Framework to Efficiently Measure Firm Smart Business Performance in a Global Management Environment

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Abstract: Many firms have implemented their smart business capabilities to efficiently perform management activities and improve the performance of business tasks in a smart management environment. Firms have applied their smart business capabilities to management activities in order to raise the performance of business execution in a global management environment. That is, the measurement and management for the performance of a firm's smart business execution need to efficiently build and improve the smart business capability appropriate for its management strategy and business departments. Hence, a measurement framework is necessary for efficiently measuring a firm's smart business performance in order to manage and improve its smart management capability. The validity and reliability of the developed framework are verified by factor analysis and reliability analysis based on previous studies. We find a 10-item framework that can reasonably measure a firm smart business performance in a total performance perspective.

1 INTRODUCTION

Most enterprises perform their management activities and business tasks with partially and fully utilizing smart device, network, solutions and systems in a smart business environment (Busquets, Rodon, and Wareham, 2009; Chang, Chen, and Zhou, 2009; Heck and Vervest, 2009; Hilty, Aebischer, and Rizzoli, 2014). Smart business technology is an important means to improve and preserve a firm's task performance in the ever-changing business environment. Firm smart business capability needs to increase its business performance in a smart management environment (Yoon, 2014). Firm smart business capability needs to increase its business performance in a smart management environment (Yoon, 2014). Its smart business performance has to be measured by a scientific and practical tool in order to efficiently build and improve a smart business capability appropriate for the management activities and business tasks. Enterprise smart business capability should be improved by objective criteria based on the analysis results of its smart business performance in a comprehensive performance perspective. Enterprise smart business performance means the business results that a firm performs its management and business activities based on its smart business capability in a smart business perspective. But a comprehensive and practical tool to measure a firm smart business performance has not been studied in previous studies. Namely, we need a measurement framework that can effectively gauge a firm smart business performance in terms of its entire smart business performance.

Therefore, this study provides a measurement framework that can efficiently gauge a firm smart business performance to effectively build its smart business capability and improving its smart business performance in terms of a total smart business performance.

2 RELATED RESEARCH

Previous literature has considered smart business as the critical factor to efficiently improve a firm's business performance and competitiveness, and to effectively prepare for a future business environment with progress of smart technology (Yoon, 2014). Smart business can be defined as an approach to increase the competitiveness of organizations by improving management activities through using smart technology such as smart devices, networks, and solutions environment (Busquets, Rodon, and

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Wareham, 2009; Chang, Chen, and Zhou, 2009; Heck and Vervest, 2009; Hilty, Aebischer, and Rizzoli, 2014). Smart business can be described as a business process that uses the smart technology medium as a conduit to fulfil business transactions (Yoon, 2014).

Hence, smart business (SB) can be defined as an approach to efficiently perform the firm's management activities by applying the smart technology and solutions, and systems to its business tasks and management activities in a global business environment.

Literature on enterprise performance provides a variety of perspectives (Bi and Zhang, 2008; Hu and Xiang, 2008; Jiao, Chang, and Lu, 2008; Liao and Chuang, 2006; Liu and Feng, 2008; Mei and Nie, 2007; Sun, Ding, and Gu, 2008; Tseng, Chiu, and Chen, 2009). The firm performance includes three factors such as improving client satisfaction, enhancing organizational competitiveness, and enhancing organizational image (Sun, Ding, and Gu, 2008). These studies focused on financial and non-financial perspectives. In financial research, the measurement of firm performance was studied in terms of sale growth, earning growth, market share, return on assets (ROA), return on sales (ROS), and market value (Liu and Feng, 2008). In non-financial research, a firm's performance was measured by efficiency, effectiveness, profitability, quality of service, client satisfaction, and productivity (Bi and Zhang, 2008; Hu and Xiang, 2008; Jiao, Chang, and Lu, 2008; Liao and Chuang, 2006; Liu and Feng, 2008; Mei and Nie, 2007; Sun, Ding, and Gu, 2008). This is their satisfaction level about their firm's performance in terms of growth in sale, growth in profits, and growth in market share (Mei and Nie, 2007). By exploring these studies, this research describes enterprise performance as the effectiveness and efficiency of its management activities that are improved by utilizing enterprise IT capability for its management activities. Firm smart business performance is able to transform enterprise performance into a type of enterprise performance based on a smart business performance perspective.

Hence, firm smart business performance (FSBP) can be defined as the performance that a firm can obtain with applying the smart business capability to its management activities and business tasks in a global management environment. Namely, FSBP means a total smart business performance that a firm can get from applying its smart business capability to its management activities and business tasks in a smart management environment.

