Understanding Companies' Transferrable Strategy with Architecture Advantage in the context of Business Ecosystem

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Abstract:

This paper is to analyze the strategy of business ecosystem architecture from firm perspective, which has already won the popularity both in practical and academic area.

It is interesting to make the comparison between natural ecosystem architecture with business ecosystem type in order to find out the commonality and implication for the following research.

A Qualitative research methodology has been adopted. By visiting 19 companies, three typical companies have been chosen to demonstrate transferrable strategy on architecture along the industry life cycle. Finally, a preliminary framework will be proposed to explain this phenomenon with three critical decisive factors: application intangible, technology maturity and ecosystem structure.

Finally, some future research such as capability of ecosystem, nurturing process of ecosystem will be highlighted.

Key words:

Business ecosystem, Architecture, Industry life cycle

Introduction:

The concept of Business ecosystem wss emerging recently because of four driving forces (Rong and Shi 2009) including the implication from natural ecosystem, competition

transfer among competitors, dynamic application and huge benefit driving. In Rong's paper, the definition of business ecosystem was preliminary identified as a network aims to develop the series of intangible application for key technology architecture with four constructional factors: architecture, open source, social networking and infrastructure support. (Fig.1) The application was intangible after the key technology had been introduced, so there were several ways to organize the supply chain to propose the new products. Furthermore the partners inside the ecosystem would help to deliver more un-known products to re-enable the ecosystem.

This paper will focus on 'architecture', one of the constructional factors of business ecosystem and to develop the content of architecture, and transferrable strategy on architecture. After the introduction part, the second part will review recent literatures both on natural ecosystem and business ecosystem, which was followed by the third part of research identification. The fourth part presents cases study to demonstrate the different strategy of architecture adoption. The fifth is to make the conclusion followed by future plan.

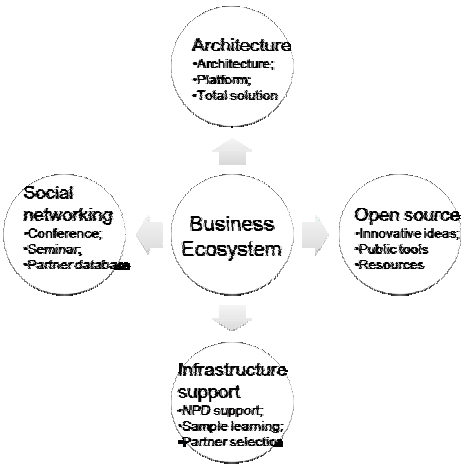

Fig.1 Constructing business ecosystem

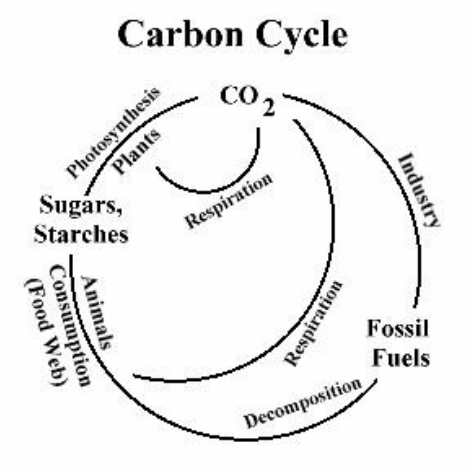

Fig.2 Carbon Cycle

(Rong and Shi 2009) (Nutrient cycle www.starsandseas.com)

Literature review:

'Architecture' in Natural ecosystem

A great deal of academic works has been done on natural ecosystem since 1940s and natural ecosystem is regarded as the best paradigm for the integration of the biotic and abiotic parts of biosphere. (Polunin 1986; Dickinson and Murphy 1998) Then they examined the ecosystem functions and found that functioning has two major subsystems including a open subsystem of energy flow and a closed subsystem of cycling of materials. This function is shown not only to unveil the connection among biotic and abiotic parts but also to demonstrate the operation mechanism inside ecosystem. The energy captured by ecosystem is transferred through different level of the trophic structure of an ecosystem and then converted to heat via respiration, which is powering the ecosystem to operate. Regarding to material cycle, the material, building blocks of ecosystems, are carrying the nutrients to all the components. The transmission of energy through an ecosystem is dependent on specific materials.

