Strategic Types and Performance of Niche-Firms within Business Ecosystems: A Study of the Japanese Video Game Industry

Tatsuhiko INOUE and Susumu NAGAYAMA

Abstract The "Business Ecosystem" is one of the emerging key concepts of competitive strategy. Although most research has been centered on the hub-firms within its ecosystem, it is niches that are responsible for creating most of the value in it. Thus, we focus on niches and separate them into four types, which are Challengers, Defenders, Replicators and Opportunity Seekers. According to our empirical study in the Japanese video game industry, the performance exhibited by each niche varies. In addition, we indicate the potential for maintaining the health of the ecosystem by having each niche play a complementary role for the ecosystem.

1. Introduction

In recent years, the focus of competition has begun to be placed not on competition between firms within the same industry, but on competition between platforms in the form of hub firms such as Microsoft, Apple and Google. Incorporating the innovations of other firms into one's own platform or forming cooperative networks with players centered on complementors have become vital elements for hub firms in developing a strong platform and gaining a competitive advantage in this context.

The business ecosystem (hereinafter referred to as "ecosystem") has been focused upon in recent years as a form of research on such platforms. The concept of ecosystem is a framework that focuses upon the interdependence of firms and uses the ecosystem in the natural world as a metaphor to express those cooperative networks.

This ecosystem research may present new findings regarding competition between platforms, but it cannot be said that sufficient research has been accumulated. In particular, there is a lack of discussion about the niches that are believed to create much of value in an ecosystem. Although hub firms have been classified into categories such as

keystones and physical dominators, no such classification has been carried out for niches.

Therefore, this research focused upon niches responsible for generating value in the ecosystem by being aware of the types of niches hub firms should capture to become keystones and what kind of niches exist in rich ecosystems. In addition, we derive hypotheses related to strategies and performance of each niche type and examine this based upon empirical data.

2. Theory and Hypotheses

2.1. Related Research on Business Ecosystems

One area that must be covered in the field of business ecosystems is research on platforms. A platform provides infrastructure and rules for mutually creating innovation by linking together several different user groups (Eisenmann et al., 2006; Gawer & Cusumano, 2002). Platform research covers arrangements related to transactions and alliances, or interfaces, because primary focus is placed upon niches that are directly linked to a firm. Gawer & Cusumano (2002), who are representative of researchers on platforms, examine the relationships with niches by primarily focusing their analysis on the behavior of platform firms and how they can attain hegemony and increase the value they gain.

Meanwhile, the business ecosystem began with research by Moore (1993, 1996) and typically uses the ecosystem in the natural world as a metaphor to represent the cooperative networks formed between investors, partners, suppliers and customers. Research on ecosystems, which had a broad and vague scope of analysis, was significantly systemized by Iansiti & Levien (2004). Since this research, research on ecosystems has been published in academic journals (Adner, 2006; Adner & Kapoor, 2010; Isckia, 2009; Pierce, 2009; Tee & Gawer, 2009).

Iansiti & Levien (2004) have made at least two contributions. One was the clarification of ecosystem performance indicators. They suggested using the ecosystem's health as an indicator of its performance, and stated that this could be measured by using *productivity*, *robustness* and *niche creation* as three indicators. ROIC (rate of return on invested capital) is a typical indicator of productivity. Indicators of robustness include the degree that the network between players is being maintained, such as the death rate of niches in an ecosystem and trading relationships. In addition, niche creation measures the degree of creation of new niches within an ecosystem and the degree of creation of innovative new products and technologies.

The other contribution they made was the classification of the roles of players

within the ecosystem. They differentiated the players within a network into hub firms and niche firms surrounding the hub firms, and also classified the hub firms. Hub firms that increase the health of the ecosystem in the long term were classified as “keystones” and those that weaken it in the long term were classified as “physical dominators”.

Although a keystone has not significant presence in the ecosystem, it leaves most of the value created by the whole within the ecosystem, providing business opportunities to niches and energizing the ecosystem. In contrast, a physical dominator integrates niche firms horizontally and vertically, controls the ecosystem and attempts to generate value alone. In order to obtain much of the value generated by the ecosystem for itself, it avoids providing business opportunities to niche firms and it is claimed that this weakens the ecosystem in the long term.

