Analysis of Respective Key Enablers in B2B e-Marketplaces

Ryo Sato 1, Ayako Kawai 2, and Yasuto Fukunaga 3

1 Yokohama National University, 79-4 Tokiwadai, Hodogaya-ku, Yokohama, Japan
2 Takachiho University, 19-1 Ohmiya 2-chome, Suginami-ku, Tokyo, Japan
3 MRI, 2-10-3 Nagatacho, Chiyoda-ku, Tokyo, Japan

Abstract: E-marketplaces had brought innovative impact in supply chain in industries. This paper focused on two successful business-to-business (B2B) e-marketplaces in Japan, and has analysed and characterized to show their respective key enablers. We have found that a B2B e-marketplace needs to be a platform for customers so that it becomes a fundamental part of customers’ business processes. Further, we developed a methodology, called soft innovation architecture (soft IA), for formulation of service innovation strategy. This builds a concrete representation of strategy of each e-marketplace. In soft IA, we represent a birds-eye view to analyse the strategy, and then conclude their strategic superiority from the resource-based view. In the future, we will expand soft IA to investigate dynamic capability of the e-marketplace in order to clarify the nature of appropriate change of their strategies.

Key Words: B2B e-marketplace, food industry, mold manufacturers, service innovation strategy, innovation architecture.

1. Introduction

The contribution of this paper is twofold. First, two e-marketplaces in Japan are analyzed and characterized to show their respective key enablers. We employ resource-based view for the evaluation of the elements in respective service architectures of the two firms. It will be turned out that a business-to-business (here after the B2B) e-marketplace needs to be a platform for customers and that each e-marketplace has distinctive character.

Second, we provide a methodology for service innovation strategy formulation in the analysis. It is called the soft innovation architecture (here after the soft IA), to build a concrete representation of strategy for service innovation so that people in both business and university education can formulate and maintain their innovation strategies.

Japan is in post-industrial society, and its average economic growth rate is almost less than 1% in recent 15 years[2]. So, Japanese government is promoting service innovation for future economic growth[19].

The first e-marketplace had appeared in Japan in 1999, and then, around 100 e-marketplaces began their operation in 2000 [6],[7]. They seemed to bring drastic change in supply chain, because they might substitute distributors and wholesalers. However, up to now it did not happen. Though once the number had grown to 300 sites, most of them were disappeared, and only a few e-marketplaces are operating now. Survivors are certainly changed the whole supply chain at their business domains.

In this paper we analyze the key enablers of such successful e-marketplaces as examples of service innovation. Since each service has respective characteristics, and many of them are closely connected to the unique environment of their field, it is too difficult to analyze from the general viewpoint. More importantly, we consider that it is more interesting to characterize each service innovation. A methodology proposed in this paper provides concrete and sound description of respective characteristics of each service innovation.

Though most CEOs and researchers pointed out the importance of innovation in business, no research has provided a descriptive methodology for innovation strategy[18]. Therefore, Tschirky and Sauber had used the innovation architecture (here after the IA) to represent and formulate the complexity, inter-action of issues, and evolutionary nature of innovation strategy. They applied it in real firms’ cases with respect to innovation strategy formulation.

Each of the firms was trying to set innovation strategy according to the proposed action process[19] (It is called action research method).

Innovation architecture and related concepts are mainly meant for tangible products. So, Sato and Fukunaga[16] changed it so that innovation of service and infrastructure of service delivery systems can be directly focused on it. Furthermore, since service is intangible and is sometimes referred to the purpose of business process, the soft systems methodology (here after the SSM)[3],[4] was incorporated into the problem formulation process with the changed architecture. It was named as SSM-IA in this paper.

Any business systems have their unique environment such as several stakeholders, their respective values and purposes and standard business processes. To realize some of the values and purposes, the standard processes should be applied. By employing SSM’s approach, they can be explicitly defined at the early phase of service development. Though SSM-IA visualizes service architectures and its contextual information of service innovation strategy with some elements, we needed...
In this paper, we employ the resource-based view to focus on the firm’s resource that depends on distinctive and historical path. By introducing Value-Rarity-Inimitability-Organization (hear after the VRIO) framework of the resource-based view, we can characterize the service architecture to understand how the combination of resources brings competitive advantage and sustainability.

