

Impact of Environmental Uncertainty on Human Resource Flexibility

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Abstract—This study aimed to examine the impact of environmental uncertainty on different dimensions of HR flexibility. A survey research was conducted using a sample of publicly traded firms listed in Taiwan Economic Journal data bank. Data was collected from different sources, including the opinions of CEO and HR managers in each company and the public disclosure of corporate information. Correlation and regression analysis were used to test the hypotheses. After collecting empirical data and performing the factor analysis, five dimensions of HR flexibility, including behavior flexibility, skill flexibility, financial flexibility, functional flexibility, and market-oriented flexibility, were identified in this study. By testing hypotheses, the results of the regression models supported the argument that some types of environmental uncertainty were positively associated with some dimensions of HR flexibility. Implications and future research directions were suggested in the final part of this study.

Keywords: HR flexibility, environmental uncertainty

I. INTRODUCTION

Due to the globalized competition, and the advancement of the new technologies, organizations are currently embedded in less predictable environments. From an open system's view, it can be argued that organizations need to deal with the environmental factors in order to survive. Flexibility is an important method for organizations to survive in this uncertain environment. It help firms to meet dynamic market demands in a timely manner (Milliman, Von Glinow, & Nathan, 1991; Sanchez, 1997; Volberda, 1998). Different ways for organizations to increase flexibility have been proposed, such as adopting flexible production methods and broadly-defined work rules (Valverde et al., 2000). However, many initiatives undertaken by firms have been less than successful. According to Upton (1995), the reason why flexibility is so elusive is that firms have failed to take into account the role of people, focusing primarily on technology. Thus, he concluded that flexibility depended much more on people than on any technical factor.

Since the environments become more and more fluctuated, it is vital to organizations to respond to the environmental change with the help of employees. In other words, if employees are flexible enough to deal with any new requirements or changes occurring in their working environments, organizations will have more chances to survive in turbulent environments. Besides, human resource management system must be able to adjust to the varied environment through designing a flexible system. It must ensure that employees are equipped with appropriate skills

and behaviors to continually adapt to the environment (Milliman et al., 1991).

HR flexibility is a concept proposed by scholars to describe how employees and HRM system help organizations adapt to the environment. It emphasizes not only on adjusting employees' competencies to respond to the variation in the environment (Eisenhardt & Martin, 2000) but also on designing a flexible HRM system that is appropriate for firms to use in any conditions. Studies regarding HR flexibility have emerged recently, but most of them focused on how companies gain the HR flexibility externally, such as downsizing, outsourcing, or non-standard employment. Few of them focused on developing HR flexibility internally (Wright & Snell, 1998). To enhance HR flexibility internally, firms can develop employees with a wide range of skills and behavior repertoires through training or job rotation (Ferris, Arthur, Berkson, Kaplan, Harrell-Cook, & Frink, 1998). Since these broad-based skills and behavior scripts are developed within the firms, they are specific to the firms and can not be easily imitated by other firms. They are also valuable because they enable the firm to deal with a variety of situations. According to the resource-based view (Barney, 1991), HR flexibility that is developed internally can be a source of competitive advantage, which will increase long-term firm performance.

Though the concepts aforementioned have been addressed in some articles (e.g., Wright & Snell, 1998; Ordóñez de Pablos, 2005), few studies have tested the relationship between environmental uncertainty and HR flexibility empirically (c.f., Bhattacharya et al., 2005). Further, not all dimensions related to HR flexibility were extensively discussed. Thus, there are two objectives of this study. First, a valid construct of the HR flexibility would be established based on the existing literatures related to organizational flexibility in the aspects of human resources and human resource management. Second, the results of the effect of environmental uncertainty on HR flexibility would be analyzed and discussed.

II. LITERATURE REVIEW

A. Human Resource Flexibility

HR flexibility was a new term used by some human resource scholars recently. This study divided the concept of HR flexibility into two categories based on Sanchez (1995) framework of flexibility: HR resource flexibility and HR coordination flexibility to provide a better understanding of HR flexibility.

