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Effects of Industrial Ecology Evolution and Business Strategy on Business Regeneration Capacity of an Enterprise

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Abstract

In the era oriented by knowledge-based economy, the enhancement of large electronic information flowing speed is an important part in the promotion of knowledge-based economic society. By observing the development history of the Internet and high-tech industry, the development of industrial ecology apparently presents recession and then recovery and gets into growth. The emergence, growth, recession, and recovery time for high-tech industry is short, and high-tech industry is still regarded as the future star industry regionally or internationally. To deeply discuss the industrial ecology evolution and business vitality in the period, the academic research and practical application present proper conditions and research value. High-tech industry statistical data provided by Fujian Provincial Government are utilized in this study for secondary data analyses. The research results show significant correlations between 1.ecology evolution and regeneration capacity and 2.business strategy and regeneration capacity. Finally, suggestions are proposed according to the results, expecting to clarify the factors in constructing the regeneration capacity of a business and provide high-tech industry with reference for adjusting the business strategy when encountering industrial ecology changes.

Keywords: high-tech, ecology evolution, business strategy, business regeneration capacity

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INTRODUCTION

In such an era with information explosion and oriented by knowledge-based economy, the most important issue for the public is to generate, process, and circulate electronic information. The Internet and broadband fiber-optic communication systems therefore become the best environment and tools for electronic information flow. For this reason, the public and the academic research agree that the popular development of the Internet and fiber-optic communication systems would enhance the speed of large electronic information flow to become a primary part in the knowledge-based economic society. Nevertheless, a series of web-based company bankruptcy induces dot-com bubbles to break the myth of the Internet, high-tech industry, and unbeaten investors. Industry experts and researchers are also searching for the root and solution of problems. By observing the development history of the Internet and high-tech industry, it is obviously that the development of industrial ecology appears recession and then recovery, and gets into growth again. When businesses in the industry drop into sudden recession, they would cope with it with various strategies and behaviors. When the industry recovers, the businesses would present distinct regeneration capacity.

After dot-com bubbles, the business strategies taken by high-tech industry present closely interaction with industrial ecology till industry recovery and show the regeneration capacity at growth stage. The emergence, growth, recession, and recovery time for high-tech industry is extremely short, and it is regarded as the future star industry regionally and internationally that deeply discussing the industrial ecology evolution and business vitality in the period reveal proper conditions and research value on academic research and practical application. As a result, the effect of high-tech industrial ecology evolution and business strategy on the

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regeneration capacity of a business is studied to clarify the major factors in constructing the regeneration capacity of a business and provide individual organizations with reference for adjusting the business strategy to cope with industrial ecology changes.

LITERATURE REVIEW

Ecology Evolution

Shim and Shin (2016) indicated that industrial ecology was a new point of view proposed by experts and researchers in past decades. From the aspect of ecology of nature, the interaction and effect among industrial ecology, organizational learning, and the related system environment were explained, including organizational process and the generation process of the dominant logic and final strategies. Micu and Micu (2016) mentioned that ecology theory explained how an organization made strategies from the most natural and original angle. Eckel et al. (2015) indicated that observing strategy evolution from such an angle could simplify thinking to affect the historical factors in organizational behavior as well as allow researchers contingently selecting global variables related to research objects; it could be a proper and systematic point of view. Such a theoretical structure cutting in from ecology might be able to provide complete opinions for the change of industry (Keegan and Green 2017). Buckley and Strange (2015) considered that organization ecology discussed market competition and evolution from environment-organization fit. In terms of organizational ecologists, market competition was not direct and conscious; in general, competition among organizations existed without consciousness. Inui et al. (2017) stated that organizational ecologists stressed on the importance of environment to an organization and emphasized more on the fit with environment than the operation of the organization for the survival. In other words, organizational ecologists regarded the larger influence of environment than internal operation of an organization.