The rest of this paper is organized as follows. In section 2, we provide the framework of soft IA. In section 3, we analyze “FOODS InfoMart”, which is a successful e-marketplace for food industry in Japan. In section 4, we analyze a B2B e-marketplace for small and medium-sized manufacturers with NC machine tools, the “NC Network”. In both sections we show how the soft IA is applied in the analysis. Though soft IA is never restricted to e-marketplaces, we will show those two cases so that soft IA is capable of analyzing service innovation in different forms with appropriate detail even in similar services. Finally in section 5 we provide conclusions and future perspectives.

2. Methodology for Service Innovation Strategy Formulation: soft IA

2.1 Overview of the soft IA

Figure 1 shows the stages of soft IA. We explain soft IA briefly in this section. The products of soft IA will be explained and shown in the analysis in sections 3 and 4.

The soft IA can be used also to analyze the past service innovation of a company. The stages 1 through 5 in Figure 1 are adopted from SSM to show the purpose of the past new service, related business environment, and business process outline. Each of stage 6 and 7 shows the structure of the past new service as an innovation strategy.

Now, we explain each stage. Assume that you will analyze a company’s business with its service, and the service was innovative when it came out. In stage 1, we start with identifying the stakeholders in the business, and then, draw their understanding of business environment. Since the stakeholders have distinctive views and values, the resultant picture is usually complex, which is called a rich picture.

Then, in stage 2, we try to make a clear statement of the relevant basic structures of the business from the view points of the respective stakeholders. Typical output of stage 2 is “the business is a mechanism to do something by doing or using something”. A statement is described by verbal language. Even a stakeholder could produce many statements about what the business is.

In stage 3, by selecting and integrating a few of the basic statements, we decide and write down the basic definition of the business, for which an activity model will be made in stage 4.

In stage 5, a thorough comparison between the activity model and existing activities in the business is carried out in order to extract some components in the innovation architecture.

In stage 6, based on the analysis in stages 1 through 3, a first cut innovation architecture is formulated.

In stage 7, the innovation architecture is completed with complementary use of the comparison result from stage 5. In stage 6 and 7, we employ seemingly suitable theory of strategy such as resource based view by Barney[1].

In general, a service process consists of three functions, the front process function, back-office process function and support process function[5],[8]. The support process function is the process that provides service. A service process requires an integration of three functions. According to Sato and Fukunaga[16], a service architecture is an innovation strategy, which consists of “innovation target”, “customers/market needs”, “services”, “functions”, “service infrastructure/ organization”, and “technology and applied knowledge”. The “innovation target” layer of service architecture represents primary purpose of service innovation. It should be stated as a usual sentence in order to set the purpose concretely. “Customers/market need” is requirement of customers of the service. The “service” represents the front process of service. “Function” defines a set of back-office process for the front process. “Service infrastructure/organization” defines how the service will be provided or delivered. “Technology and applied knowledge” is personal and corporate knowledge on product and process, which is explicit or implicit. Its basis is in natural, social, or engineering issues. Depending on the service, the service infrastructure can be analyzed with technology. “Scientific knowledge” is basis of technology. If a firm does not pursue scientific knowledge in developing innovation, it can be omitted in the analysis.

The analysis with soft IA is not straight forward, but rather repetitive so that the resultant methodological products are consistent and meaningful for innovation strategy formulation of past successful businesses.

A service process is related to the components of the resultant service architecture. In order to evaluate the innovation architecture as a strategy, we need to clarify what is a strategy. Sato and Fukunaga[16] define it as an assembly of a firm’s goal and strategic path for the company direction, after surveying numerous number of papers. Barney[1] defines a strategy as a firm’s theory of how to achieve high level performance, also reviewing numerous papers. We define a strategy combining these definitions, that it is a firm’s theory to achieve high level performance, which includes the firm’s goal and strategic path. So, service architecture is a strategy in our definition.