The following observations can be made when comparing such platform research with ecosystem research. First, ecosystem research focuses on the entirety that is not directly connected to oneself. Whereas typical platform research tends to focus upon niches directly connected to hub firms, ecosystem research discusses niches only indirectly connected to hub firms and the ecosystem as a whole including relationships that cannot be reduced to individual elements.

This indicates that ecosystem research also focuses upon other firms and the surrounding networks. It is believed that hub firms are affected not only by directly connected niche firms, but also niche firms in alliances with them, rival hub firms that have dealings with those niche firms and any other party indirectly connected through the network. This is the second characteristic.

The third is that adopting multiple positions instead of establishing the perspective of a particular player is problematic. The interdependence of the players within an ecosystem is an issue, and attention is given to hub firms based on an understanding of niches and to niches based on an understanding of hub firms. The above contrast is illustrated in Table 1.

Table 1. Comparison of Platform and Ecosystem Research

	Platform Research	Ecosystem Research
Focus	Own firm	Other firms and whole
	Focus on value capture	Focus on value creation
Links	Direct (dyad)	Indirect (network)
	Single faceted (single unit)	Multi faceted (multiple units)
	Dependence	Interdependence

2.2. Limitations of Prior Ecosystem Research

As described above, ecosystem research is characterized by the formulation of strategies based on consideration of the actions of others and the overall impact based on a multi-perspective. However, even in the most advanced systematic organization of ecosystem research conducted by Iansiti & Levien (2004), these characteristics have not been fully utilized.

That is because attention has been directed toward the behavior of hub firms themselves. The classification into keystone or physical dominator is focused solely upon the behavior of hub firms themselves with regard to what they should do to gain hegemony and become keystones or what behavior will result in them becoming physical dominators. This self-contained discussion of hub firms does not adopt the perspective of niches, which create much of the value in an ecosystem, and ignores the unique multi-perspective approach of the ecosystem. Hub firms are not simply able to become keystones of their own accord. They only become keystones once they surround themselves with niches that help make the ecosystem healthier. Therefore, it is necessary to classify niches and gain a deeper understanding of the behavior of niches and the prosperity of the ecosystem.

2.3. Analysis Approach Using Classification of Niches

What kind of niches should hub firms surround themselves with and what kind of niche behavior should be encouraged to make an ecosystem prosper? The key is niches' "dependence on hub firms" in a multi-platform environment. According to the approach adopted in ecosystem research, niches need to be free from excessive domination by hub firms and must maintain their own energy. To do this, niches must appropriately manage their dependence on resources (Pfeffer & Salancik, 1978) while maintaining appropriate

dependence without concentrating transactions on a single firm (Porter, 1980).

Multi-platform strategy (Hagiu & Yoffie, 2009) focuses on this point. A Multi Platform Niche (MPN) refers to a niche that creates and maintains relationships with multiple platforms to maximize its own interests in the long term. Its opposite is a Single Platform Niche (SPN). According to prior research, an MPN has advantages over an SPN such as better risk dispersion, better use of economy of scope and more efficient resource allocation (Hagiu & Yoffie, 2009; Iansiti & Levien, 2004; Uzzi, 1996).

The basic approach of the multi-platform strategy concerns the kind of dependence a niche has on multiple platforms. Does it have relationships with a single platform or multiple platforms? Even if it does have relationships with multiple platforms, is the niche's dependence on them equal and does the dependence change? If it does change,

Table 2. Characteristics of Niche Types

Niche Type	Challenger	Defender	Replicator	Opportunity Seeker
Platform	Single Platform	Multi Platform	Multi Platform	Multi Platform
Relationships with platform firms	Only has a relationship with one platform firm	Always has a stronger relationship with one platform firm	Has relationships with both platform firms	Has a strong relationship with the stronger platform firm
Change in dependence ratio	No change (Always 100%)	No change (Relatively stable)	Freaqent change (Back and force)	Drastic change (Occasionally reversed)
Strategies	Increase autonomy in actions and more innovative products and services due to being situated on the periphery (Caplado, 2007; Dhanaraj & Parkhe, 2006; Moran, 2005)	Reduces transaction costs by forming strong ties (Uzzi, 1996; Williamson, 1985)	Benefits from economy of scope by repeatedly using accumulated resources (Gimeno & Woo, 1999)	Pursues network externality by forming ties with the strongest platform (Eisenmann et al., 2006)

what kind of pattern does this change follow? In this research, we categorize niches into four types based not only on links to platform firms, but also changes in dependence.