Energy and materials are seemed as the architecture to build the roles within ecosystem as well as the interaction among them. A key part of that interaction is the cycling of nutrients through different populations and trophic levels in an ecosystem. (Lawrence 1999) One of the typical nutrient cycle is carbon cycle. Through the carbon cycle (Fig.2), energy and materials as carbon will be developed inside ecosystem and keep the balance within communities.(Hartzog 2004)

Architecture in Business ecosystem

The definition of business ecosystem was firstly proposed by James Moore: An economic community supported by a foundation of interacting organizations and individuals- the organisms of the business world (Moore 1993). The model was composing of seven dimensions, one of which was 'offer' from firm to ecosystem. It was the first time to mention about the connected content among companies in the network. Following the Moore's work, more and more academic works began to focus on the functioning operation inside ecosystem like natural ecosystem, where architecture was one of the most popular words. (Iansiti and Levien 2004; Li 2009; Bannerman and Zhu 2008) So far there are several types of thinking over the architecture of business ecosystem.

Iansiti and Levien proposed three foundation factors to define and execute strategy from firm perspective with business ecosystem including architecture, integration, market management. (Iansiti and Levien 2004)Architecture aims to define how companies draw boundaries between technologies, products and organizations. There are two kinds of Architecture as platform and standards in ecosystem. Platforms can be usefully divided into two distinct types of components: the implementation and the interface. The implementation is solving the problem and bridge the technology and application with the help of the interface, which can be seen as embodiments of sharable solutions to common ecosystems problems. Regarding to the standard, it is an interface that facilitates interoperability which empower participants in a network to interact with each other and to sustain those interactions over time even when their internal details change. Standards are also the strong support for platform.

Bannerman and Zhu presented that standards in business ecosystem are useful in demarking a boundary between cooperation and competition, enabling industry stakeholder to coexist and thrive. (Bannerman and Zhu 2008)As a standard, it must be prescriptive easily which will result in reduced interoperability between systems. Also they strongly suggested that standardization processes must include requirements specifications and compliance checking.

Bailetti in 2009 strongly highlighted that today's competition is about ecosystem vs ecosystem, not about company vs company by a structured business ecosystem. Inside its structure, out of box platform is regarded as key component which is comprised of assets, processes and norms in order to harness creative individuals to co-create new value and take it to market globally.

In the technical side, Manning and Thorne believed that open architecture or standards for communicating data today and in the future mean that companies can communicate through information standards with less effort to build and create new communicating interfaces. (Manning and Thorne 2003)Furthermore, Power & Jerjian proposed business ecosystem as a web-based system as "A system of websites occupying the world wide web, together with those aspects of the real world with which they interact. It is a physical community considered together with the non-living factors of its environment as a unit."(Power and Jerjian 2001) Within the acquisition of new techniques, the Internet has been transformed from an information-only system into an integrated service platform. In this platform, there are four functional architecture broken down as structural services, support services, basic services and service chains.(Heistracher, Kurz

et al. 2004)

Conclusion of literature review

By review the above literatures, Table.1 has made a comparison among these perspectives. In the natural ecosystem, energy and material are enabling to transfer inside the natural ecosystem while so-called architecture could be used by every participant inside business ecosystem. The similarity demonstrates that inside business ecosystem there are some sort of architecture 'transferring' from one participant to another one to enable establishment of connection among different companies. However, the classification of architecture has not been explored clearly regarding to the Table.1, so the following parts of this paper will aim to identify the kinds of architecture within ecosystem as well as some relevant issues.

Table.1 literature review in architecture of ecosystem

Author	**Perspective**	**Contents**
Moore 1993	Value Chain	Offer: products or services
Iansiti& levien 2004	Business network	Platform: implementation level and interface level; Standards: enable interoperability and support platform
Bannerman and Zhu 2008	Business Relationship	Demarking ecosystem boundary; Open standardization process
Bailetti, 2009	Business Relationship	Compose of assets, processes and norms; Harness individual innovation together
Power,T & Jerjian,G 2001 **Manning and Thorne (2003)** **Heistracher et al 2004**	Technical perspectives	Information system adoption; Web-based; Open sources available
Dickinson and Murphy 1998; Polunin 1986; Henderson's Dictionary	Natural ecosystem	Open subsystem: energy; Close subsystem: material cycle

Research identification:

Research Process

From the literature review, we can see that architecture issue plays vital role in business ecosystem management. In order to identify the content and strategy of architecture, the research process is shown as below:

- An introduction on the current situation of architecture in business ecosystem.
- Literature reviews on both architecture of natural ecosystem and business ecosystem.
- Determine the gap for this study
- Cases exploration, who established ecosystem with the help of architecture.
- Finally develop the advantage of architecture: content, strategy as well as transferable capability.