Though the original innovation architecture is a methodology for actual processes of innovation strategy formulation. However, we apply it to formulate past innovation, especially service innovation, to gain insight of service innovation as well as to train people in innovation strategy formulation. By applying SSM-IA, which is the former version of soft IA, to historical development of serval innovative services, some important and respective issues had been investigated. Kamagata[13] investigated the steel industry in Japan. Iwasaki et.al[9] analysed a new railway company in relation to retail and restaurant shops inside railway stations. Suzuki[20] had applied SSM-IA to sea container industry in Japan and Sato[17] did to the history of sea container. Noguchi et.al[15] applied it to e-government of Japan. Kawai et.al[10] had revealed the key enabler of an e-marketplace as of 2008 for food industry in Japan. Since evaluation of a new service cannot use data because of its newness, and since failed innovations do not give us sufficient data, a data-centric approach is mostly not suitable.
2.2 VRIO Check Sheet in soft IA

The resource-based view of a firm provides an evaluation framework for strategy. It called VRIO[1], which indicates value, rarity, inimitability and organization. In this paper we use this VRIO as a check-sheet of innovation strategy. In order to evaluate a strategy, you can ask the following questions:

1. The question of value: Does the service resources enable the firm to respond to environmental threat and opportunities?
2. The question of rarity: Do only small number of firms use and plan to use service resources?
3. The question of inimitability: Is it easy for other firms to have the service resources with respect to technology or cost?
4. The question of organization: Are the firm’s policies and procedures organized to support value, rarity, and inimitability of service resource? Are they effectively organized to adjust the above three issues?

Since resources in common can be divided into 4 categories [1], the questions are asked to respective capitals. They are financial, physical, human, and organizational capitals. Therefore, this research proposes the VRIO check-sheet in Table 1. After analyzing service innovation strategy and then formulated as service architecture, we evaluate the architecture in respective sections in the sheet.

3. First Case: FOODS Info Mart? B2B e-Marketplace for Food Industry

FOODS InfoMart (here after the FIM) is a platform of an electronic commerce for food industry providing electronic commerce service to retailers, food manufacturers, food wholesale companies, restaurants, and shops in food business in Japan. InfoMart Corporation operates the FIM. The service was introduced in February, 1998. FIM is supported by 200 employees and made 3 billion JPY annual earns in 2010. More than 0.5 trillion JPY business transactions are operated through FIM. The member companies of FIM have steadily grown, and InfoMart Corporation became public company in 2006 and listed on the Tokyo Stock Exchange’s Mothers section. Kawai et.al[10] showed that the characteristics of FIM in 2008. In order to formulate and evaluate the development of strategy of FIM, we investigated FIM in 2001 at the early stage of the service and FIM in 2008. In order to focus on the key issues, we show stages 1, 2, 3 and 7 of the soft IA.

3.1 Stage 1 and 2: getting the picture of problem situation

Figure 2 is a rich picture that depicts stakeholders and their concerns and values surround FIM in 2001. This analysis mainly uses the information delivered in their presentation for sales promotion by InfoMart Corporation. We observe that there are numerous demands and goals to be pursued.

Fig. 1 The low probability and high impact event in the Chinese economy.

*FOODS InforMart, "FOODS InfoMart: A B2B site for electronic commerce," presentation delivered in ECOM Japan, 2001
### Table 1 VRIO-based evaluation for service innovation strategy

|   | A (financial capital) | B (physical capital) | C (human capital) | D (organizational capital) |
|---|-----------------------|----------------------|-------------------|----------------------------|
| 1. | Value                 |                      |                   |                            |
|   | Does the service resources enable the firm to respond to environmental threat and opportunities? | Financial feasibility and execution possibility | To acquire new resource. To rebuild or reform present product or service. | Organizational culture to take risk for innovation. Too much focus on the past success? |
|   |                       |                      |                   |                            |
| 2. | Rarity                |                      |                   |                            |
|   | Do only small number of firms use and plan to use service resources? | Financial feasibility and execution possibility | Rare business process and service. Rare location. Comparison with competitors. | Enough number of people to maintain rarity of service. |
|   |                       |                      |                   |                            |
| 3. | Immutability          |                      |                   |                            |
|   | Is it easy for other firms to have the service resources with respect to technology or cost? | Financial feasibility and execution possibility | To consider the possibility of direct duplication and substitution. | Invisible asset. Innovation rate in product line-up. |
|   |                       |                      |                   |                            |
| 4. | Organization          |                      |                   |                            |
|   | Are the firm’s policies and procedures organized to support value, rarity and inimitability? Are they effectively organized to adjust the above three issues? | Financial feasibility and execution possibility | Production process can be source of competitiveness. | Optimal combination and management of value, rarity and inimitability of innovative service. |

### 3.2 Stage 3: Basic definition of the business

In order to start new business in food industry, the FIM was requested to set an appropriate business goal. Since there are many possible goals, one should be selected as the basic definition of FIM.

