for each proposed IT application. The result is shown in Table 5. Based on the result, the value-readiness matrix is developed, as shown in Figure 6.

Table 5. The assessment of business value and e-readiness

<table>
<thead>
<tr>
<th>IT Investments</th>
<th>Aspects of considerations (total points)</th>
<th>E-readiness (98)</th>
<th>Business Value (77)</th>
<th>Total (175)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Buyer management system</td>
<td>70</td>
<td>54</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>Vendor management system</td>
<td>70</td>
<td>56</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>Press release and marketing application</td>
<td>71</td>
<td>52</td>
<td>123</td>
<td></td>
</tr>
<tr>
<td>Marketing activity management system</td>
<td>65</td>
<td>52</td>
<td>117</td>
<td></td>
</tr>
<tr>
<td>Exhibition time period management system</td>
<td>72</td>
<td>52</td>
<td>124</td>
<td></td>
</tr>
<tr>
<td>Exhibition space management system</td>
<td>75</td>
<td>50</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Identity recognition technology</td>
<td>57</td>
<td>50</td>
<td>107</td>
<td></td>
</tr>
<tr>
<td>Instant visitor counts technology</td>
<td>58</td>
<td>37</td>
<td>95</td>
<td></td>
</tr>
<tr>
<td>Instant exhibition information announcement system</td>
<td>68</td>
<td>48</td>
<td>116</td>
<td></td>
</tr>
<tr>
<td>Marketing activity and commercial news release system</td>
<td>71</td>
<td>54</td>
<td>125</td>
<td></td>
</tr>
<tr>
<td>Online Seminar/activity reminder system</td>
<td>70</td>
<td>50</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Online match making system</td>
<td>69</td>
<td>57</td>
<td>126</td>
<td></td>
</tr>
<tr>
<td>After exhibition statistic reporting system</td>
<td>70</td>
<td>65</td>
<td>135</td>
<td></td>
</tr>
</tbody>
</table>

1 The tool can be requested from the authors
2 The scoring chart can be requested from the authors
As can be seen from the matrix, all of the IT investments are situated in the “High-High” area, except for identity recognition technology, instant exhibition information announcement system, and instant visitor counts technology. As a result, four ITs that belong to the category of low-priority investments in the initial IT portfolio are shifted one level higher into the medium-priority investments, transforming the IT portfolio into a new priority order:

- **High-priority investment:** (1) After exhibition statistic reporting system, (2) Buyer management system, (3) Marketing activity management system, (4) Marketing activity and commercial news release system, (5) Online match making system, and (6) Press release and marketing application
- **Medium-priority investment:** (1) Exhibition space management system, (2) Exhibition time period management system, (3) Online seminar/activity reminder system, and (4) Vendor management system
- **Low-priority investment:** (1) Identity recognition technology, (2) Instant exhibition information announcement system, and (3) Instant visitor counts technology

At last, the budget is allocated based on the priority ordering of the IT investment.

### 5. Summary and conclusion

This paper has presented a new IT portfolio approach for justifying IT investment priorities. The approach, through strategy maps, helps to identify the important internal processes. A set of IT applications are then proposed to improve these processes. These IT applications are formed as the initial IT portfolio based on Miles and Snow’s strategy classification typology. The initial IT portfolio is then adjusted according to value-readiness matrix. The ultimate goal is to provide a quantifiable prescriptive model to improve the quality of IT investment. The example presented here has demonstrated the applicability of the model to support IT investment of TAITRA; the same model can be applied to other organizations.

There are several unique features about the proposed model. First, the model provides a powerful tool to complement the strategy maps. Strategy maps are qualitative in nature and are applied to general business innovations. It includes neither analytical models nor corresponding decision support systems for IT portfolio management. The proposed model does not eliminate subjectivity completely, but that is not an attainable or desirable end result. The advantage of the proposed model is that it adds quantitative precision to an otherwise qualitative decision-making process. Second, the proposed framework not only incorporates IT strategic alignment, IT business values, and e-business readiness, but also coordinates them through a fine-tuning process. The diagrams and matrices resulting from the process allow the decision maker to examine the sensitivity of IT investment priorities with respect to changes in competitive strategies and its corresponding business needs, as well as changes in values and readiness. Finally, the example provided in this paper demonstrates the applicability and ease of use of the model in different organizations.

This study raises interesting issues that warrant further research. Through this article has demonstrated the use and benefits of the proposed method, further evaluation and refinement of the model using additional field studies may prove beneficial.

### 6. References