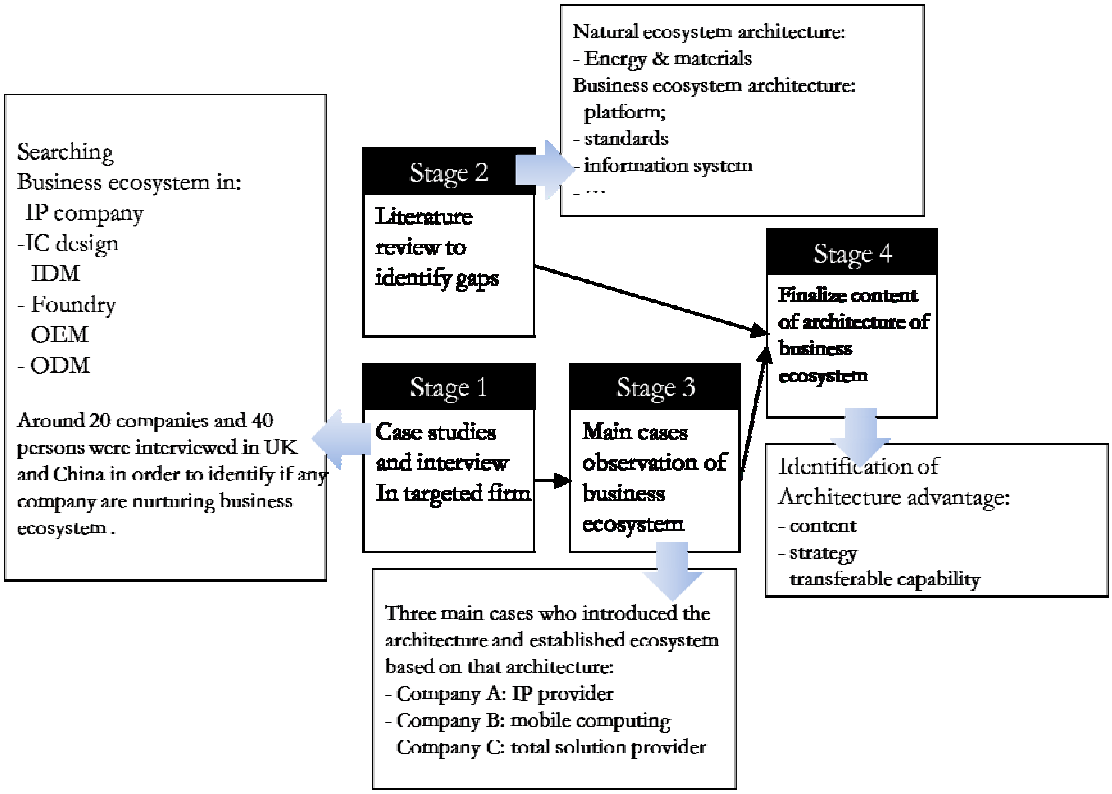

Figure.2 Research identification

Case selection criteria

The mobile computing industry as high tech background has been chosen because this industry emerged with various application of high degree uncertainty and group of innovation together, which is also the challenging issue discussed in business ecosystem theories. After completing exploratory cases, we happen to find that company A, B,C provide the architecture-based service for other companies, and they all build up their own ecosystem separately but overlapped actually. So, mobile computing industry would be a good example to demonstrate the high degree of interaction among companies based on some specific architecture aiming at intangible and future application. In this way, we decide to deep study about the ecosystem built by these three companies. (Fig.3)

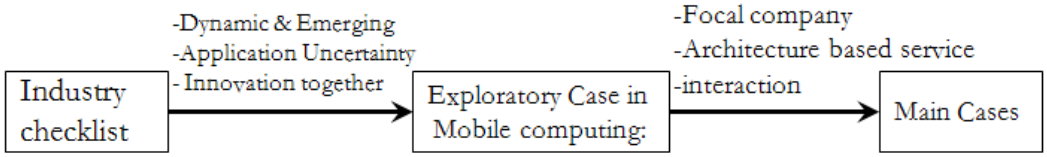

Fig.3 Case Selection Criteria

Case studies

Following the case selection criteria, this section exploring three main cases is aiming to find out what these companies have done in terms of architecture issue as well as their strategy with critical factors. Company A is an IP (Intellectual property) provider which is the architecture of IC chips (Integrated Circuit)in semiconductor industry; Company B is an IDM(Integrated Device Manufacturer) company providing processor both in PC industry and mobile computing industry; Company C is an IC design company. All these companies, owning their own business ecosystems, regarded architecture as one of their competitive advantages, which will demonstrate the acceptance of architecture-importance inside ecosystem.