1) *HR resource flexibility*: Sanchez (1995) defined resource flexibility as the extent to which a resource can be applied to a larger range of alternative uses, the costs and difficulty of switching the use of a resource from one alternative use to another, and the time required to switch. So, HR resources flexibility could be defined as “the flexibility in regard to employees’ competence which comes from a broad grouping of skills, and behavior scripts that enable employees to work in different work-related activities”. Thus, it included the following two dimensions.

a) *Behavior flexibility*: Varca (2004) defined behavior flexibility as “the ability to change behavior, habits, & style to meet rapidly changing demands of the work environment”(p.10). As a result, the definition of behavior flexibility of this study emphasized the extent to which employees possessed a wide range of repertoire of behavioral scripts that might be exhibited appropriately in different situations (Wright & Snell, 1998).

b) *Skill flexibility*: This study defined skill flexibility as “the breadth of individual skills available to a firm, the high speed of these employees’ skills can be applied to other usages in a work and the ability of employees to acquire new skill”. This definition implies that companies with high level of skill flexibility will have broad, heterogeneous skills of the workforce which can be quickly redeployed.

2) *HR coordination flexibility*. Sanchez (1995) defined coordination flexibility as a firm’s dynamic capability of redeploying and reconfiguring its resources effectively. Based on this, HR coordination flexibility was referred to the managerial capabilities that companies can effectively and promptly acquire, coordinate, and deploy of human resources. Three dimensions were identified in the construct of HR coordination flexibility.

a) *Financial flexibility*. Financial flexibility referred to the ability of a company to link the pay structures and other employment costs to the external labor market conditions and to reward and encourage employees based on the improved performance.

b) *Functional flexibility*. Functional flexibility referred to the firm’s ability to utilize employees’ skills based on changing functional needs. As a result, companies can redeploy employees quickly and smoothly between activities and tasks when they meet a rapid environmental change.

c) *Numerical flexibility*. It referred to the firm’s ability to manipulate the number of labor input through working arrangement (e.g., flexible working hours) within the firm or by using the external labor market (e.g., short-term contracts, layoffs) (Valverde et al., 2000). It enabled organizations to swiftly response to changes in demand and supply for their human resources and match employee skills with tasks.

To sum up, there are five dimensions of HR flexibility: behavior flexibility, skill flexibility, financial flexibility,

functional flexibility and numerical flexibility. These five dimensions are used later to discuss their relationships with environmental uncertainty.

B. *Environmental uncertainty*

The nature of the relationship between an organization and its environment has always been a hot topic in management research, and the construct of environmental uncertainty has been a focus to most of this inquiry. However, the definition of environmental uncertainty made by scholars was still inconsistent.

Duncan (1972) describes the external environment in terms of its level of uncertainty. He uses two dimensions to assess the level of uncertainty in the external environment in which it operates and competes. One is simple-complex dimension, which is defined as the number of elements that affect the organization’s decision making. When the number is relatively low, the organization is embedded in a simple environment where the uncertainty is low. In contrast, if the number of elements that affect the organization is relatively high, the organization is in a complex environment. It raises the uncertainty. The other is the static-dynamic dimension, which is described as the degree to which these elements remain the same over time or are in a continual process of change. When there is a low degree of volatility, the organization is in a stable environment, where the organizations can operate and function with routines. Instead, if the volatility is high, the organization is in a dynamic environment where the uncertainty is high. Milliken (1987) defined environmental uncertainty as “which an individual's perceived inability to predict an organization's environment accurately because of a lack of information or an inability to discriminate between relevant and irrelevant data” (1987: 136). This definition includes three dimensions: the response uncertainty, the effect uncertainty and the state uncertainty. State uncertainty referred to a firm’s inability to predict the state of the environment. Effect uncertainty referred to uncertainty over what the consequences of environmental changes would be on the organization. Finally, response uncertainty related to a firm’s options of how to response to conditions in the external environment.