The four types of niches shown in the table change their ties and dependence according to their goals and strategies. Therefore, one type of niche is not necessarily superior to other types in all ways. Hypotheses on how each niche pursues performance are presented below.

According to ecosystem research, it is preferable for a niche to maintain relationships with several platforms. However, it is better to have stable ties with a single platform in order to spark innovation. The reason for this is that attempting to support multiple platforms will prevent niches from optimization to a specific platform. Without such optimization, it would be more difficult for niches to target their main customers and take advantage of the distinctive technology of the platform (Caplado, 2007; Dhanaraj & Parkhe, 2006; Moran, 2005). In this research, we refer to Single Platform Niches that have ties with a single platform and attempt to face new challenges as a "Challenger." Challenger niches are believed to maintain the health of the ecosystem by promoting the creation of new markets and the creation of niches.

Conversely, in terms of productivity, it is more advantageous to have ties with several platforms (Echoles & Tsai, 2005; Hagiu & Yoffie, 2009; Iansiti & Levien, 2004; Uzzi, 1996). Investment in development can also be recovered with less risk and greater stability. Two hypotheses concerning innovation and productivity can be derived from this.

H1: Single Platform Niches have a higher level of innovation than Multi Platform Niches.
H2: Multi Platform Niches have a higher level of productivity than Single Platform Niches.

Furthermore, there are several conceivable methods used to increase productivity by niches linked to multiple platforms. The first is a high-risk, high-return strategy. This involves awareness of network externality and utilizes multiple platforms according to the opportunities presented (Eisenmann et al., 2006). This kind of niche is called an "Opportunity Seeker." An Opportunity Seeker is a niche that identifies business opportunities, changes its main platform and dramatically shifts its dependence. Drastic reallocation of resources is carried out if there is an opportunity, and although there is much fluctuation in productivity due to this reallocation being hit-and-miss, this type of

niche contributes to the productivity of the ecosystem.

The opposite is a low-risk, low-return strategy. Even when dealing with multiple platforms, transaction costs can be reduced by keeping the main client fixed (Williamson, 1985). Niches adopting this strategy are called "Defenders." These are niches that keep their main platform fixed and do not make any extreme changes to dependence in their relationships. Defenders are forming strong ties so that they can form trust and avoid opportunism (Uzzi, 1996). Thus, Defenders have the smallest fluctuations in productivity and contribute to increase the robustness of the ecosystem.

Finally, there is a strategy that limits risks while seeking reasonable returns. This strategy utilizes the economy of scope through the repeated use of development assets across multiple platforms (Gimeno & Woo, 1999). This kind of niche is called a "Replicator." Replicators are niches that switch their main platform in a short timeframe and make incremental changes in dependence in order to efficiently recover development investment. Hypotheses 3a-3b concerning robustness can be derived from the assertions above.

H3a: Opportunity Seekers have larger fluctuations in productivity than Defenders or Replicators.

H3b: Defenders have smaller fluctuations in productivity than Replicators or Opportunity Seekers.

3. Research Design

3.1. Data Collection

The study covers the ecosystems of Nintendo Co., Ltd. (NTD) and Sony Computer Entertainment (SCE) in the Japanese video game industry (Xbox was excluded from the study because its market share was only 2 percent in Japan). There are two reasons that we chose to cover the video game industry. One is that because the ecosystem of the game industry has a simple structure made up of two opposing platforms and niches, niche strategies are easy to observe. Another is that the dynamism of the ecosystem can be comprehensively observed because of the rapid changes in the industry (Fine, 1998; Srinivasan & Venkatraman, 2009).

Data was collected using the list of the 500 best-selling games shown in *The Annual Video Game Industry Report* published by Mediacreate CO., Ltd. Data was created for 4,500 titles over 9 years with 49,500 cells of data under titles such as development costs. Annual sales and development costs for each publisher and the number of titles for each

platform were calculated based on this data set. Using the procedures above, 469 samples were eventually obtained over an observation period of 9 years. However, merged firms were treated as samples combining the figures for the pre-merger firms.