FIM is a mechanism that incurs more active business transactions and information both by providing standardized business process of routine business transactions of companies in the food industry in Japan, and by providing services in its site to buyers and sellers in the food industry so that they can develop more efficient business process in a strategic way. FIM is owned by Info Mart Corporation.

The basic definition above is meaningful from the following Weltanschauung (i.e., the view of the world).

Weltanschauung:

The more buyers FIM can attract, the more sellers FIM will have. If FIM have many sellers, then the buyers can purchase from a wide variety of food with lower price. Furthermore, FIM can open new sales and purchase routes conveniently, and more frequent trading through FIM will strengthen business relation. Thus, FIM will facilitate the business process of food industry. Especially for small and medium-sized companies, FIM allows to use information systems at a very cheap price for its membership. It is helpful for the companies because the companies do not have to have their own information systems that require technological expertise and/or investment. FIM could work as a de facto standard of business process that reduces or eliminates miscellaneous tasks such as checking purchase orders in forms from various customer companies and calculating sales records for aggregation.

### 3.3 Key Enablers of FIM

Figure 3 shows the service architecture of FIM as of 2001. By using soft IA, we describe following elements for a formulation of innovation strategy. The architecture is comprehensive, and shows the purpose of the founders of FIM, the external business environment of FIM that is specific and individual, and the internal elements of an innovation strategy. Since the users of FIM are companies, an example of typical business transaction on FIM is: “Processed Japanese radish with 60 centimeters in diameter and 2.5 centimeters thick, no discolored, no cavity. We require 80,000 pieces in a month.” The FIM in 2001 has the Food Catalog system that allows sellers to register their food by filling in required fields. Buyers can request sample items through the system. Buyers can also register the food they want in the Procurement Catalog system. Sellers can send quotations for the wanted food through the system. If both agreed on food and related conditions, then a buyer places an order and a seller gets it as a purchase order.

In the food industry in Japan, the buyers and sellers used own information systems, however the order processing through FIM was not integrated or standardized until year 2001. Those orders that matched through FIM were issued by fax machines, telephones, e-mail, or respective EDI (electronic data interchange) systems.

Though the users of FIM can use their existing information systems in placing and accepting orders, drastic work saving could not be attained by the then FIM. That is, for instance, when an order was accepted via FIM, the seller should check it and enter the data into the information system for further processing such as packaging, shipping, and billing. Also, the seller calculated aggregation sales for many buyers for
their own accounting purpose at the end of the each month. From February 2003, FIM operates ASP (application service provider) Order Processing System with which buyers and sellers directly place orders and just download them, respectively. Also accounting data and items movement record will be supplied from FIM monthly. That is ASP Order Processing System have provided standardized processing with elimination or drastic reduction of the works that are related to order processing for both buyers and sellers in food industry. The order processing function in 2001 was only partial implementation from the whole image of the ASP system. The Catalog systems is now in an ASP system so that the users use it via Internet and data are stored in the system for later use for respective users. The strategic elements of FIM in 2008 are depicted in Figure 4.

3.4 Development of Service Architecture of FOODS Info-Mart

Figure 3 shows the service architecture of FIM in 2001 and Figure 4 in 2008. The characteristics of FIM’s innovation strategy are examined in Table 2. It is shown that the service of FIM is valuable and inimitable and that the human and organizational capitals are difficult to imitate. However, the rarity of ASP is not sustainable because such an information system itself is not difficult to reproduce. Figures 3, 4 and Table 2 are output of soft IA. We can point out the service innovation strategy of FIM as follows.