Referring to Chen et al. (2017), industry is regarded in this study as an ecological system and a business is an organism in the ecological system, where industrial ecology evolution is divided into industry development stage, business life cycle, and strategy change period. When the ecological system evolves or appears temporary unbalance, the survival of organisms in the system relies on the environmental adaptability, i.e. the survival ability of an organism. The ultimate environmental adaptability of an organism is the regeneration capacity, allowing an organism overcoming damage resulted from environment changes with self-healing ability.

Business Strategy

Hwang et al. (2016) pointed out the basic company-level strategies as business strategic decisions of pure concentration on single business, vertical integration, diversification, and strategic alliance. Nguyen and Wright (2015) mentioned that the business-level strategies depended on the generation of competition strategies, including target customers, customer needs, and customer satisfaction. Janáková (2015) regarded business strategy as a comprehensive, consistent, and planned integration allowing a company combining the advantages with environment challenges to ensure the basic objective of the business being achieved through proper execution of the organization. Cahen et al. (2017) regarded business strategy as the pattern of purposes or objectives as well as the major policies and plans to achieve objectives for explaining current or future situations of the business and the current or future pattern of the company. Accordingly, business strategy could be the response of a business considering the advantages and disadvantages to form advantages and create survival and development space in the competitive environment (Siepel et al. 2017). According to above basic strategic thinking model, a business could apply general strategies, which, in terms of competition model, could be divided into cost leadership strategy, differentiation strategy, and focus strategy. Eniola and Entebanga (2015) proposed that the purpose of business cooperation aimed at a business organization's needs of (1) complementary efficiency, (2) complementary competition, and (3) complementary resource.

From the long-term point of view, Lin and Chang (2017) simplified the coverage of business strategy into competition strategy, mixed strategy, and cooperation strategy, which were defined as below.

(1) **Competition strategy:** General competition strategy was divided into cost, differentiation, and centralization, and the purpose was to expand or reduce businesses so that the business operation conformed to industrial ecology development trend.

(2) **Mixed strategy:** Mixed strategy, on one hand, was the competition based on cooperation and, on the other hand, the cooperation based on competition. In other words, the business strategy of a business organization existed in both characteristics of competition and cooperation.

(3) **Cooperation strategy:** It referred to the merge and alliance among businesses, due to the complementary demands for products, technology, and production or market competition to fight the major enemies by allying with minor enemies.

Regeneration Capacity

In the research on regeneration capacity, Shia and Tai (2016) regarded regeneration capacity as the psychological reconstruction outcome of organizational members. Jayawickramaa et al. (2016) also regarded a business as an organic "biomass", in the business vitality theory, to comprehend regeneration capacity and considered that regeneration capacity mainly reflected on adaptability to changes and ability to changes. Oura et al. (2016) pointed out adaptability to changes as business adaptability to environment changes, mainly depending on the business' response; ability to changes, on the other hand, was the ability of business biomass to change the environment, relying on the independent innovation of the business. Crinò and Ogliari (2017) deeply discussed organization regeneration and considered that organizations were divided into functional organization and community organization due to different objectives. Lopez-Rodriguez and Martinez-Lopez (2017) pointed out a functional organization being formed to achieve external objectives, aiming to pursue profits, complete a plan, or win a battle. A business was a typical functional organization in modern society. A community organization aimed to satisfy the members' demands and pursue the members' harmony and stability. Greg et al. (2017) pointed out regeneration capacity as to adjust an organization's constitution. An excellent organization, with healthy constitution, would naturally develop purification and repair functions internally to recover even though suffering from disasters.

Referring to the viewpoint of Hong et al. (2016), the coverage of regeneration capacity is simplified into two dimensions.

(1) **Psychological quality:** It is the psychological quality of organizational members, i.e. employees' psychological reconstruction outcome. This study stresses on the value and norms commonly agreed by employees, in addition to business regulations.