C. *Relationship between Environmental uncertainty and HR Flexibility*

Based on the literature of environmental uncertainty, it could be found that different organizations operate in different environments and organizations need to keep interact with the environments and make some necessary changes according to the change of environments in order to maximize the effectiveness of their operation (Duncan, 1972; Thompson, 1967). Thus, one of the central issues here was how organizations coped with uncertainty from the environment (Duncan, 1972). Gerwin (1993) indicated that increases in environmental uncertainty should lead to increases in flexibility. Therefore, flexibility was a way to respond to environmental uncertainty. It was believed that if companies operated in a stable and predictable environment, there was no need for companies to invest money in developing the flexibility. On the contrary, it was very

helpful for companies to develop flexibility in an uncertain environment. Several scholars have posited that within dynamic competitive environments characterized by a high level of uncertainty, HR flexibility was a positive predictor of firm performance (Dyer & Shafer, 1999; Lepak et al., 2003; Milliman et al., 1991; Wright & Snell, 1998). This positive relationship was not expected to generalize outside of dynamic environments (Lepak et al., 2003). Within stable environments HR flexibility was not likely to be required by firms, so it became a slack resource. The investments required to generate HR flexibility may not be recoverable in stable environments (Dyer & Shafer, 1999; Wright & Snell, 1998). To be more specific, in-depth discussions of the effect of environmental uncertainty on HR flexibility was discussed below.

1) *Impact of Environmental uncertainty on HR resources flexibility*: When companies faced uncertain environments, there might be many factors organizations need to react to. So, organizations needed to maintain a broad range of alternatives for adaptation in such an environment, leading to a greater need for flexibility (Mascarenhas, 1985). As a consequence, comparing to the firms operating in certain environments, greater skill requirements and flexible behavior of the employees for firms operating in uncertain environments were likely to be demanded. The employees were required to have both the capability to deal with uncertainty. Otherwise, it would be difficult for organizations to analyze and predict environmental factors. It was therefore hypothesized in this study that:

a) *Hypothesis 1*: The environmental uncertainty has positively influence on the HR behavior flexibility.

b) *Hypothesis 2*: The environmental uncertainty has positively influence on the HR skill flexibility.

2) *Impact of Environmental uncertainty on HR coordination flexibility*. Operating in an environment characterized by low uncertainty, organizations could predict the needs from the external environment accurately. That was to say what was true about the external environment today would likely be true tomorrow. Therefore, there were no need for companies to investing money in increasing their HR coordination flexibility, such as numerical flexibility, functional flexibility and financial flexibility. However, if organizations face an uncertain environment, which is difficult to predict the changes, firms tend to need more dynamic capabilities in managing people (Schilling & Steensma, 2001). It would be helpful for organizations to adapt to the environment through HR coordination flexibility, since organizations can reduce costs by externalizing administrative control through the use of temporary help agency or contract workers, utilizing human resources more efficiently, and reducing the fixed cost in labor cost (Kalleberg, 2001). Thus, the above arguments lead us to formulate the following hypotheses:

a) *Hypothesis3*: The environmental uncertainty positively influence the HR financial flexibility.

b) *Hypothesis4*: The environmental uncertainty positively influence the HR functional flexibility.

c) *Hypothesis5*: The environmental uncertainty positively influence the HR numerical flexibility.

III. RESEARCH DESIGN

A. Data Collection

The target population encompassed all publicly listed firms and over-the-counter (OTC) firms in the Taiwan Stock Exchange. At the end of 2005, 1,452 companies were listed in the TEJ databank. However, 25 companies which did not establish for at least 3 years were excluded. Thus, 1,427 companies were selected for this study.