(1) The service of FIM as of 2008 is comprehensive with respect to the routine work for buyers and sellers. The service architecture of FIM depicts it with other strategic elements. A buyer’s typical process consists of retrieval of food, request for sample and quotation, comparison of quotations, issuing purchase orders, receiving food, checking invoices from sellers, and settlement. The ASP Order Processing System and ASP Matching System of FIM covers those routine processes. If an e-marketplace required miscellaneous usual tasks for daily operation, then it would not be very attractive for users, even if it would open new chances for matching. Though FIM did not cover all of the routine tasks in 2001, headquarters of some franchises of family restaurants have adopted FIM and then the franchisees and suppliers for the franchise could have used FIM’s functions of order processing.

(2) The service of FIM, depicted in the Figure 3, deserved to be an infrastructure of food industry in the following sense. Business transactions use many business documents that are required in the routine tasks. It is much different from business-to-customer transactions. For a buyer with around five employees, the annual sales amount to a few hundred million JPY and the number of transactions is a few thousands. Every transaction uses a business slip that requires to check the names and pieces of ordered foods and to be used in the later operations such as inven-
Those characteristics above are pointed out by the product of soft IA methodology. It was difficult to show such characteristics if we applied a statistical method that mainly focus on mean values of characteristics.

4. Analysis of NC Network’s Service Innovation Strategy with soft IA

The NC network Co., Ltd. is an e-marketplace company in Japan. Through its Internet site, NC Network (hereafter the NCN), its business is mainly to support major manufacturers with developing and procurement of new machine processing, and to support small and medium-sized manufacturers and oth-

(3) Info Mart communicates frequently with the users through the call centers and in off-line meetings so that necessary change of FIM can be designed and implemented by the employees of Info Mart. This is one way of CRM (customer relationship management) and part of the management activity of Info Mart.
ers with doing sales and marketing activities. NCN was opened in 1998 [13] and they had only 9 first member companies at the beginning. In 1999, the Japan Broadcasting Corporation (NHK, in Japanese) broadcasted creative activities of the NCN, and it helped NCN to increase the member companies. The number of members exceeded 5,000 in August 2000, and reached 16,351 in 2009 so that the amount of business trade via NCN reach 100 billion JPY. NCN is awarded the Nikkei Internet Award same year.

NCN’s sales consist of the membership fee and the sales of its machinery division. The community of the member factories of NCN forms a virtual factory. Based on the virtual factory, the machining division of NCN accepts orders from major manufacturers of final products, makes the specification of the order clear, proposes improvement of functions and/or cost if any, manufactures and makes shipment. The orders are of wide range, such as sheet metal processing, mold building, plating, and so on. Since the member manufactures have their own specific manufacturing capacities and expertise, and since NCN employs machinery experts, the machining division can provide any kind of machines by combining them. NCN also assures the quality of the manufacturing for an order.

4.1 Stages 1 and 2: Business Situation and S Stakeholders
NCN as of 2001 is shown as a rich picture with its stakeholders and their concerns and values in Figure 5. This analysis uses the information delivered in their presentation*. It’s service via the Internet in a tough environment, somehow could get many member SMEs with respective manufacturing expertise, started the machining division with member manufacturers, and then, is trying to expand its service to Japanese manufacturers in Asia now.

The following Weltanschauung (view of the world) was valuable for the NC Network in late 1990s.

Weltanschauung:

The advantage of the manufacturing industry in Japanese is in the fact that there are many small and medium-sized manufacturers with capable craftsmen and workers most of whom use computer-controlled NC machines. Based on human and local bond, those manufacturers were loosely united. The president of NC Network, Mr. Yasuo Uchihara, Uchihara, wanted to stimulate Japanese manufacturing industry, especially small and medium-sized factories of mold and other machining in the industry. By using the Internet, NCN had built a community site where small and medium-sized factories have their presence so that they can provide information of themselves and can be stimulated. In this sense, NCN will activate information sharing among SMEs. If the community is strong enough, then the technical knowledge and know-how will be represented and shared beyond generations. Advanced technological knowledge of skilled workers will receive recognition and will be leveraged by other workers. It leads for workers to take pride, to challenge to new technology, to motivate them, and to strengthen the sense of unity. Thus, NCN will be a convenient and indispensable medium through which major manufacturers for final products will use to place orders for machine processing to factories within Japan, instead of overseas factories. From the SMEs point of view, the existence of major manufacturers as ordering parties behind the NCN will make the community more