3.2. Measures

To begin with, the method used to categorize niches is shown here. Figure 1 shows the Japanese video game industry networks consisting of NTD, SCE and niches in 2008 as drawn using UCINET6.0 (Bogatti et al., 2002). The circles with bold outlines indicate platforms and the black circles are niches. The size of the circles indicates sales. The thickness of the grey lines indicates the strength of ties calculated based on the number of software titles provided (Srinivasan & Venkatraman, 2009; Venkatraman & Lee, 2004).

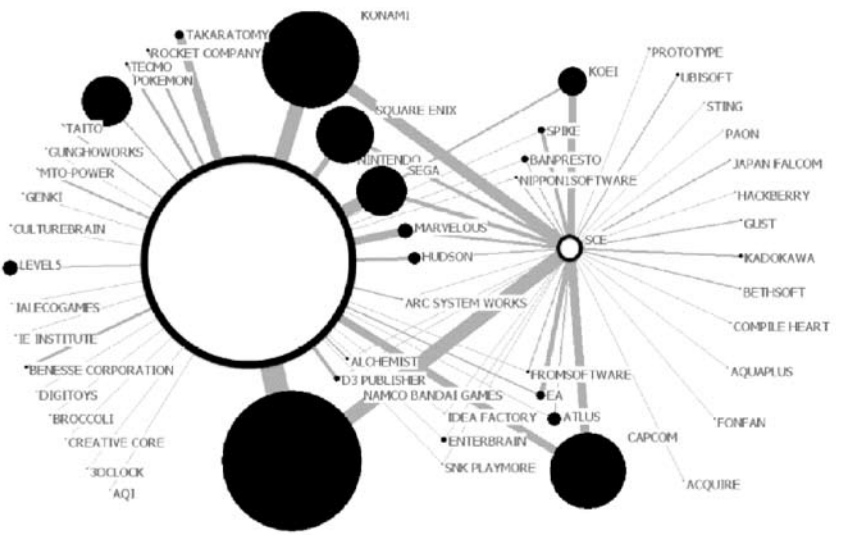
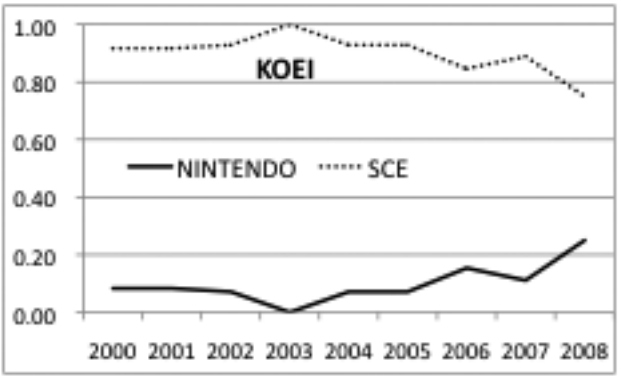


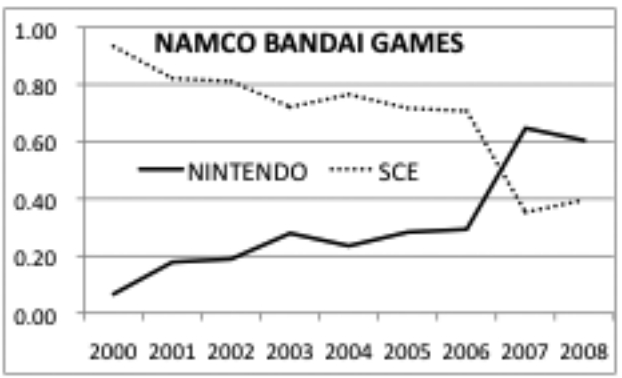
Figure 1. Japanese Video Game Networks in 2008

Niche firms that only released titles for one platform (SPN) during the period studied have been categorized as Challengers (the niche shown at the far right or left of Figure 1). A firm is categorized as an MPN[1] if it has sold even one title for both platforms (the niche in the center of Figure 1). Among these MPNs, a Defender supplies software for both platforms and the platform dependence ratio[2], or supply ratio has never been reversed (e.g. Figure 2. KOEI). A Replicator is a niche firm that supplies software for both platforms and has reversed the dependence ratio on numerous occasions. Finally, an