A questionnaire survey method was employed to gather data for the variables of HR flexibility, and environmental uncertainty. Since common method variance problem was a major concern in organizational studies (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003), this study tried to avoid the problem through using different sources for the predictor and criterion variables. Therefore, CEOs' perception of environmental uncertainty, and HR managers' perception of the company's HR flexibility were surveyed separately through the mail-out questionnaire. Totally, 250 companies returned their questionnaires. However, not all the responding companies had both two copies of questionnaires from different respondents. The final sample was 98 couplets, including a senior HR manager respondent and a CEO respondent of each firm. As a result, the valid response rate for the companies that had data from two different sources was 6.87 %.

B. Measuring Instruments

1) *HR flexibility*: HR flexibility was measured by the following five dimensions.

a) *Behavior flexibility* was measured by 8 items using the scale developed by Bhattacharya (2005).

b) *Skill flexibility* was measured by 5 items selected from the skill flexibility scale developed by Bhattacharya (2005).

c) *Numerical flexibility* referred to a firm's ability to quickly acquire the needed human resources was measured by 3 items developed from literatures were included in this subscale (Pfeifer, 2005; Valverde et al., 2000; Atkinson, 1984; Connell & Burgess, 2002).

d) *Functional flexibility* was related to a firm's ability to redeploy their human resource according to business needs. 4 items developed from literatures were included in this subscale (Atkinson, 1984; Bhattacharya, 2005).

e) *Financial flexibility* referred to the ability of companies to link the pay structures and other employment costs to the external labor market conditions was measured

by 3 items developed from literatures were included in this subscale (Mitchie & Sheehan-Quinn, 2001).

All the items were measured on the five-point Likert scale. Higher scores indicated higher level of flexibility of that factor in the company.

2) *Environmental Uncertainty*: A modified version of environmental uncertainty scale made by Doty, Bhattacharya, Wheatley, and Sutcliffe (2006) was adopted. These items are perceptual measures. Respondents answered these questions according to their perception of the firm's operating environment.

IV. RESULTS AND DISCUSSIONS

A. Validity and Reliability

1) *HR Flexibility Scale*: The results of exploratory factor analysis indicated that the HR flexibility construct was comprised of five factors. They were: behavior flexibility, skill flexibility, financial flexibility, functional flexibility, and market-oriented flexibility. The alpha values of these factors are .863, .834, .873, .763, and .624. The last factor, named as market-oriented flexibility, was a new formed dimension of HR flexibility. It was related to the degree to which a firm's existing employees could quickly respond to their customers' needs and help their firm remain competitive in the market. The above result of exploratory factor analysis showed that factor structure of HR flexibility was almost the same as described in the reviewed literatures. To be specific, one dimension of HR flexibility, numerical flexibility, was eliminated; however, we also got a new dimension, market-oriented dimension.

2) *Environmental Uncertainty Scale*: After results of factor analysis, three factors were extracted with eigenvalue greater than one and 70.69% of the total variance can be explained by these three factors. Factor one was named as "response uncertainty", which was related to the confidence of a decision maker in a firm to decide about how to respond to some environmental changes. Factor two was named as "effect uncertainty", which was related to a company's disability to anticipate the effect of an environmental event or change on their organization (Milliken, 1987). Factor three was named as "state uncertainty", which was related to a firm's inability to predict the environmental change in the future. The Cronbach's alpha of these three factors ranged from .568 to .694. The above results showed that all the scales were construct validated, and the measures were reliable.

B. Correlations

An examination of the correlation matrix revealed that some environmental uncertainty components were significantly correlated with some HR flexibility components. Response uncertainty was positively correlated with skill flexibility ($r=.168, p<.10$) and effect uncertainty

was positively significantly correlated with behavior flexibility ($r=.168, p<.10$), skill flexibility ($r=.319, p<.05$), and market-oriented flexibility ($r=.291, p<.01$).

