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Developing a Scale Measurement of Market Uncertainty: A Cluster Analysis on Taiwan's Financial Services

Shu-Hsien Liao[1], Wen-Jung Chang[2], Da-Chian Hu[2], Yi-Wen Lin[2]
[1] Department of Management Sciences and Decision Making, Tamkang University, Taipei County, Taiwan.
[2] Department of Management Sciences, Tamkang University, Taipei County, Taiwan.

Abstract –**The way to ensure a company's long-term advantages for survival is to completely know market uncertainty. Though the financial services have been made great contributions to Taiwan's economic development, past research pays little attention on them without a scale development of market uncertainty. Building on extensive literature, a 53-item survey questionnaire was developed and 323 respondents from 28 domestic financial services were selected as the sample of this study. Using an exploratory factor analysis (EFA), we would retrieve four dimensions of market uncertainty, including market situation, market forecasting, market innovation and competitor's threats. Meanwhile, we would divide market uncertainty into three groups by cluster analysis and further verify them with business performance as well as project efficiency.**

Keywords – **Financial services; Market uncertainty; Scale development; Strategic management**

I. INTRODUCTION

During the past four decades, the environmental issues have been attracting scholars' attentions. Among those literatures, *environmental uncertainty* (EU) has been a central concept [1-4] as well as a critical management issue for top managers [4]. The following research topics on EU have ranged from organizational design (e.g., [3-6]), strategic planning system (e.g., [7-8]), to market and technologic turbulence (e.g., [9-10]), and competition intensity and market turbulence (e.g., [11]).

For past studies rarely developed a scale measurement of market uncertainty (MU) for a specific industry and neither have come to an agreement on its definition and measurement, we thus make attempts to develop a scale of MU for financial services with extensive literature, exploratory and confirmatory factor analysis (EFA/CFA) and cluster analysis. We finally develop a theoretical model and conclude with some managerial implications.

II. BACKGROUND

A. Defining uncertainty

Different types of uncertainty have been discussed and investigated in both behavioral decision theory and organization literatures (e.g., [4, 6, 12-13]). Uncertainty represents not having enough information to describe a current state or to predict future states or the actions needed to achieve them [14-15]. Beckman [16] argues that uncertainty is the difficulty firms have in predicting the future, which comes from incomplete knowledge. Abbott [17] defines that uncertainty is a perceived lack of knowledge, by an individual or group that is relevant to the purpose or action being undertaken.

B The role of uncertainty plays in context of environment-strategy-performance relationship

Under such ever-changing environment, individuals and organization would face a complex and uncertain future [17]. Though the term *uncertainty* is popularly seen in our daily life, no one could really know what it is. Due to the diversity of denominations, it is possible to find terms such as turbulence, dynamism, and uncertainty. According to the Oxford and the Merriam-Webster two on-line dictionaries, the turbulence and dynamism is kind of situation in contrast to the uncertainty, a kind of feeling and attitude. These three terms maybe look so similar as not to make a distinction among them, but it is strongly believed that the different levels of uncertainty would affect all the management activities with strategy orientation.

Prior researches have consistently supported that the significant role of uncertainty plays in strategic context. For example, the frequent changes from industry would decrease the certainty of strategies and increase the difficulties on the accuracy of planning, forecasting as well as cost reduction [18]; uncertainty arises when the venture is unable to predict or control its external environment, a condition that can profoundly influence the venture's operations [19]; a firm couldn't concentrate on the product innovation when it operates under high market uncertainty [20]. On the other hand, other scholars mostly support that EU is conducive to innovation (e.g., [21-23]). Today's business environment, after all, is full of uncertainties that might directly or indirectly determine a firm's decision-making risk (See Fig. 1). Before having developed a business strategy, a firm needs to monitor its environment surrounding with caution.

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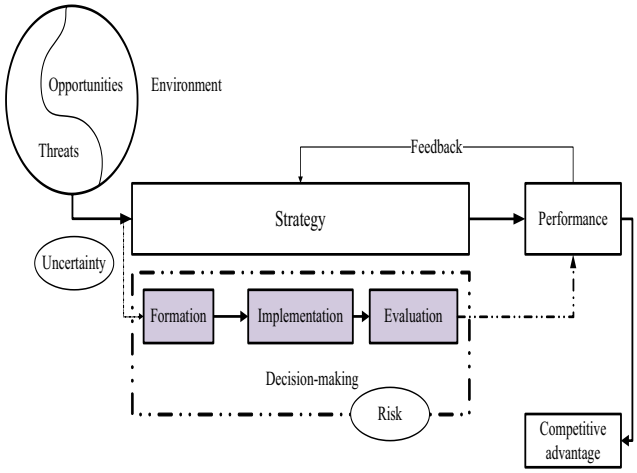