Company A: IP Provider-the IC chips core

Company A is the world's leading semiconductor intellectual property (IP) supplier and IP is at the heart of the development of digital electronic products. IP is now provided as the technology foundation for nearly everything electronic in the world today. (Company A website) Fig.4 describes its special business model which involves the designing and licensing of IP. Its Partners utilize its IP designs to create and manufacture system-on-chip designs, paying Company A the license fee for the original IP and a

royalty fee on every chip or wafer produced. (Company A website)

Company A is positioning itself in the upstream of supply chain which is far from the market side because of its product with the bottom level technology of electronic products. In order to establish the ecosystem to support its architecture, Company A leads several ways to highlight its architecture advantage as shown in Fig.4.Firstly, 'design win' is aim to license IPs as many as possible. In this process, Company A will use common sales methods with fully infrastructure support. If it is successful to get a new licensee or some OEMs' device containing the IP from Company A, both of these two ways are called 'design win', which means IP from Company A is used widely and win the market share to enable this consumer electronic market. Secondly, if 'design win' is not successful, Company A will lead another way to convince OEMs to adopt its architecture and then ask OEMs to persuade their IC supplier to adopt its IP architecture. This is a very unusual way to develop new product however with much success. Thirdly, Company A follows a lead-partner strategy to push its new processor IP into market with strong support from lead partners. Company A will do specific and customized changes on processors IP with all development tool kit for lead partners.

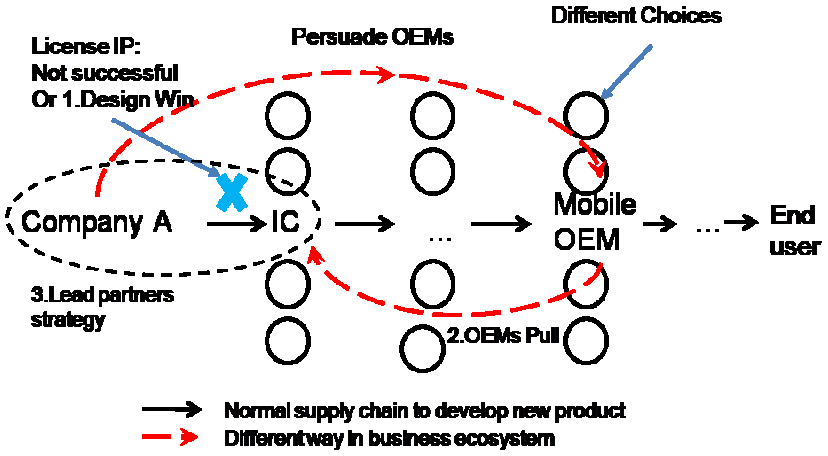

Fig.4 Company A's architecture advantage

Company B: new low power processor aims to penetrate into mobile computing market

Company B is IDM (Integrated Device Manufacturer) company, which is the top player in semiconductor industry. Previously, Company B mainly focused on PC industry. However as the computer industry became saturated, it began to penetrate to mobile computing industry which had much space for increase. (Company B website)

Company B used two ways to make its processor win competitive advantages. Firstly, Company B provided low-power IC processor which was aiming at mobile computing area such as net-book, MID (Media Integrated Device), smart phone. Different from Company A, Company B had already integrated some parts of its own architecture. Other partners only to develop the other parts of the whole solution based on the platform of Company's processor because the architecture of processor was kept close. Due to the big power and excellent performance in PC industry, this kind of processor was also sold well in mobile computing industry. Secondly, similar as Company A, Company B launched and enabled a new operation system ecosystem in order to support its processor's sales. In this open community, partners are free to access to all resources provided by Company B such as open source core of operation system, the development project as well as financial support.(Zhang 2009) . So far, there are more than 100 ISV (independent software vendor) and 15 OSVs (operation system vendor) developing software based on Company B's processors. This ecosystem's core is to provide the common platform which is specific for different user experience by

providing the SDK (software development kit).

Company C: the Mobile phone IC total solution enabled the free market.