C. Tests for Hypothesis

Since the dimension of numerical flexibility was eliminated based on the result of exploratory factor analysis; thus the impact of environmental uncertainty on numerical flexibility was not analyzed in the regression analysis. In addition, since one new dimension named as "market-oriented flexibility" came out based on empirical data, the influence of environmental uncertainty on market-oriented flexibility was discussed. Multiple hierarchical regressions were employed to test Hypotheses 1 to 5. As shown in the table I, the hypotheses 2, 5 were all partially supported. To be specific, effect uncertainty had positively significantly influence on the skill flexibility and market-oriented flexibility. The standardized coefficient estimates were .306 and .341 respectively (all $p<.01$). The above findings indicated that the firms facing higher level of effect uncertainty had higher level of skill flexibility and market-oriented flexibility. These findings were insightful because the findings showed that firms with inability to predict the effect of a future state of the environment on the organization developed their employees with more skills and higher levels of customers' responsiveness. Besides, the results also supported the argument that employees' multiple skill help firms to adapt effectively to changes in demand pattern for HR skills and companies can benefit from their capability of quickly redeploying their employees' skills.

The hypothesis 4 was also partially supported. The response uncertainty had an positive effect on functional flexibility ($\beta =.239, p<.05$). This result reflected that firms with inability to predict the likely consequences of a response choice developed higher level of functional flexibility for them to adapt to the environmental change. However, the hypotheses 1 and 3 were not supported, which means that environmental uncertainty had no influence on behavior and financial flexibility.

TABLE I. REGRESSION RESULTS

Dependent variable	Behavior flexibility	Skill flexibility	Financial flexibility	Functional flexibility	Market-oriented flexibility
Response	.118	.058	.096	.239*	-.131
Effect	.150	.306**	-.021	-.196	.341**
State	-.098	-.036	-.076	-.008	.011
R ²	.042	.104	.009	.057	.098
Adjusted R ²	.012	.076	-.023	.027	.070
F	1.380	3.656	.285	1.891	3.416*

Note: Standardized regression coefficients are reported.

* $p<.05$; ** $p<.01$; *** $p<.001$

V. CONCLUSIONS

This study explored whether environmental uncertainty were associated higher level of HR flexibility. Extending the theoretical arguments of previous scholars (Milliman et al., 1991; Wright & Snell, 1998; Bhattacharya et al., 2005), this study integrated the concept of dynamic capability and the resource-based theory into a HR flexibility model and further explored the impact of environmental uncertainty on HR

flexibility. Several findings and limitations of this study could be mentioned.

First, a construct valid measure of the HR flexibility construct was developed based on the literatures. Based on the literature and empirical driven data, this study found that five sub-dimensions of HR flexibility. They were behavior flexibility, skill flexibility, financial flexibility, functional flexibility and market-oriented flexibility. Therefore, this study contributes to the scholars and practitioners in HRM field since they can get a more comprehensive and holistic from the conceptualization of HR flexibility in this study.

Second, the effects of environmental uncertainty on HR flexibility were tested in this study. Results found that effect uncertainty had a positive influence on skill and market-oriented flexibility, which indicated that the firms with higher level of effect uncertainty would result in higher skill and market-oriented flexibility comparing to firms with lower level of effect uncertainty. The same positive effect was also found in the impact of response uncertainty on the functional flexibility. Therefore, the results of this study provided empirical evidence that developing the HR flexibility has become an important thing for firms to adapt themselves to the environment. It gave future researchers and practitioners a better understanding of whether developing the capability of HR flexibility really been adopted by firms to adapt their environment change.

Finally, this study has some limitations. First, since variables of HR flexibility were measured using managers' self-reports in this study, it might be reasonable to assume that some people may exaggerate the level of HR flexibility in the company but underestimate the environmental uncertainty they faced because of considering a company's reputation. Consequently, the self-report problem should be noted in this study. Second, since the samples in this study didn't include any firms from the Cement, Glass, and Ceramics industry, it is uncertain whether the findings could generalize to these industries. Thus, the nature of the study sample may evoke questions about the generalizability of the findings in other kinds of industries.

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