Fig 1. Uncertainty in context of strategic management

III. METHODOLOGIES

A. Questionnaire design

Based on extensive literature on uncertainty, a 105-item survey questionnaire was initially developed and comprised six categories: market condition (e.g., [24-29]), customer (e.g., [25, 30-31]), competitors (e.g., [25-26, 30-31]), information (e.g., [27]), supply chain (e.g., [32-33]) and criterions (e.g., [11, 34-35]). A 5-point Likert scale (1=totally disagree, 5=totally agree) was used to measure the constructs. Besides, we would also add two criterions, organizational performance (OP) and project efficiency (PE), for verifying the theoretical model in the future.

B. Data collection

The data processing proceeded in three stages. The first stage was to mail our initial questionnaire to six professionals from financial services to ensure the content validity. The initial 105 items would be cut down to 61 items after receiving their responses. Next, a pilot test randomly selecting 200 students of EMBA from a private university on Northern Taiwan was administered from the end of November to the middle of December 2008. A total of 143 valid responses were received with 7 incomplete questionnaires while tests indicated sufficient reliability and validity. After an item analysis with, 53 items were remained for formal scale. The third stage was to distribute the questionnaires from the end of December 2008 to February 2009. A total of 308 questionnaires were sent out and 186 were returned. Excluding 6 invalid questionnaires, a total of 180 valid responses were received for an effective response rate of 58.44%.

C. Factor analysis

Our research is concerned with a scale development. Firstly, we performed EFA to extract latent construct, and verified the relationships between items and latent variables by CFA. After using EFA with the method of principal axis factoring to retrieve the factor structure of MU, four factors and 15 items accounting for 57.33% of variance are accessed. We rename these 4 factors as follows: market innovation (MI), market situation (MS), market forecasting (MF) and competitor's threats (COT). Each factor explains 23.53%, 15.80%, 9.05% and 8.95%, respectively. The operating definition of each factor is as follows: (1) MI: the degree of organizational innovation (e.g., products and marketing, etc.) in response to the market changes; (2) MS: the constituent elements of the industry's market the degree of change (such as: customer demand, product life cycle and competitive structure, etc.); (3) MF: business-to-market changes in elements of the accuracy of the forecast (such as: product demand and competitor actions, etc.); (4) COT: enterprises are faced with the threat of the degree of marketing tactics (such as: sales and advertising, etc.). The four factors might be further grouped into three levels by its characteristics: one is the adaptability to MU, another is the reaction to competitor's threats, and the other is stability of market condition. From Fig. 2, the conceptual framework clearly depicts the relationships between MU and three characteristics.

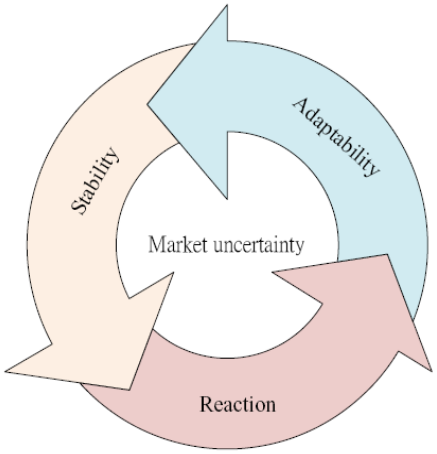

Fig 2. The conceptual framework of market uncertainty

Ⅳ. DATA ANALYSIS AND RESULTS

A. Reliability& Validity

The Cronbach's α and construct reliability of each dimension in our study is greater than .7 and .6 respectively; it means the reliability of each dimension is good. The results of convergent validity indicate that the T-value of all the measurement items from each dimension of variables is from 4.93 to 8.93. Meanwhile, the testing of discriminant validity is based on the method of Anderson and Gerbing [36]. If the chi-square ($\chi 2$) value that the difference between the restricted model and non-restricted model is greater than 3.84, it represents the discriminant validity of these two dimensions is good. Because of the chi-square ($\Delta\chi 2$) value is ranging from 44.86 to 125.26, the discriminant validity of this study is good.

