Configure exploitation and exploration through the process of internalization and interaction

Yi-Ju Lo

Department of Business Administration and Graduate School of Services & Technology Management, College of Management, Yuan Ze University, 135, Yuan-Tung Road, Chung-Li 32003, Taiwan,
Email: aowlio@yahoo.com
Introduction

Organizational capabilities can be regarded as a firm’s capabilities to manage both exploitation and exploration along various business scopes in a synergistic manner (March, 1991; Christensen and Foss, 1997; Lewin, Long, and Carroll, 1999), because exploitation and exploration draw on different structures, processes, and resources, generating significantly different performance outcomes over time (He & Wong, 2004).

March (1991) draws a distinction between exploration and exploitation. Exploration involves experimenting with ideas, paradigms, technologies, strategies, and knowledge to find new alternatives that are superior to obsolete practices while exploitation is associated with systematic reasoning, risk aversion, defining and measuring performance, and explicitly linking activities to these measures (March, 1991).

Nonetheless, exploration and exploitation are by no means independent of each other. For sustainable growth, a firm exerts explorative efforts in creating new resources to further exploitative initiatives through expanding the utilization of existing resources, while the process of internalization from the existing capabilities may accompany learning opportunities for resource renewal. Hence, the optimal growth becomes “a matter of finding the optimal configuration between exploiting
resources in present business and using them for developing new resources” (Christensen & Foss, 1997, p. 294).

Therefore, the interplay between exploitation, exploration and the configuration of business scope served becomes a critical managerial issue. Despite the criticality, the extant literature is scant in discussing such dynamics and its performance impact, which in turn motivates the present research.

**Theoretical Background and Hypotheses**

The optimal configuration happens after a firm identifies something at which they are good (McGrath et al., 1995), applies such things to organizational activities (Helfat & Peteraf, 2003), differentiates the initiatives to obtain growth and profit (Prahalad & Hamel, 1990), and then address the rapidly change environment (Teece et al., 1997). In other words, this configuration could be indicated that there are two level of process — internalization and interaction.

**Internalization Process**

Internalize exploration means that exploration drives the utilization of competence and translates the utilization into initiatives such as functional activities of the firm. On the one hand, the development path of capabilities initially involves the changing
route from competence building to utilization initiatives in inner process of a firm. On the other hand, to create and sustain competitive advantage and expansion growth, firms inevitably invest in new competences and reconfigure the initiatives that will be the sources of dynamic capabilities in empirical realization (Maritan, 2001).

To find out the building activities and then to measure the incremental changes help figure out the condition of exploration internalization. Moreover, observing the change in organizational activities help figure out the variation of utilization initiatives. For example, the exploration activities entail research and development investment (Brown & Eisenhardt, 1995; Eisenhardt & Martin, 2000) and a firm's utilization initiatives encompass activities of product diversity and customer diversity (Lo & Lee, 2006). Therefore, it could be established the following hypotheses:

*Hypothesis 1: The exploration internalization will influence the reconfiguration of a firm’s initiatives.*

*Hypothesis 1a: The level of R&D building efforts will be positively associated with the degree of product diversity.*

*Hypothesis 1b: The level of R&D building efforts will be positively associated with the degree of customer diversity.*
**Interaction Process**

In the completed internalization process, exploration drives the utilization of competence and translates the utilization into initiatives such as functional activities of the firm. The competence would be digested and leveraged in the every initiative which may interact with each other.

For example, firms build up the R&D competencies, and then reconfigure the diversified productive activities for the customers’ requirements. Because the diversity of the products may signal the firm’s product related capabilities, which brings in new business and broaden the customer scope. Therefore, it could be established the following hypothesis:

*Hypothesis 2: Dynamic capabilities drive the formation of each initiative which will interplay with each other; the degree of product diversity will be positively associated with the degree of customer diversity.*

The interaction level which dynamic capabilities differentiate the initiatives to obtain growth and profit (Prahalad & Hamel, 1990), and then address the rapidly change environment (Teece *et al.*, 1997). Perceiving firm as a repository of productive resources, Penrose (1959) depicts that a firm’s growth will be driven by the
entrepreneur’s heterogeneous initiative of utilizing excess resources in productive opportunities that are beyond the existing firm boundary (p. 32). Based on preceding discussion, a firm’s organizational capabilities can be regarded as its management of competence management along with various resource utilization initiatives in a synergistic manner. Firm performance is therefore determined by the extent to which the building competence can be efficiently internalized into different initiatives and substantiated to new organizational initiatives such as diversified products and diversified customers.

Hypothesis 3: The reconfiguration of initiatives will lead to better firm performance; the degree of customer diversity will be positively associated with the firm’s performance.

Methodology

Data Sources and Sample Selection

Figure 1 summarizes the research framework and the research would conduct the empirical test in Taiwan IT manufacturers. For the empirical study, the sample companies were chosen from the publicly offering companies listed in the Electronics and Information Technology category of the Taiwan Stock Exchange and R.O.C Over-the-Counter Securities Exchange. As the present empirical investigation
requires a disclosure of firm-level operating and financial information from the sample companies, the choice of publicly listed companies could ensure the availability and accuracy of the required data over the sampling period from 1998-2002.