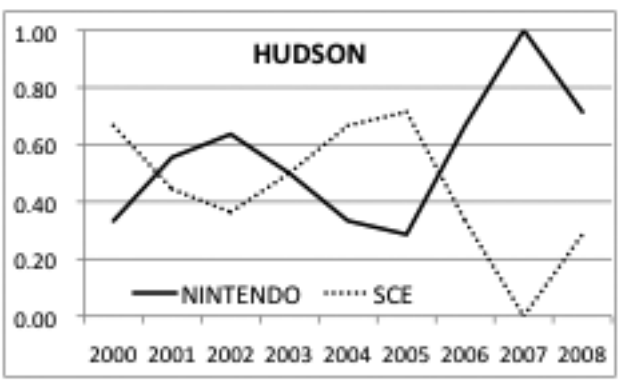
Figure 2. Typical Patterns of Temporal Dependence Change



Defender



Opportunity Seeker



Replicator

Opportunity Seeker is a niche firm that supplies software for both platforms and has reversed the dependence ratio only when a change in dominance occurs. During the period being studied, such a change occurred only once in the video game industry (SCE was dominant until 2004 when NTD released the DS and later the Wii in 2006, resulting in a shift to NTD[3]). Therefore, niche firms that have reversed their dependence ratio two or more times are categorized as Replicators (e.g. Figure 2. HUDSON). And niche firms that have reversed their dependence ratio only once are categorized as Opportunity Seekers (e.g. Figure 2. NAMCO BANDAI GAMES). Using the procedures above, categorical variables were given to each of the four strategic types of niche firms.

In order to measure these three performance aspects in the video game industry, the three measures of *Innovativeness*, *Productivity* and *Stability* have been developed (See the Appendix). *Innovativeness* is a measure for indicating how innovative products and services created are (Iansiti & Levien, 2004). The Annual Video Game Report listed titles that cannot be categorized into existing game categories as *ETC titles*[4]. ETC is the genre that it cannot be classified into any genres. So, we use the ratio of ETC titles among all titles released was used as the measure of innovativeness. *Productivity* is a measure for indicating how efficiently products and services create value (Iansiti & Levien, 2004). In this study, productivity was measured using the return on investment in terms of how many times video game development costs can be recouped in sales. Sales of each software title (by platform) were divided by development costs to calculate the annual average for each publisher. *Stability* is a measure of how little productivity varies. Here, stability was simply measured by calicurating variance of productivity. A lower value indicates little variance in productivity and high stability.

4. Results

Table 3 reports descrptive statistics of niche's charastaristics by each type. Data was consisted of 144 firms (unique niches) and 469 firms during 9 years observations. Annually there are approximately 52 niches that form the Japanese video game ecosystem except for platform firms, such as Nintendo or Sony Computer Entertainment. These average niches release 5.5 titles (average sales per title is 427 million yen) and earn around 3.6 billion yen. Thus, the whole ecosystem creates 190 billion yen per year. However, a significant difference in sales was observed among niche (standard deviation is 8660×10^6).

Table 4 reports the descriptive statistics for the performance of niches and the test results for the difference between the averages of groups. The ANOVA model was utilized to test the difference between groups.

Table 3. Statistical Description of Niche Characteristics

		All	Challenger	Defender	Replicator	Opportunity Seeker
The Number of niches		144 (100.0%)	109 (75.7%)	17 (11.8%)	7 (4.9%)	11 (7.6%)
Sample size		469	220	113	53	83
The number of titles	**Mean**	**5.51**	**1.51**	**4.97**	**8.64**	**14.87**
	S.D.	9.50	.89	5.78	6.26	17.46
Sales (Million yen)	**Mean**	**3,640**	**452**	**3,201**	**4,560**	**12,110**
	S.D. (10^6)	8,663	641	5,171	4,637	16,650
Average sales per title (Million yen)	**Mean**	**427**	**289**	**500**	**465**	**668**
	S.D. (10^6)	524	345	378	295	936

Table 4. Performance Measurements by Niche Strategy Type

		Challenger	Defender	Replicator	Opportunity Seeker	F-value
Innovativeness	**Mean**	**.13(220)**	**.02(113)**	**.08(53)**	**.05(83)**	5.58**
	S.D.	.32	.11	.18	.14	
Productivity	**Mean**	**8.42(220)**	**10.44(113)**	**11.37(53)**	**16.38(83)**	3.59*
	S.D.	0.95	1.06	1.93	7.50	
Stability	**Mean**	**91.83(171)**	**71.70(113)**	**120.54(53)**	**706.37(83)**	11.26**
	S.D.	280.61	116.43	237.17	1897.16	

Significance: *p<.05 **p<.001
Parentheses show the number of observations

As is explained above there are three hyposeses to test. First, Hypothesis 1 states that *Challenger SPNs have higher innovativeness than other niches*. The innovativeness of Challengers (0.13) is the highest among all of the niche groups and is statistically significant (p<0.01), supporting Hypothesis 1.