Based on these previous literature, we extract the analysis factors and items to measure firm performance in a smart business perspective as follows: operation performance (efficiency of business process, inventory turnover and accounts, quality of services, and client satisfaction), growth performance (sale revenue growth, market growth, market value, and return on sale), profitability performance (sale gross and profit margin, net income growth, growth in profits, and cash turnover ratio), and competitiveness performance (sale growth rate, capital structure, market share, number of patents, customer share, and R&D expenditure ratio) (Bi and Zhang, 2008; Hu and Xiang, 2008; Liao and Chuang, 2006; Liu and Feng, 2008; Mei and Nie, 2007; Sun, Ding, and Gu, 2008; Tseng, Chiu, and Chen, 2009). We use these items as measures with which to gauge the FSBP through the verification process of a validity and reliability analysis.

3 METHODS

This study initially generated 19 measurement items for FSBP based on definitions and components of enterprise performance (Bi and Zhang, 2008; Hu and Xiang, 2008; Jiao, Chang, and Lu, 2008; Liao and Chuang, 2006; Liu and Feng, 2008; Mei and Nie, 2007; Sun, Ding, and Gu, 2008; Tseng, Chiu, and Chen, 2009). We analyzed the construct validity of the refined items to ensure that FSBP is efficiently measured by the items. The construct validity of the model was researched by many researchers. These studies presented two methods of model construct validation: (1) correlations between total scores and item scores, and (2) factor analysis (Etezadi-Amoli and Farhoodmand, 1996; Mei and Nie, 2007; Torkzadeh and Doll, 1999; Torkzadeh and Lee, 2003). Etezadi-Amoli and Farhoodmand (1996) used factor analysis to verify the validity of the measurement tool construct. Torkzadeh and Doll (1999) and Torkzadeh and Lee (2003) used correlation analysis to verify the validity of the measurement tool construct. This study is likely to verify the validity of the analysis tool construct and the extraction of adequate analysis items by factor analysis and reliability analysis. The ratio of sample size to number of measurement items (11:1) was above the minimum (10:1) ratio suggested for factor analysis (Etezadi-Amoli and Farhoodmand, 1996; Torkzadeh and Doll, 1999; Torkzadeh and Lee, 2003). The analysis questionnaire used a five-point Likert-type scale; where, 1: not at all; 2: a little; 3: moderate; 4: good; 5: very good. The survey was gathered data from a variety of industries, business departments, experience, and education. We performed two kinds of survey methods: direct

collection and e-mail. The respondents either directly mailed back the completed questionnaires or research assistants collected them 2-3 weeks later. The collected questionnaires represented 41 % of the respondents.

3.1 Sample Characteristics

This research collected a sample of 166 usable responses obtained from a variety of industries and business departments. We excluded nine incomplete or ambiguous questionnaires, leaving 157 usable questionnaires for statistical analysis. The respondents in terms of business departments were identified as strategy planning (16.6%), development and maintenance (16.0%), business application (36.9%), and administration support (30.5%). The respondent had on average of 9.6 years of experience (S.D. =1.018) in their field, their average age was 34.9 years old (S.D. =5.168), and their gender, male (70.7%) and female (29.3%). This survey was intentionally focused on various industries and persons working above the 10 years within their firms. Namely, the respondents could efficiently provide the correct responses for our questionnaire survey.

3.2 Analysis and Discussion

After factor analysis and reliability analysis, the first 19 measurement items were reduced to 10 items, with 9 items were deleted, with applying the criterion of previous studies (Etezadi-Amoli and Farhoodmand, 1996; Torkzadeh and Doll, 1999; Torkzadeh and Lee, 2003). The elimination was sufficiently considered to ensure that the retained items were adequate analysis items of FSBP. The validity and reliability of the developed framework were also verified through factor analysis and reliability analysis. They were used to identify the underlying factors or components that comprise the FSBP construct. Each of the 10 items had a factor loading > 0.634. The reliability coefficients (Cronbach's alpha) of four potential factors had values > 0.801 as indicated in Table 1, above the threshold recommended for exploratory research (Etezadi-Amoli and Farhoodmand, 1996; Torkzadeh and Doll, 1999; Torkzadeh and Lee, 2003). This research calculated the corrected item-total correlations between each variable and its corresponding factor in order to investigating the reliability and validity of the measurement items. These correlations along with alpha coefficients of each factor are presented in Table 1.

Table 1: Reliability, validity, and factor loadings of FSBP construct.

Variable	Factor Loading				Corrected Item-Total Correlation	Coefficients Alpha
	Factor 1	Factor 2	Factor 3	Factor 4		
V01	0.771				0.679	
V03	0.794				0.731	0.815
V04	0.665				0.637	
V06		0.802			0.733	0.833
V08		0.826			0.636	
V10			0.801		0.725	
V13			0.836		0.641	0.837
V15			0.711		0.612	
V17				0.796	0.659	0.801
V19				0.634	0.602	

These coefficients indicate the relative contribution of a measurement item to the construction of a scale for gauging a particular factor. Most corrected item-total correlations were greater than 0.602, showing that the measurement items are good indicators of their corresponding factors. The extracted items have a validity and reliability in terms of an analysis construct based on the analysis results as presented in Table 1. These results may be successfully achieved by accumulating many research findings and case studies. Through reflecting the analysis results of case studies, the developed analysis tool can be became more objective and practical scale in the application of industrial fields.