|   | A financial capital | B physical capital | C human capital | D organizational capital |
|---|-------------------|-------------------|----------------|------------------------|
| 1. Value | Yes: FIM went public at TSE-mothers in 2006. | Yes: The service of FIM covers all necessary daily transactions. | Yes: It is operating also in China. |
| 2. Rarity | Yes: FIM is the only eMP that covers all of daily transactions. | Yes: The division of customer development has accumulated experience in introducing FIM to new wholesalers. |
| 3. Imitability | No: Order processing ASP system itself is a software so that other firms could directly imitate. | Yes: The customer support division has a good communication with customer. |
| 4. Organization | | Yes: The change of the systems is rapidly made. |

* NC network Co., Ltd., “The IT strategy of Lively Manufacturers in Japan,” presentation delivered at in ECOM Japan, 2001

Table 2 Service Architecture of FIM as of 2008

|   | A financial capital | B physical capital | C human capital | D organizational capital |
|---|-------------------|-------------------|----------------|------------------------|
| 1. Value | Yes: FIM went public at TSE-mothers in 2006. | Yes: The service of FIM covers all necessary daily transactions. | Yes: It is operating also in China. |
| 2. Rarity | Yes: FIM is the only eMP that covers all of daily transactions. | Yes: The division of customer development has accumulated experience in introducing FIM to new wholesalers. |
| 3. Imitability | No: Order processing ASP system itself is a software so that other firms could directly imitate. | Yes: The customer support division has a good communication with customer. |
| 4. Organization | | Yes: The change of the systems is rapidly made. |
In accordance with the above view of the world in Japanese industry of manufacturers, we define the NCN’s primary purpose as follows. This is used as the innovation goal of the innovation architecture for NCN.

The Basic Definition of the Business:

The NC Network (NCN), owned and operated by NC network Co., Ltd., firstly, is a virtual factory that works as a community for people who have jobs in Japanese manufactures of molds and other machines and who work in the industry. The people can share technical knowledge on manufacturing and materials via NCN even if they are not affiliate subsidiaries or in regional relationship. Secondly, the machining division of NCN accepts and completes various orders such as special production or prototypes from major manufactures by coordinating member factories of the virtual factory with their specific and/or remarkable expertise.

4.3 Development of Service Architecture of NC Network

The service architecture of NCN as of 2000 is shown in Figure 7. The architecture together with the analysis so far reveals the key enabler of NCN. With the strong will of the founder-president of NC Network to activate the Japanese manufacturing SMEs more, NCN became a community for craftsmen and people in manufacturing industry, and the bulletin board system, the forest of technology, is effectively and actively maintained my member companies. The “forest of technology” contains high quality knowledge and insightful information, and users can post questions to the system to get answers. From time to time an answer brings detailed explanation so that youngsters in the industry can understand. The body of knowledge in the system is developing. Furthermore, based on the list of member factories with appraisal of them, the NCN can coordinate new orders from manufacturers of final products. In that sense, NCN operated a virtual factory, and the machining division earns more than the half of the corporate revenue. We notice that the division was possible because NCN has the member factories, and that those factories have been attracted by the NCN’s community. Currently in 2012, appraisal of each member factories is provided to the factories themselves in order to control indirectly the quality of factories themselves. Figure 8 shows the service architecture of NCN as of 2011. It is currently operating NC Network in Vietnam to support Japanese SMEs to install business in Vietnam in addition to offering business information as usual. In comparison to the NCN as of 2000, the machining division earns more and NCN is expanding its service.

The service architecture of NCN is not only useful to explicitly represent the innovation strategy but also effectively used to maintain and update the innovation strategy. IA has been primarily intended to be used in such a way, and actually is used in several firms[20]. In the case of NCN, Figure 8 represents development of innovation strategy from Figure 7. It is intended for IA to formulate new innovation strategy after active and organization-wide workshops, when a firm tries to set new direction or add other services in current business situation. By comparing Figures 7 and 8, and by characterizing them with the VIRO framework, we get Table 3. The community function of NC Network is a key of its strategy, and it has strong superiority with respect to imitation.
Business situation of Japanese manufacturers with NC machine tools in 1990s:
Business relationship was based on locality or affiliation.