Company B set up an open ecosystem in software side comparing with its close ecosystem of hardware side in some extent. However Company C actually provided the total solution both in two sides with single chip. Normally, the PCB(printed circuit board) board of mobile phone contains four chips, which are the processors of Baseband, RF, application and power management. Company C just provided the turn-key model which integrated four chips into one single chip and also integrated operations system and application software. The total solution cut down the entry barrier to mobile industry. As a result, Shan-zhai mobile industry with much lower price was trigger in Shenzhen area in China as the local OEMs only need to do easy works such as outside design and manufacturing work.

Looking back over Company C's history, we could discover it not only provided total solution in mobile market, but also provided in CD-ROM market and DVD market ten years ago. Fig.5 demonstrates the industry life cycle with two dimensions of time and market maturity, which means the industry size will be changed over time. In 1997, as a latecomer in CD-ROM market, Company C began to integrate all the chips into only one chip, which cut down the price, shorten lead time and finally dominated that market. Company C as an early adopter also dominated DVD player market using the same strategy. Then this kind of strategy was reused in mobile market.(Rong and Shi 2009)

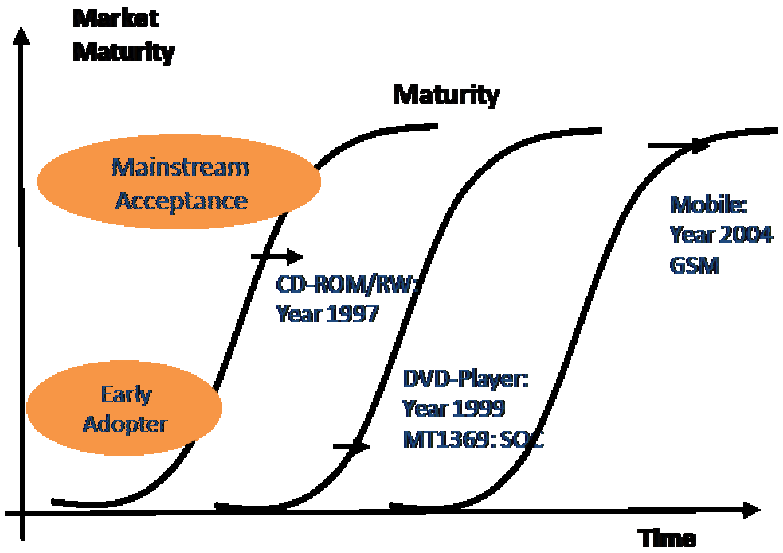

Fig.5 Company C's market penetration strategy

Discussion of Architecture in Business Ecosystem

The reason for Architecture Strategy

Table.2 presents the different strategies in terms of hardware and software development within these case companies. Company A regarded its IP as key competitive advantage and his aim was to persuade IC companies as many as possible to adopt its architecture. In that way, Company A had to lead a very open strategy and various platforms based on its architecture will be nurtured. In order to maintain its advantage, Company A also provided the software development kit in order to keep its processor supported by numerous software tools which even competed with some design support companies within ecosystem. Regarding to Company B, low-power processors were succeeding from PC industry had already adopted some integration work over the processor core. The key competence in that time is not the processor but software side. In order to win the support from various software companies, Company B decided to set up an open

community for free operations system development as well as the application software based on that platform. Company B would like to imitate its successful business model in PC industry in mobile computing industry. And as the industry become mature, Company B will continue doing integration work such as two chips of 2nd generation and only single chips of 3rd generation.(Zhang 2009) However due to uncertainty of end-user device of mobile computing industry, Company B also took an open attitude in processor development as they outsourced manufacturing to a foundry company with the purpose of involving their partner's ecosystem. The reasons why Company C led such close strategy mainly because the technology was mature in feature mobile (2G mobile) industry and its capability to integrate all chips in a low price. After the technology barrier was cleared, the downstream company in the supply chain could easily to deliver the new mobiles with different functions to meet the diverse requirement from market side. The number of those kinds of OEMs was big as more than 2000 in China. Company C's contribution was to trigger the huge free market and cottage-like mobile industry with around 200 million handsets in 2008.(Pan 2008)

Table.2 Architecture strategy cross cases

	Processor Evolution	**Software Development**	**Reasons**	**Decisive Factors**
Company A	Very open: license business model	Less open as Software development kit: competition inside ecosystem	1. End-user application intangible 2. Bottom level of technology 3. Encourage diverse innovation	