Second, Hypothesis 2 states that *MPNs have higher productivity than SPNs*. In our results shown in Figure. 3, the productivity of Defender, Replicator, Opportunity Seeker MPNs is 10.44, 11.37, and 16.38 respectively, which is higher than the 8.42 productivity of Challenger SPNs. The difference between these averages is statistically significant

(p<0.05), supporting Hypothesis 2.

Third, Hypothesis 3 states that *Opportunity Seeker's have larger fluctuations in productivity than Defenders or Replicators.* And Hypothesis 3b states that *Defenders have smaller fluctuations in productivity than Replicators or Opportunity Seekers.* According to our results, the highest stability was seen for Defenders (71.70) and the lowest stability was for Opportunity Seekers (706.37). The difference between the averages of groups was statistically significant (p<0.01) , supporting Hypoteses 3a and Hypotesis 3b.

5. Discussion

We have classified niches into four categories and sought out the roles they play. If the world-leading Japanese video game industry has created a rich ecosystem, why is the dependence of each of these four niches so important? Here, we discuss this logic based upon the results of testing our hypotheses.

An ecosystem requires a niche that is able to launch a platform or break it out of stagnation. This role is played by Challengers. As supported by Hypotheses 1 and 2, Challengers that are Single Platform Niches are inferior to Multi Platform Niches in terms of productivity, but are able to provide hub firms with highly innovative software. Recently, educational institutions and publishing companies have been providing software that are completely different to conventional games, such as language tests and dieting software. However, the scale of activity of these highly innovative Challengers is limited (average of 1.5 titles[5]), and they are unable to create many titles in a short period of time. A single failure can be fatal, and they are unable to contribute much in terms of either productivity or robustness.

Opportunity Seekers are niches that complement this and raise the productivity of the ecosystem. Actually, the *Final Fantasy* series and the *Dragon Quest* series from SQUARE ENIX, which falls into this category, have been major hits that have provided much profit to hub firms. However, because Opportunity Seekers always 'back the winning horse (Leibenstein, 1950)', they do not provide profits to hub firms which are in downturn. Furthermore, as supported by Hypothesis 3a, there is much fluctuation in productivity depending on whether the niche produces hits because resources are concentrated on opportunities that have been identified.

Because of this, the ecosystem becomes unstable unless there are niche firms that will not cast aside the hub firm even when faced with a crisis. This role is played by Defender niches. As supported by Hypothesis 3b, Defender niches increase the robustness

of the ecosystem as a whole by ensuring its own stable relationships and performance. In fact, KOEI are not only reducing transaction costs, but also optimizing for certain hub firm's platform attributes. For example, *Dynasty Warriors (Sangoku Musou* in Japanese*)* series optimize for the high level of image processing provided by SCE.

Replicators provide a balanced strengthening of these complementary relationships. This niche increases the productivity and the robustness of the ecosystem at the same time. For example, HUDSON's most well-known title in the Japanese market is the *Momotaro Dentetsu* series, but the firm frequently provides series for all platforms and offers a steady stream of hits. The results of our investigation also confirmed the balanced strategy of Replicators.

Based on this argument, it can be seen that each of the niches plays a role in the health of the ecosystem and that their presence is essential and complementary for each other. Some inferences can also be made by assuming these niches' roles and complementary relationships. For example, the ratio of shared niches has been increasing in the video game industry over the past 9 years (from 25% in 2000 to 39% in 2008). The flip side of this is that the proportion of Challengers has decreased. This is by no means desirable for the ecosystem. In fact, the resale of past hit titles is gradually increasing (from 3.6% in 2000 to 6.0% in 2008), and there is a sense of stagnation in the video game industry.