Low cost and high quality in mold manufacturing in Korea, Taiwan, and China

The competitive edge of Japanese manufacturers was disappearing.
Measure for activation on the industry was called for. In 1998, NCN was established.

The members of NCN are attracted and increased.
Major manufacturers joined NCN as ordering parties.
A television program of NHK was broadcasted.

The community on NCN had grown.
Many kinds of S&M-sized manufacturers joined NCN.
The machining division of NCN started.

Japanese manufacturers started operation in China.
The NCN in China started.

Japanese manufacturers started operation in Vietnam.
The NCN in Vietnam started.

Fig. 6 Historical Development of NC Network

Fig. 7 Service Architecture of NCN as of 2000

4.4 Key Enabler of NC Network
According to the analysis so far, we can point out key enabler of NCNs.

Key Enabler of NCN as of 2000:
(1) NCN works as a grown community for craftsmen and experts in SMEs with computer controlled (NC: numerical
control) machines in Japan. NCN’s “forest of technology” bulletin board system allows those people to recognize their knowledge each other and to ask questions and answer to them anonymously so that the system is growing as a database of such knowledge. The NCN’s community was possible because the founder-president of the NC Network, Mr. Yasuo Uchida, has been very enthusiastic to activate the industry in Japan[15].

(2) SMEs of mould and others become members of the NCN’s community database by specifying one of the three types of membership one of whose fee is free. A member company can ask its homepage to build up and maintain at

---

**Table 3 Strategic Characterization of NC Network**

|   | A financial capital | B physical capital | C human capital | D organizational capital |
|---|-------------------|------------------|----------------|------------------------|
| 1. Value | Yes: NC network works as a directory of SME factories so that the manufacturing division is possible. | No: The orders from major manufacturers are not many. | Yes: Orders for die and mold manufacturing is not simple transaction like purchasing. So, NC network requires employees challenge spirit. | Yes: The founder, Mr. Yasuo Uchida, has been enthusiastic to activate the manufacturing industry in Japan. |
| 2. Rarity | Yes: The database of member factories and the community with NC network members is rare and valuable. Yes: NC network provided the evaluation method for member factories. It works as a mean of quality control. | Yes: The forum for manufacturing intelligence on NC network attracted craftsmen and new comers. | Yes: The database of member companies grew amount enough from the beginning of the early stage of the history of NCN. |
| 3. Imitability | Yes: At the early stage of NC network, NHK broadcasted NC network and new members increased rapidly. | Yes: The forum for manufacturing intelligence on NC network | | |
| 4. Organizaion | | | Yes: NC network programs its own site, so that necessary change and maintenance can be executed without delay. | Yes: Some employees of NC network have experience in SME factories, and then, they can examine orders from major manufacturers. |
appropriate price, and can apply to the orders from major manufacturers and others that is shown in a bulletin board system that shows orders for machine processing and related processing.

(3) The machining division of NCN accepts orders from major manufacturers, chose an appropriate member factory. The chosen factory will communicate to the major manufacturer with the order, and do machine processing and shipment. This operation of the machining division is possible because the database of member companies grew big enough at the early stage of the history of NCN.

(4) NCN is programmed by the experts in the NC network corporation so that necessary change and maintenance can be executed without delay.

(5) At the early stage of the NCN, a TV program of the Japan Broadcasting Corporation (NHK, in Japanese) was broadcasted and it helped NCN to increase the members.

**Key Enabler of NCN as of now:**

NCN has added the following characteristics, (6) and (7).

(6) The NC network has developed an evaluation method of factories. The evaluation is done by NC network and the result is opened to the evaluated factory. The evaluation form consists of mission of the factory, cost, quality, service level of deadlines, and so on. The communication via the evaluation form works as quality control of the performance of factories.

(7) In response to the structural development of manufacturing business in Japan, NCN is expanding its service to support Japanese SMEs to operate in Asia by providing web pages in both Chinese and Vietnamese.

By comparing the service of NCN as of 2000 and now, we can point out the following. In 2000, NCN mainly operated as a kind of community site for information exchange among member companies and for showing procurement information from major manufactures. In that sense, NCN was engaging in the industry. NCN as of now is more straightforward. The machining division has expanded to accept orders from major manufactures much more than those in 2000, and the NC machine manufacturers has accumulated technical and control-by-evaluation knowledge for factories so that NCN has augmented the service mainly for Japanese manufacturers to start overseas operation.