Company B	Less open: low level integrated platform; outsource manufacturing to partner	Very open: operation system open community, encourage participation	1. Application uncertainty in mobile computing industry. 2. Dynamic market requirement 3. Improve efficiency 4. Imitating 'Wintel' model	Application Intangible; Technology maturity; Ecosystem structure
Company C	Very close: turn-key model - integration of all chips into single chips	Very close: embedded all operations system and application software in turn-key model	1. Application and technology maturity 2. Meet market diversity 3. Cut down cost	

Combining literatures and practical cases, some decisive factors influencing the architecture strategy are to identify as application intangible, technology maturity and ecosystem structure. The same architecture will enable the close cooperation among different companies crossing industries boundaries. Nowadays, the innovation could be hardly to achieve within single company's boundary. More and more companies are encouraged to take effect in this progress. As the technology getting mature, technology is not the only critical factor to develop new product, in that situation, some integration works will achieve more success.

Different types of companies demonstrate ecosystem structure as more species the ecosystem has, the more creative innovation the ecosystem will achieve. The ecosystem structure will has huge impact on frequency and efficiency of cooperation inside ecosystem.

Architecture strategy moving in industry life cycle

Fig.6 illustrates some common feature among three different levels of companies in their own ecosystem. If we place these companies on the industry life cycle curve with two dimensions of industry maturity and ecosystem standardization, we could see these companies moving the strategy all the time.

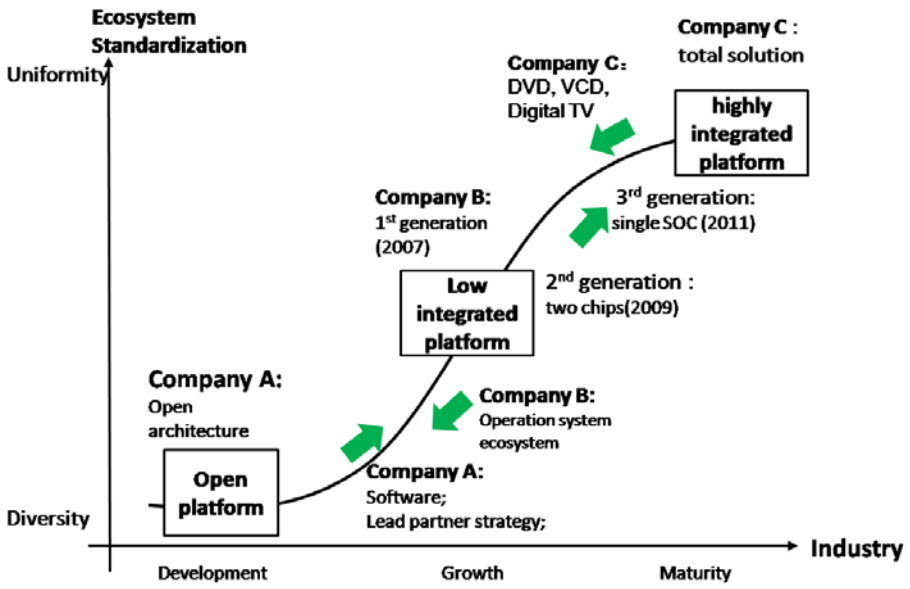

Fig.6 Architecture strategy moving in industry life cycle

In development stage, Company A lead the license business model to share the bottom-level technology like the Company B's operation system ecosystem. However company B's processor strategy was rather close comparing with its software side and it would continue to integrate as the industry become mature in the growth stage. Company C is only to develop the total solution with low cost and find the niche market despite the maturity degree of industry. The company even developed the total solution when the DVD industry was emerging around 2000. (Report of Company C 2009)

Conclusion

In the natural ecosystem, there is architecture-like stuff moving from one species to another one from vegetation. The moving stuff enables the interaction among communities and help the population inside communities co-evolve all the time. The similar things happened in business ecosystem which had been already accepted by industrial people as they got huge benefit from business ecosystem. See from this phenomenon, all the partners inside ecosystem will help the architecture provider to achieve new product development. The architecture is moving from one company to other company and just acts as the relationship identity and enabling force. With the help of architecture strategy, individual creative innovation could be brought together in order to achieve what is not able to do by single company in different choices and different ways. When considering strategy of architecture, companies mostly regard application intangible, technology maturity and ecosystem structure as the most important decisive factors.

In the future, some key issues would be paid special attention to : How do companies nurture ecosystem besides the key factors of architecture? ; What kind of capability does ecosystem have?

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