Of course, the decrease in Challengers is not the only cause of the stagnation, but based on the complementary relationships derived here, the increase in sharing of niches within the ecosystem implies sacrificing originality for stability. The stability-oriented approach of each of the players in the ecosystem may lead to a maturing of the industry. Therefore, hub firms must make an effort to intentionally create new niches. They must design their platform architecture to enable appropriate switching, provide easy-to-use development tools and make it easier for new niches to enter the market through niche support such as sales agreements.

6. Conclusion

We have been able to make the following contributions to ecosystem research. The first point is that we have focused on niches that have been overlooked in ecosystem research to date, classifying them into four categories in a similar fashion to hub firms, and revealing the differences in each of their contributions to the ecosystem. The second point is that we were able to discuss how the roles of the four niches interact to increase the health of the ecosystem. The third point is that we were able to provide suggestions

about the form taken by keystones based on a niche perspective.

However, there are further issues to solve. One is to test external validity. The categories proposed here are found in the Japanese video game industry. Thus further research should be taken place in other industries. The other issue is to investigate the best niche portfolio for platform firms. If each type of niches plays a different role as we explained, further research question should be addressed to which proportion is good for the ecosystem. While too many opportunity seekers would decrease the stability of the ecosystem, too many defenders would decrease innovativeness of the ecosystem. Pursuing best portfolio is one of the most challenging issues in ecosystem research.

Footnotes

[1] MPNs confirmed during the period observed were as follows. The 17 Defenders were EA Square, Athena, NEC Interchanel, Asmic Ace, Sammy, ChunSoft, Yuke's, Nippon Ichi Software, Idea Factory, Enterbrain, SNK Playmore, Atlas, Gusto, Capcom, Koei, Fromsoftware and Kadokawa. The 7 Replicators were Kids Station, Electronic Arts, Marvelous Entertainment, SEGA, Spike, Hudson and Banpresto. The 11 Opportunity Seekers were AQ Interactive, Arc System Works, Success, Genki, D3 Publisher, Konami, Square Enix, Taito, Takara Tomy, Techmo and Namco Bandai Games.

[2] Dependence is calculated by dividing the number of titles released by a publisher for a platform in the year *t* by the total number of titles supplied that year. For example, if 6 of the 10 titles released are for NTD, the dependence is 60%.

[3] NTD's share was 48.1% in 2006 while SCE's was 51.9%, but NTD's share was extended to 60.6% in 2007. SCE's share fell to 39.4% and hegemony shifted to NTD (market scale calculated by excluding Xbox).

[4] Software genres were categorized into the 11 groups of ACT, ADV, ETC, FTG, PZL, RCE, RPG, SLG, SPT, STG and TBL in accordance with *The Annual Video Game Industry Repor*t.

[5] The number of yearly average released titles of Challenger, Defender, Replicator, and Opportunity Seeker are 1.51, 4.97, 8.64, and 14.87 respectively ($p<0.01$).

Appendices: Formula Used to Compute the Performance of Niches

・ $Innovativeness_{i,t} = Titles_{etc,i,t} / Titles_{i,t}$

$Titles_{etc}$: The number of ETC titles released that year, *Titles* : Total number of titles released that year *i*: Publisher *t*: 1, 2 …9

· $Productivity_{i,t} = \sum_{p} \sum_{k} k(Sales_{i,t,k,p})/(DevelopmentCost_{i,t,k,t} \times p \times k)$

Sales: Sales of titles released that year, *Development Cost*: Average development cost per title (by platform), *i*:Publisher, *t*: 1, 2 …9, *k*: Titles, *p*: Platform

· $Stability_i = \sum_{t} (Productivity_{i,t} - AverageProductivity_i)^2 / Observationtimes$

i: Publisher, *t*: 1, 2 …9, *Observationtimes*: Frequency of a firm obseverbed during observation period

[References]

Adner, R. (2006). Match your innovation strategy to your innovation ecosystem. *Harvard Business Review 84(4)*, 98-107.

Adner, R. & Kapoor, R. (2010). Value creation in innovation ecosystems: How the structure of technological interdependence affects firm performance in new technology generations. *Strategic Management Journal 31(3)*, 306-333.