(2) **Evolution ability:** It refers to the ability of a business organization keeping up with the trend and the diverse practical needs of product, production, technology, organization, process, and management covered in the ability.

HYPOTHESIS DERIVATION AND RESEARCH METHOD DESIGN

Hypothesis Derivation

Chen et al. (2017) pointed out three changing states in industrial structure, namely balanced order structure, unbalanced chaos, and complex interval in industry evolution, and deducted the cyclic evolution history of "order-complexity-chaos". Such evolution occurred repeatedly to form the history. It therefore generated the feedback mechanism of industry development stage. An industry, when getting into degraded period due to environment changes at life cycle stage, could still recover and regrow. Gulamhuseinwala et al. (2015) indicated that an organization would get in recession stage after maturity stage, but it could recover the operation through proper comprehensive industry development or reorganization & reengineering; the operating profitability would then enhance again, and the industry and organization structures and systems would become flexible and efficient through the environment fit (Jensen and Clausen, 2017). It also explained that an industry, after recession, would regain growth opportunity through policies or management tactics (Mainelli and Smith, 2015). The following hypothesis is therefore established in this study.

H1: Ecology evolution presents remarkable correlations with regeneration capacity.

Xu et al. (2015) stated that, from the viewpoint of history, business development was a continuous adjustment and change process; a business organization, similar to an organism, would go through life cycle in the process to pursue survival. It was assumed in the life cycle model that a business would go through the stages of establishment, growth, maturity, and recession. Sadeghi (2018) indicated that business strategies were theoretically distinct due to different survival problems encountered in various life cycle stages. Hassan et al. (2015) mentioned that not all organizations were allowed to demand limited resources in the environment, but merely those being able to adapt to the environment could continuous utilize environmental resources for the survival. For this reason, inspecting the use of organizational resources was a primary indicator to understand organization-environment fit (Siepel et al. 2017). Kabuel and Kilikal (2016) indicated that industrial structure was not constant. According to historical experience, the change in industrial structure (i.e. environment) would

Table 1. Regression analysis of ecology evolution and business strategy

dependent variable →	regeneration capacity							
independent variable ↓	psychological quality		evolution ability		psychological quality		evolution ability	
ecology evolution	β	ρ	β	ρ	β	ρ	β	ρ
industry development stage	2.244**	0.000	2.277**	0.000				
business life cycle	2.186**	0.000	2.204**	0.000				
strategy change period	2.346**	0.000	2.358**	0.000				
business strategy								
competition strategy					2.166**	0.000	2.277**	0.000
mixed strategy					2.388**	0.000	2.433**	0.000
cooperation strategy					2.243**	0.000	2.315**	0.000
F	28.462		35.738		30.162		38.775	
P	0.000***		0.000***		0.000***		0.000***	
R2	0.296		0.369		0.312		0.398	
adjusted R2	0.277		0.346		0.293		0.374	

Note: * stands for $p<0.05$ and ** for $p<0.01$

enhance/reduce product attraction to result in major challenge of organizational strategies and profitability. The prediction of industry evolution ability therefore was critical for the strategic planning of an organization. Organizational strategies should be able to adopt necessary adjustment according to the industry evolution trend (Martin and Javalgi, 2016). The following hypothesis is therefore established in this study.

H2: Business strategy shows notable correlations with regeneration capacity.

Research Object

High-tech industry statistical data provided by Fujian Provincial Government are utilized for secondary data analyses in this study.

Analysis Method

Regression analysis is applied to understand the relationship among ecology evolution, business strategy, and regeneration capacity.

