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MeasuringEnterpriseSmart Business Performance in an Entire Performance Perspective

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ABSTRACT : Most enterprise has applied their smart business capabilities to management activities in order to raise the performance of business execution in a global management environment. The measurement for the performance of a firm's smart business execution should be performed to efficiently build and improve the smart business capability appropriate for its management and business departments. A measurement instrument needs to effectively measure a firm's smart business performance in order to manage and improve its smart management capability. We verified the validity and reliability of the developed instrument by factor analysis and reliability analysis based on previous studies. This researchprovides a 12-item instrument that can reasonably gauge a firm smart business performance in a total performance perspective.
KEYWORDS -Smart business, Business performance, Smart business performance, Measurement factors and items, Structural instrument

I. INTRODUCTION

Enterprises perform their management activities and business tasks with partially and fully utilizing smart device, network, solutions and systems in an IT environment [1, 2, 3, 4]. Enterprise have implemented smart business environment to improve their task performance and to raise their competitiveness in a global management environment [5]. Smart business technology is an important means to improve and preserve an enterprise's business performance in the ever-changing business environment. Firms have driven to build a smart business capability appropriate for their management activities. In this environment, smart business capability is a kernel factor for future business environment. Firm smart business capability needs to increase its business performance in a smart management environment [5]. Its smart business performance has to be gauged by a scientific and practical instrument in order to effectively build and improve a smart business capability appropriate for the management activities and business tasks. We have to raise firm smart business capability by objective criteria based on the measurement 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 instrument to measure a firm smart business performance has rarely been studied in previous literature. Hence, this research needs a reasonable instrument that can effectively gauge an enterprise smart business performance in terms of its entire smart business performance.

Therefore, this study provides a structural instrument that can efficiently measure an enterprise smart business performance to effectively build its smart business capability and to improve its smart business performance in terms of a total smart business performance.

II. PREVIOUS STUDIES

Previous literature has considered smart business as the critical factor to efficiently improve an enterprise's business performance and competitiveness, and to effectively prepare for a future business environment with progress of smart technology [5]. Firms have partially or fully built smart business environment to perform their management activities and business tasks in a global business environment. Smart business can be described as a business process that uses the smart technology medium as a conduit to fulfill business transactions [5]. 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 [5].

Hence, we can define smart business (SB) 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 [6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18]. The enterprise performance includes three factors such as improving client satisfaction, enhancing organizational competitiveness, and enhancing organizational image [16]. 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 [11][12]. In non-financial research, a firm's performance was measured by efficiency, effectiveness, profitability, quality of service, client satisfaction, and productivity [6, 7, 8, 10, 13, 14, 15, 17]. This is their satisfaction level about their firm's performance in terms of growth in sale, growth in profits, and growth in market share [18]. 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, enterprise smart business performance (ESP) 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, ESP 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) [6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18].This research uses these items as measures with which to gauge the ESP through the verification process of a validity and reliability analysis.

III. METHODS

This research initially generated 18 measurement items for ESP based on definitions and components of enterprise performance [6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17]. 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 [20][21][22]. Etezadi-Amoli and Farhoodmand (1996) used factor analysis to verify the validity of the measurement tool construct [20]. Torkzadeh& Doll (1999) and Torkzadeh& Lee (2003) used correlation analysis to verify the validity of the measurement tool construct [21][22]. 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 [20][21][22]. 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 39 % of the respondents.

3.1 Sample Characteristics

We collected a sample of 187 usable responses obtained from a variety of industries and business departments. This research excluded nine incomplete or ambiguous questionnaires, leaving 178 usable questionnaires for statistical analysis. All respondents had college or university degrees in: humanities and societies (19.6%), management and economics (38.2%), engineering (27.1%), and science (15.1%). The respondents in terms of business departments were identified as strategy planning (17.4%), development and maintenance (19.6%), business application (34.4%), and administration support (28.6%). The respondents identified themselves as top manager (3.9%), middle manager (41.5%), and worker (54.6%). The respondent had on average of 8.4 years of experience (S.D. =1.014) in their field, their average age was 33.5 years old (S.D. =5.117), and their gender, male (74.1%) and female (25.9%). This survey was intentionally focused on various industries and persons working above the 8 years within their firms. The respondents could efficiently provide the correct responses for our questionnaire survey.