TABLE Ⅰ
Correlation matrix

	MS	MI	MF	COT	OP	PE
MS	1	-.386**	.067	-.366**	.206**	-.024
MI	-.386**	1	.305**	.184**	.282**	.339**
MF	.067	.305**	1	-.128	.583**	.597**
COT	-.366**	.184**	-.128	1	-.143	-.193**
OP	.206**	.282**	.583**	-.143	1	.579**
PE	-.024	.339**	.597**	-.193**	.579**	1

**p<.01

From Table 1, we found the four MU dimensions are most significantly associated with criterions. It supports that the concurrent validity of this measurement. However, the MS-PE and COT-OP relationship are not significant. It is reasonably accepted that the insignificant results might be resulted from homogeneous competition (i.e., the latter) and interior performance (i.e., the former).

B. Cluster analysis

By aggregating measures of the four MU dimensions from 28 financial services, k-means cluster analysis was performed. This resulted in three clusters representing low (N=6), medium (N=21), and high (N=1) MU. Table 2 shows the cluster means obtained for the four MU dimensions. Higher cluster means for a given dimension imply a lower level of adaptability and responsiveness. In a word, the cluster analysis clearly revealed a pattern in which all four dimensions of MU moved in the same direction as the MU went from low to high. The same analysis revealed an inverse relationship between the four and criterions, particularly pronounced for OP as opposed to PE (See Table 3).

TABLE Ⅱ
Cluster means for dimensions of market uncertainty

	Cluster		
	Low	High	Medium
MI	4.21	2.50	3.67
MF	3.71	2.00	3.24
COT	3.40	3.67	3.48
MS	3.48	2.50	3.15

*the mean is not significant among three levels of market uncertainty

TABLE Ⅲ
Market uncertainty and criterions

Cluster	OP	PE
High/Medium MU	3.14	3.20
Low MU	3.71	3.54
T-value	-2.13*	-1.29

*p<.05

C. Common method variance (CMV) testing

To test whether CMV exists in this study, we decide to adopt the Harman's one-factor test, the most used to date by researchers to manage CMV, to all the items of variables. According to Peng *et al*. [37], the Harman's one-factor test is better seen as a method for detecting the severity of CMV rather than a remedy. The assumption of Harman's one-factor test is that if the variance explanation of a single factor or a composite factor extracted by factor analysis is more than 50%, it means that we have CMV problems [38]. Based on the results from testing, there are five extracted factors and the first factor loading is 26% that is not more than 50%. It means that our study is not seriously suffered from CMV.

V. THEORECTICAL MODEL

Though there is no significant difference for COT among three levels of MU (Table 2), we still believe that the role of competition intensity plays in the context of environment-strategy-performance. Based on analytical results and literature survey, we would develop a theoretical model for facilitating a good understanding of MU.

Ⅵ. CONCLUSION AND IMPLICATONS

A. Conclusions

The main purpose of our study is to develop a scale measurement of MU for financial services. There are two important conclusions we can draw from our research. First, the empirical results indicate the degree of MU could be assessed by MS, two organizational capabilities (i.e., innovation & forecasting) and COT. Second, the cluster analysis tells us that most of Taiwanese financial services are under high and medium MU whereas both MS and COT could not significantly impact on market forcasting. This means that these domestic firms are lacking of forecasting mechanism to reduce the operating risk. Third, the MS would significantly affect OP instead of PE and the influence of COT is contrary.

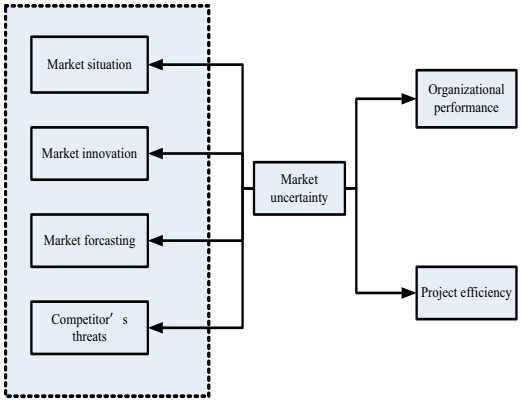

Fig 3. The theoretical model

B. Implications

The past studies on uncertainty, as we know, largely focused on the relationships between EU and organizational activities (e.g., [39-41]). On the other hand, MU has been regarded as part of EU. Little research thus pays attentions to explore its significant role on business, and develop its scale measurement either. Contrast to the past, our measurement not only keeps the source of MU (i.e., MS & COT), but also dig out two new factors named MI and MF and refer to the adaptability and management capacity.

Since the MF is not significantly associated with MS and COT, we suggest that the mechanism of forecasting and sensing is not well established among domestic financial services. A firm with precise market predictions could shorten the distance gap with environment as well as good for developing superior competitive advantages. Meanwhile, the analytical result shows that MI might positively affect both OP and PE. All managers should bear in mind that they need to examine their adaptability and responsiveness to EU with more new thinking and more comprehensive point of view.

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