Borgatti, S. P., Everett, M. G. & Freeman, LC. (2002). *UCINET 6 for Windows: Software for Social Network Analysis*, Analytic Technologies.

Capaldo, A. (2007). Network structure and innovation: The leveraging of a dual network as a distinctive relational capability. *Strategic Management Journal 28,* 585-608.

D'Aveni, A. R., & Ravenscraft, J. D. (1994). Economies of integration versus bureaucracy costs: Does vertical integration improve performance? *Academy of Management Journal 37(5)*, 1167-1206.

Dhanaraj, C. & Parhke, A. (2006). Orchestrating innovation networks. *Academy of Management Review31(3)*, 659-689.

Echols, A., & Tsai, W. (2005). Niche and performance: The moderating role of network embeddedness. *Strategic Management Journal 26(3)*, 219-238.

Eisenmann, T., Parker, G. & Van Alstyne,W. M. (2006). Strategies for two-sided markets. *Harvard Business Review 84(10)*, 92-101.

Fine, C. H. (1998). *ClockSpeed: Winning Industry Control in the Age of Temporary Advantag*e. Reading, Perseus Books.

Gawer, A. & Cusumano, AM. (2002). *Platform Leadership: How Intel, Microsoft, and Cisco Drive Industry Innovation*, Harvard Business School Press.

Gimeno, J. & Woo, YC. (1999). Multimarket contact economics of scope, and firm performance. *Academy of Management Journal 43(3),* 239-259.

Göthlich, S. E. (2003). From loosely coupled systems to collaborative business

ecosystems. *University of Kiel*. May(573). online publication http://www.bwl. uni-kiel.de/

Hagiu, A. & Yoffie, D. B. (2009). What's your google strategy? *Harvard Business Review 87(4),* 74-81.

Iansiti, M. & Levien, R. (2004). *The Keystone Advantage: What the New Dynamics of Business Ecosystems Mean for Strategy, Innovation, and Sustainability,* Harvard Business School Press.

Isckia, T. (2009). Amazon's evolving ecosystem: A cyber-bookstore and application service provider. *Canadian Journal of Administrative Sciences*, *26(4)*, 332-343.

Leibenstein, H. (1950). Bandwagon, snob, and veblen effects in the theory of consumers' demand. *Quarterly Journal of Economics, 64(2)*, 183-207.

Maki, K., Inoue, T. & Nagayama, S. (2010). Symbiotic relationships in business ecosystems. *Papers Proceedings of Fuji-Conference*: 1-20.

Moore, J. F. (1993). Predators and prey: A new ecology of competition. *Harvard Business Review 71(3),* 75-86.

Moore, J. F. (1996). *The Death of Competition: Leadership and Strategy in the Age of Business Ecosystems*, Harper Business.

Moran, P. (2005). Structural vs. relational embeddedness: Social capital and managerial performance. *Strategic Management Journal 26(12)*, 1129-1151.

Porter, M. E. (1980). *Competitive Strategy: Techniques for Analyzing Industries and Competitors,* Free Press.

Srinivasan, A. & Venkatraman, N. (2009). Investigating the dynamics of system-based competition in the videogame sector. *Academy of Management Proceedings*, 1-6.

Tanriverdi, H. & Lee, C. (2008). Within-industry diversification and firm performance in the presence of network externalities: evidence from the software industry. *Academy of Management Journal 51(2)*, 381-397

Tee, R. & Gawer, A. (2009). Industry architecture as a determinant of successful platform strategies: A case study of the i-mode mobile internet service. *European Management Review 6(4)*, 217-232.

Pierce, L. (2009). Big losses in ecosystem niches: How core firm decisions drive complementary product shakeouts. *Strategic Management Journal 30(3)*, 323-347.

Rochet, JC. & Tirole, J. (2003). Platform competition in two-sided markets. *Journal of the European Economic Association 1(4)*, 990-1029.

Uzzi, B. (1996). The source and consequences of embeddedness for the economic performance of organizations: The network effect. *American Journal of Sociological*

Review 61, 674-698.

Venkatraman, N. & Lee, C. H. (2004). Preferential linkage and network evolution: A conceptual model and empirical test in the U.S. video game sector. *Academy of Management Journal47(6)*, 876-892.

Williamson, E. O. (1985). *The Economic Institutions of Capitalism: Firms, Markets, Relational contracting*, Free Press.