3.2 Analysis and Discussion

The first 18 measurement items were reduced to 12 items, with 6 items were deletedafter factor analysis and reliability analysis, with applying the criterion of previous studies [18, 20, 21, 22]. The elimination was sufficiently considered to ensure that the retained items were adequate analysis items of ESP. The validity and reliability of the developed instrument were also verified through factor analysis and reliability analysis. They were used to identify the underlying factors or components that comprise the ESP construct. Each of the 12 items had a factor loading > 0.621 as shown in Table 1. The reliability coefficients (Cronbach's alpha) of four

potential factors had values > 0.798 as indicated in Table 1, above the threshold recommended for exploratory research [18, 20, 21, 22]. 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 analysis items. These correlations along with alpha coefficients of each factor are presented in Table 1. It also shows the alpha coefficients for the analysis factors if an analysis item was deleted from the scale. These coefficients indicate the relative contribution of an analysis item to the construction of a scale for analyzing a particular factor. They are all in the acceptable range. Most corrected item-total correlations were greater than 0.621, showing that the measurement items are good indicators of their corresponding factors.

Table 1. Reliability, validity, and factor loadings of ESP construct

Variable	Factor Loading				Corrected Item-Total Correlation	Coefficients Alpha
	Factor 1	Factor 2	Factor 3	Factor 4		
V01	0.708				0.621	
V02	0.812				0.713	0.811
V04	0.809				0.638	
V06		0.743			0.747	
V08		0.729			0.719	0.804
V09		0.811			0.781	
V11			0.827		0.713	
V13			0.801		0.724	0.842
V14			0.648		0.642	
V15				0.787	0.712	
V16				0.815	0.706	0.798
V18				0.621	0.624	

* Significant P < 0.01

The extracted items have a validity and reliability in terms of a measurement construct based on the analysis results as presented in Table 1. This may be successfully achieved by accumulating many research findings and case studies. Through reflecting the measurement results of case studies, the developed measurement instrument can be became more objective and practical scale in the application of industrial fields [5].

IV. MEASUREMENT INSTRUMENT OF ESP

We presented the 12measurement items appropriate for gauging ESP. This research classified four factor groups from the factor analysis. The factor groups indicate the potential factors as major measurement components to analyze ESP. By exploring the measurement items of each factor group based on previous studies, 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 include the overall measurement content for ESP from SB operation performance to SB competitiveness performance. The potential 4 measurement factors are used as the 4 core measurement factors of our measurement instrument construct. The meanings and measurement items of each factor are as follows. SB operation performance presents the efficiency and effectiveness improved by applying the firm smart business capability to its management activities in enterprise SB operation perspective. That is, the SB 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 represents the efficiency and effectiveness raised by applying the firm smart business capability to its management activities in a firmSB growth perspective. It comprises sale revenue growth, market growth, and sale growth and profit margin. SB profitability performance means the efficiency and effectiveness improved by applying the firm smart business capability to its management

activities in a firmSB profit perspective. It has sale gross and profit margin, growth in profits, and net income growth. SB competitiveness performance refers to the efficiency and effectiveness increasing by utilizing the firm smart business capability for its management activities in an enterprise competitiveness perspective. Namely, SB competitiveness performance means the total smart business performance of a firm in a competitiveness perspective. It contains sale growth rate, market share, and R&D expenditure. Our findings provide a structural instrument that can efficiently measure ESP in terms of a total smart business performance, including 4 measurement factors and 12 items.