To avoid confounding effect due to the heterogeneity of industry sectors, this paper chose those manufacturers mainly involving in producing electronic hardware products and excluding software, services, telecommunication services, consumer electronics, optoelectronics companies. The final sample set contains 91 manufacturers with completed operation information for five years.

***************

**Insert Figure 1 About Here**

***************

**Variables and Measurements**

Based on the conceptual framework shown in Figure 1, we will detail the measurements for respective constructs in the following paragraphs and summarize them in Table1.

***************

**Insert Table 1 About Here**

***************
**Exploration.** This paper calculates the amount of a firm’s research and development expenditures as a percentage of its total sales revenue, as a proxy to measure the firm’s exploration efforts (e.g., Celly, Spekman, & Kamauff, 1999; Griliches, 1998; Lee et al., 2005). As a prior knowledge that the product development normally requires a year to proceed, the paper therefore uses a one-year lag data to proxy the lagged effect of product competence building.

**Exploitation Initiatives.** This paper adopts the Product Diversity and Customer Diversity as a variables to depict the exploitation initiatives of a firm.

**Product Diversity.** To measure the degree of product diversity, this study creates a variable of product concentration, which is calculated by the summation of squared sales percentage of each principal product items the firm offers, similar to the Herfindahl- Hirschman index (HHI) used for measuring market concentration (Lo & Lee, 2006). Product scope diversity then is calculated by taking one minus product concentration.

**Customer Diversity.** Similarly, this study sets a variable of customer scope diversity to evaluate customer scope diversity, as one minus the summation of the square sales percentage of each principal external major customer who contributes at least 10% of the total revenue of the focal manufacturer.

**Firm Performance.** The present paper adopts returns on invested capital (ROIC)
suggested by Copeland, Koller and Murrin (1995) as the measure to economic performance. It’s helpful to evaluate the strategic priority based on the effectiveness and the value of the company (Copeland, Koller, & Murrin, 1995). It therefore could further extend the inference to the value impact of a firm’s dynamic capability.

***************

Insert Table 2 About Here

***************

***************

Insert Table 3 About Here

***************

Analytical Results

The descriptive statistics and the relative correlation coefficients for all of the variables are presented in Tables 2 and 3.

The regression results are presented in Table 4 with ‘product diversity’ and ‘customer diversity’ as the dependent variables respect to ‘competence building’ as the independent variable. The results in Table 4 reveal a significant positive relationships between the competence building and product diversity ($p <0.001$) and between the competence building and customer diversity ($p <0.001$), thereby
confirming Hypothesis 1.

************************************************

**Insert Table 4 About Here**

************************************************

The regression results are presented in Table 5 to reveal the significantly positive correlation between ‘product diversity’ and ‘customer diversity’ \((p < 0.001)\) support Hypothesis 2.

************************************************

**Insert Table 5 About Here**

************************************************

It was predicted in Hypothesis 3 that the resultant customer diversity would lead to better performance; the results shown in Table 6 reveal a no significant positive relationship between such initiatives and firm performance; it is not providing support for Hypothesis 3.

************************************************

**Insert Table 6 About Here**

************************************************

**Discussions and Conclusions**
While theory suggests that competence building and resource utilization initiatives are vital to the firm growth, it's to find that competence building is essential to business configurations from the empirical evidence among Taiwanese IT manufacturers. A series of empirical results (cf. H1, H1a and H1b) show that competence building will positively influence a firm’s pursuit of diversified product and customer scopes. At the same time, a high level of investments in competence building play an important role with leveraging competence into differentiated business configurations for horizontal expansion. This part of empirical findings confirms the researches focusing on competence management (e.g., Christensen & Foss, 1997; Foss, 1996; Sanchez et al., 1996) and dynamic capabilities (e.g., Eisenhardt & Martin, 2000; Teece et al., 1997) which elaborate that a firm’s sustainable growth is dependent on its building of capabilities or competences.

Additionally, focusing on the interplay among two initiatives, the present result from the proof of H2 shows that the product diversity has positive influences on customer diversity. On the other hand, the empirical results also reveal that under high-level diversity of product scope, firms may create new customers and decrease the dependency to existing customers, but with diversified customer scope they may increase the demand for the product deployment.

Although the empirical results do not completely support the hypotheses about
the effects of utilization initiatives on firm performance i.e., H3, the present study indicates that a diverse configurations may implicitly spread the risk and would lead to heterogeneity in performance.

Conclusions and Future Research

The present paper has elucidated the interplays among a profit-seeking firm’s efforts in building various initiatives of exploration, exploitation utilization, and the firm performance, which constitutes the essence as well as the challenges to the firm’s pursuit of organizational capabilities. What the present research endeavor attempts to achieve, and hence to contribute to the existing conversation of organizational capabilities can be elaborated from the following two aspects.