4 MEASUREMENT FRAMEWORK OF FSBP

We provided the 10 measurement items appropriate for measuring FSBP. This research classified four factor groups from the factor analysis. The factor groups indicate the potential factors as major measurement components to gauge FSBP. By exploring the measurement items of each factor group, we identified the following four potential factors: factor 1: SB operation performance; factor 2: SB growth performance; factor 3: SB profitability performance; and factor 4: SB competitiveness performance. These factors comprise the overall measurement content for FSBP from SB operation performance to SB competitiveness performance. The potential 4 analysis factors are used as the 4 core measurement factors of our framework construct. The meanings and measurement items of each factor are as follows. SB operation performance represents the

efficiency and effectiveness improved by applying the firm smart business capability to its management activities in a firm operation perspective. That is, the operation performance indicates the result that a firm obtains from its smart management activities in terms of business execution. It includes efficiency of business process, quality of service, and client satisfaction in firm management activities. SB growth performance presents the efficiency and effectiveness raised by applying the firm smart business capability to its management activities in a firm growth perspective. It comprises sale revenue growth and market growth. SB profitability performance means the efficiency and effectiveness improved by applying the firm smart business capability to its management activities in an enterprise profit perspective. It has sale gross and profit margin, growth in profits, and net income growth. And, SB competitiveness performance refers to the efficiency and effectiveness increasing by utilizing the firm smart business capability for its management activities. Namely, SB competitiveness performance means the total smart business performance of an enterprise in a competitiveness perspective. It contains sale growth rate and market share. Our findings provide a structural framework that can efficiently measure FSBP in terms of a total smart business performance from SB operation performance to SB competitiveness performance, including 4 measurement factors and 10 items. This framework includes four measurement factors such as SB operation performance, SB growth performance, SB profitability performance, and SB competitiveness performance (Fig. 1). Each factor has two or three measurement items. As indicated in Table 1 and Fig.1, SB operation performance has the analysis items, such as V01, V03, and V04. SB growth performance includes V06 and V08. SB profitability performance contains V10, V13, and V15. SB competitiveness performance comprises V17 and V19. These factors affect FSBP, that is, the total FSBP of a firm. It is important to improve and manage FSBP by measuring a firm's SB performance with a valid and reliable instrument. Using this framework can facilitate efficiently raising a firm's SB performance. Measuring FSBP is a critical method to investigate the total smart business performance of an enterprise, based on its SB operation performance, SB growth performance, SB profitability performance, and SB competitiveness performance. Hence, the developed framework for FSBP consists of 4 measurement factors and 10 items verified by the previous analysis results as shown in Figure 1. The developed framework is an important theoretical construct to efficiently measure the total smart business performance that a firm can obtains by utilizing its smart business capability for its management activities in a smart management environment.

Hence, understanding the FSBP construct is essential to measure the success of FSBP that denotes the total SB performance to efficiently support its management activities. We can use the structural framework to measure FSBP across different industrial fields and business departments, and perhaps even as a global measure. Therefore, the developed framework is an important theoretical construct to efficiently gauge the total SB performance that a firm can obtains by utilizing its SB capability for its management activities in a global management environment.

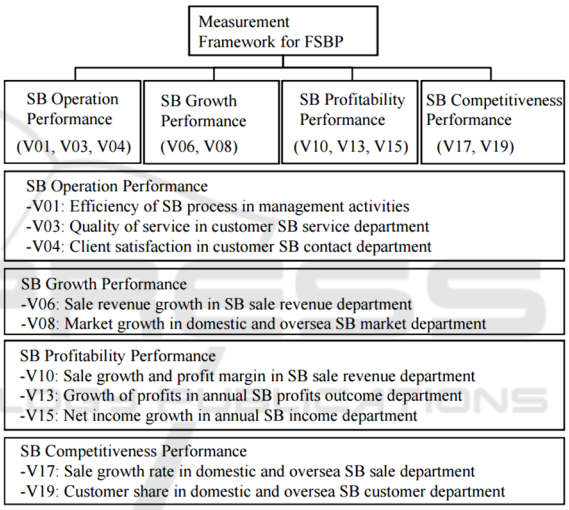

Figure 1: The developed measurement framework construct.

5 CONCLUSIONS

This study provides a structural framework that can measure perceived FSBP from a total smart business performance perspective. This 10-item scale framework is implicative, concrete, easy to use, and appropriate for practical and research purposes. We also have some limitations in terms of a specific FSBP perspective. This problem can be solved by many comparative and cumulative research findings. The developed framework with adequate validity and reliability provides groundwork for the development of a standard framework of FSBP.

Therefore, this study presents a structural framework that can efficiently measure FSBP that a

firm can obtain by applying a firm smart business capability to its management activities and business tasks in a global management environment. In future research, we will find the practicality and availability of the developed framework with providing the measurement results by applying it to many case studies.

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