ANALYSIS AND DISCUSSION

Correlation Analysis between Ecology Evolution, Business Strategy and Regeneration Capacity

Regression analysis is applied to test the hypothesis and theoretical structure in this study. The first regression analysis result, **Table 1**, reveals the significance of regression equation ($F=28.462$, $p<0.001$). Ecology evolution appears significant effects on psychological quality, where "industry development stage", "business life cycle", and "strategy change period" in ecology evolution present remarkably positive effects on psychological quality in regeneration capacity ($\beta=2.244$, $p<0.01$; $\beta=2.186$, $p<0.01$; $\beta=2.346$, $p<0.01$). The second regression, **Table 1**, shows the significance of regression equation ($F=35.738$, $p<0.001$). Ecology evolution reveals notable effects on evolution ability, where "industry development stage", "business life cycle", and "strategy change period" in ecology evolution appear significantly positive effects on evolution ability in regeneration capacity ($\beta=2.277$, $p<0.01$; $\beta=2.204$, $p<0.01$; $\beta=2.358$, $p<0.01$). H1 is therefore supported.

The third regression, **Table 1**, presents the significance of regression equation ($F=30.162$, $p<0.001$). Business strategy appears remarkable effects on psychological quality, where "competition strategy", "mixed strategy", and "cooperation strategy" in business strategy present notably positive effects on psychological quality in regeneration capacity ($\beta=2.166$, $p<0.01$; $\beta=2.388$, $p<0.01$; $\beta=2.243$, $p<0.01$). The fourth regression, **Table 1**, reveals the significance of regression equation ($F=38.775$, $p<0.001$). Business strategy reveals significant effects on evolution ability, where "competition strategy", "mixed strategy", and "cooperation strategy" in business strategy appear remarkably positive effects on evolution ability in regeneration capacity ($\beta=2.277$, $p<0.01$; $\beta=2.433$, $p<0.01$; $\beta=2.315$, $p<0.01$). H2 is therefore supported.

CONCLUSION

According to the results, when most businesses in high-tech industry appear weak regeneration capacity, most high-tech businesses, after experiencing industry recession, might lose the competitiveness and could not catch up with the reverse growth speed or could not maintain normal operation at the recovery stage. The ecology evolution in high-tech industry might exceed the original development stage to result in regeneration capacity affecting ecology evolution. The problem might be a high-tech business lack of regeneration capacity. When a high-tech business lack of regeneration capacity becomes common in an industry, the regeneration capacity would seriously affect the industrial ecology evolution when the industry appears degeneration change. In regard to a high-tech with

moderate regeneration capacity, it shows the possibility to take expansion strategy and non-expansion strategy. However, the final strategy decision is the decision maker's judgment. From the observation in this study, a confident decision maker would first take positive expansion strategy to positively enhance the regeneration capacity of a high-tech business. It is considered in this study that it is the promotion of psychological quality in a high-tech business' regeneration capacity. However, the decision maker's confidence might come from the regeneration capacity of the high-tech business to take the expansion strategy. In this case, the regeneration capacity of a high-tech business might be enhanced by the stimulation of business strategy, rather than simply the expansion opportunity due to strong regeneration capacity.

SUGGESTION

Aiming at high-tech industrial ecology evolution, the following suggestions are proposed in this study.

1. When an industry appears unexpected recession in the globally competitive environment, it could easily fall into a business crisis. Such a phenomenon is common in high-tech industry that it should take the recession of an industry exceeding life cycle norm as the convention. A high-tech business should reinforce the capability to survive in the global competition.
2. It is normal for unexpected recession in high-tech industry. A business manager should not be panic, but explore the timing changing recession stage to recovery stage and returning the recovered industry to growth stage or recession stage as the primary strategy decision making. Furthermore, it is suggested in this study to reinforce the internal capability of a business to enhance the regeneration capacity for medium and small enterprises with limited resources.
3. The regeneration capacity of a high-tech business is not the guarantee of competitiveness. However, a business with stronger regeneration capacity presents higher survival chance in recession risks and higher growth potential during industry recovery. For this reason, a high-tech business thoroughly understanding the ecology evolution and presenting adequate regeneration capacity could make the most suitable strategy selection at correct timing to establish the bases for the survival and regeneration after risks.

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