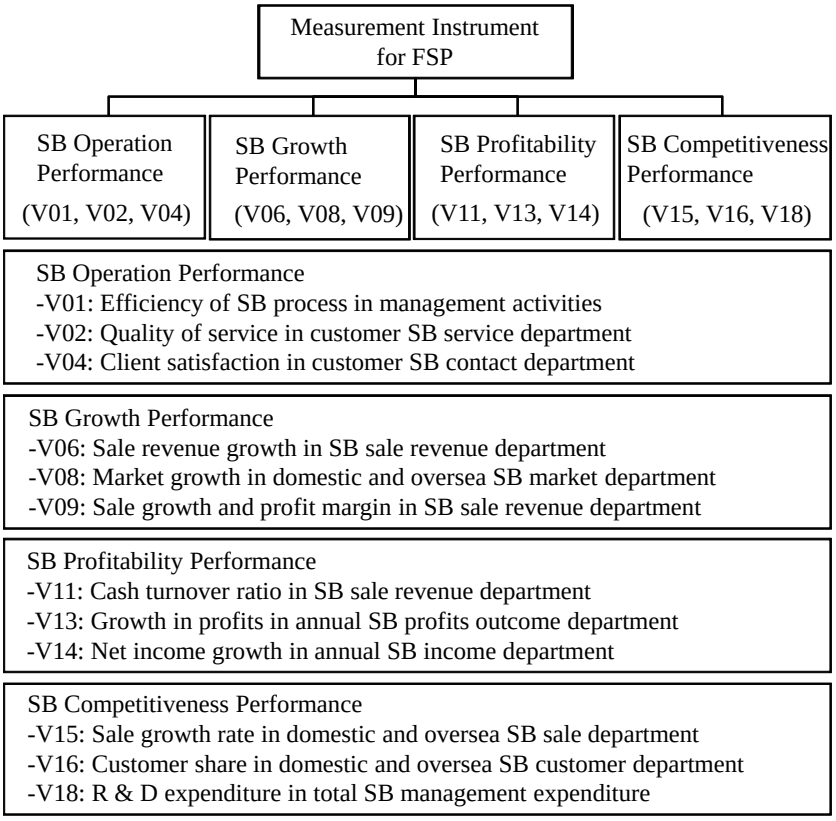

Figure 1. The developed instrument construct

Hence, the developed measurement instrument for ESP consists of 4 measurement factors and 12 items verified by the previous analysis results as shown in Fig. 1. This instrumentcomprises four measurement factors such as SB operation performance, SB growth performance, SB profitability performance, and SB competitiveness performance (Fig. 1). Each factor has three measurement items. As presented in Table 1 and Fig.1, SB operation performance has the analysis items, such as V01, V02, and V04. SB growth performance includes V06, V08, and V09. SB profitability performance contains V11, V13, and V14. SB competitiveness performance comprises V15, V16 and V18. These factors affect ESP, that is, the total smart business performance of a firm. It is important to improve and manage ESP by measuring an enterprise's smart business performance with a valid and reliable instrument. Using this instrument can facilitate efficiently raising a firm's smart business performance. Measuring ESP 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, understanding the ESP construct is essential to measure the success of ESP that denotes the total smart business performance to efficiently support its management activities. We can use the structural instrument to measure ESP across different industrial fields and business departments, and perhaps even as a global measure. Therefore, the developed instrument 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 global management environment. And, this research analyzed the mutual relationship between the analysis factors, and the relationship between each factor and ESP. Since there are the factors affecting ESP, understanding their mutual relationship is very important for efficiently improve ESP and for the effective utilization of the developed instrument in industrial fields. Their mutual relationship is complex and may be affected by other variables. This research analyzed how they were correlated in order to examine the

relationship between SB operation performance, SB growth performance, SB profitability performance, and SB competitiveness performance, and ESP, as presented in Table 2.

Table 2. Correlation matrix

Division	Factor Correlation Matrix				
		(2)	(3)	(4)	(5)
ESP	(1)	0.41	0.51	0.43	0.42
SB Operation Performance	(2)		0.45	0.45	0.43
SB Growth Performance	(3)			0.47	0.44
SB Profitability Performance	(4)				0.43
SB Competitiveness Performance	(5)				

V. CONCLUSION

This study provides a structural instrument that can gauge perceived ESP from a total smart business performance perspective. This 12-item scale instrument is implicative, concrete, easy to use, and appropriate for practical and research purposes. This research also has some limitations in terms of a specific ESP perspective. This problem can be solved by many comparative and cumulative research findings. The developed instrument with adequate validity and reliability provides groundwork for the development of a standard framework of ESP.

Therefore, we provide a structural instrument that can efficiently measure ESP that an enterprise can obtain by applying an enterprise smart business capability to its management activities and business tasks in a global management environment. This finding provides a new foundation for the development and advancement of the efficient measurement instrument for ESP. In future research, we will provide the measurement results by applying it to a lot of case studies in industrial fields.

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APPENDIX A: MEASUREMENT ITEMS FOR ENTERPRISE SMART BUSINESS PERFORMANCE

1. Efficiency of SB business process in management activities
2. Quality of service in customer SB service department
3. Inventory turnover and accounts in management activities
4. Client satisfaction in customer SB contact department
5. Market value in domestic and oversea SB market department
6. Sale revenue growth in SB sale revenue department
7. Return on sale in SB sale revenue department
8. Market growth in domestic and oversea SB market department
9. Sale growth and profit margin in SB sale revenue department
10. Capital structure in enterprise total assets
11. Cash turnover ratio in SB sale revenue department
12. Market share in domestic and oversea SB customer market
13. Growth in profits in annual SB profits outcome department
14. Net income growth in annual SB income department
15. Sale growth rate in domestic and oversea SB sale department
16. Customer share in domestic and oversea SB customer market
17. Number of patents related to smart business possessed by enterprise
18. R&D expenditure in total SB management expenditure

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