The study has decomposed the internalization and interaction level analysis of organizational capabilities (Teece et al., 1997; Eisenhardt & Martin, 2000) through the guidance of endogenous growth theory (Penrose, 1959). While the existing capability research mainly provides where, what, and how does a firm create ability to sustain competitive advantage, this paper advances that the evolutionary changes of business configurations through internalization and interaction process are key to the understanding of organizational capabilities. By explicitly explaining the elements of dynamic generation and digestion as directions from building competencies to
substantiating competencies, this study proposes that exploration are essential to the extent and the constitution of business initiatives. Further, concurring with the notion of balanced growth (e.g., Penrose, 1959), this working framework postulates that only by integrating efforts of building exploration efforts and those of leveraging through resource utilization initiatives, can a firm achieve better economic performance.

After above discussions, one immediate action for future study to conduct further empirical verification on the validity of the theoretical arguments that this paper has adopted. In addition, watching closely at industry heterogeneity may provide more insights regarding different kinds of dynamic capability development within the context of industry supply chains and may render more verification for the logic of business growth presented in this study. Furthermore, future research that applies the logic of present study may prove to be fruitful in identifying both exploration and exploitation initiative, which will provide a significant implication for a firm’s organizational capabilities.
REFERENCES


Appendix

Table 1: Variables and Measurements

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Variables</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration</td>
<td>Competence Building</td>
<td>R&amp;D Expenditure_{t-1} / Total Sales Revenue_{t-1}</td>
</tr>
<tr>
<td>Exploitation Initiative</td>
<td>Product Diversity</td>
<td>1–Σ (P_{i.t} / Total Sales Revenue_{i.t}) 2</td>
</tr>
<tr>
<td></td>
<td>Customer Diversity</td>
<td>1–Σ (C_{i.t} / Total Sales Revenue_{i.t}) 2</td>
</tr>
<tr>
<td>Firm Performance</td>
<td>Returns on Invested Capital</td>
<td>(Net Profit Before Interest and Tax_{i.t} + Depreciation and Amortization_{i.t} – Non-operating Income_{i.t}) / (Total Assets_{i.t} – Other Assets_{i.t} – Long Term Investment_{i.t}) × 100%</td>
</tr>
</tbody>
</table>

Table 2: Descriptive statistics

<table>
<thead>
<tr>
<th>Variables</th>
<th>Mean</th>
<th>S.D.</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Exploration</td>
<td>0.055</td>
<td>0.048</td>
<td>0.000</td>
<td>0.220</td>
</tr>
<tr>
<td>2 Product Diversity</td>
<td>0.146</td>
<td>0.095</td>
<td>0.000</td>
<td>0.990</td>
</tr>
<tr>
<td>3 Customer Diversity</td>
<td>0.000</td>
<td>64.052</td>
<td>0.092</td>
<td>1.000</td>
</tr>
<tr>
<td>4 Returns on Invested Capital</td>
<td>128.104</td>
<td>138.309</td>
<td>-0.346</td>
<td>0.360</td>
</tr>
</tbody>
</table>
### TABLE 3
**Pearson correlation coefficients**

<table>
<thead>
<tr>
<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Exploration</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Product Diversity</td>
<td>0.182***</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3 Customer Diversity</td>
<td>0.136***</td>
<td>0.215***</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4 Returns on Invested Capital</td>
<td>0.068</td>
<td>0.027</td>
<td>0.005</td>
<td>1</td>
</tr>
</tbody>
</table>

**Notes:**

a Total sample number = 495
b All tests are two-tailed. **p<0.05; ***p<0.01.

### TABLE 4
**Regression results among Exploration and Utilization of Exploitation Initiative**

<table>
<thead>
<tr>
<th>Independent \ Dependent Variables</th>
<th>Product Diversity</th>
<th>Customer Diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration</td>
<td>4.115***</td>
<td>3.048***</td>
</tr>
<tr>
<td></td>
<td>(0.000)</td>
<td>(0.002)</td>
</tr>
<tr>
<td>$R^2$</td>
<td>0.033</td>
<td>0.018</td>
</tr>
</tbody>
</table>

**Notes:**

a Total sample number = 495.
b **p<0.05; ***p<0.01.

### TABLE 5
**Regression results of product diversity on customer diversity**

<table>
<thead>
<tr>
<th>Variables</th>
<th>Standardized β-value</th>
<th>t-value$^b$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>69.074</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td>product diversity</td>
<td>1.96</td>
<td>4.407***</td>
<td>0.000</td>
</tr>
<tr>
<td>R-square</td>
<td>0.056</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Notes:**

a Total sample number = 495.
b **p<0.05; ***p<0.01.
TABLE 6
Regression results of customer diversity on firm performance\textsuperscript{a}

<table>
<thead>
<tr>
<th>Variables</th>
<th>Standardized $\beta$-value</th>
<th>t-value$^b$</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Constant</td>
<td>3.420</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Customer diversity</td>
<td>0.05</td>
<td>0.103</td>
<td>0.918</td>
</tr>
<tr>
<td>R-square</td>
<td>0.005</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
\textsuperscript{a} Total sample number = 495.
\textsuperscript{b} **p<0.05 ; ***p<0.01.