5. Conclusion

We have applied soft IA to formulate B2B e-marketplaces’ innovation strategies and their development. In the analysis of this research, each service innovation strategy of two e-marketplaces’ concrete and distinctive services has been structured. We have clarified that FIM and NCN as respective industries’ infrastructures that facilitate business processes. Also, service architectures of different years will be helpful to understand the development strategy, and to see how service architecture can be maintained. Furthermore, those service architectures were assessed with VRIO check sheet. It was shown that they have differently their value and rarity in their business environment, inimitability as competitive sustainability, and appropriate organization. Their strength and weakness were assessed so that further development can be planned. As like the original idea of innovation architecture[18], we will be able to not only formulate service innovation strategy but maintain a service architecture. By using soft IA, service innovation strategies of two e-marketplaces are formulated with clear representation of service architecture. Each of the architecture represents the characteristics of the service innovation strategy so that the strength and weakness can be evaluated. The service architecture can be also used to provide the basis of the road map of innovation of product and service and technology of a company as like usual innovation architecture[18].

**Acknowledgments**

The authors are grateful to the executive director, Mr. Masaharu Metabi, and chief of the management planning section as of 2006, Ms. Sachiko Sakurai, of Info Mart Corporation, for their cooperation to our interviewing and support. The second author was communicating with the then vice president of the NC network corporation, Mr. Teruo Yasui, who is now the president of the Emidas Global Corporation, for more than 10 years. The authors are grateful to Mr. Yasui for his help and support in this research. Finally, this research is partly supported by Grant-in-add (21530350 and 23330125) from JSPS.

**References**

[1] Barney, Jay. 2010. Competitive Advantage; 4th International edition, FT Press.
[2] Cabinet Office of Government of Japan. 2012. “Annual Growth rate of Japanese GDP during 1994-2011”, http://www.esri.cao.go.jp/jp/sna/menu.html (date of access 2012/07/02)
[3] Checkland, Peter. 1981. Systems thinking, systems practice, John Wiley & Sons.
[4] Checkland, P. and Scholes, J. 1990. Soft systems methodology in action, Wiley.
[5] Harvey, Jean. 2005. Managing Service Delivery Processes: Linking Strategies to Operations, Amer Society for Quality.
[6] ECOM. 2003. ECOM (Electronic Commerce Promotion Center of the Japan Information Processing Development Corporation) Survey Report on Development and Openess of B2B Electronic Commerce ? E-marketplace cases. (in Japanese)
[7] ECOM. 2002. ECOM Working Group of E-Marketplace of the Japan Information Processing Development Corporation, Survey Report of E-Marketplace Working Group ? Trends and Perspectives for Japan’s E-marketplaces. (in Japanese)
[8] Fitzsimmons, J. and M. Fitzsimmons. 2008. Service Management: Operations, Strategy, Information Technology, 6th Edition, McGraw-Hill Irwin.
[9] Iwasaki, K., Shinozuka, A., Simooka, O. Chiba, A., and Terao, A., 2007. The Concept of Innovation Architecture to Service and its Application to Tsukuba Express, City Planning, and Public Administration, Master thesis, University of Tsukuba. (in Japanese)
[10] Kawai, A., Fukunaga, Y., and Sato, R., 2010. On the Key Enabler for an e-Marketplace Firm of B2B Food Industry, Journal of Japan Society of Management Information, 19(1), pp.51-68. (in Japanese)
[11] Kamagata, T. 2006. Analysis of Steel e-Marketplace through Soft Systems Methodology, Master thesis, University of Tsukuba. (in Japanese)
[12] Marc Levinson. 2006. The Box, Princeton University Press. (Japanese translation from Nikkei BP, 2007)
[13] NC network, 2012. http://www.nc-network.com

Innovation and Supply Chain Management, Vol. 7, No. 4, December 2013 135
[14] Yasuo Uchihara, 2009. Presidents in Japan - NC network corporation, Nikkei BP, http://nvc.nikkeibp.co.jp/report/company/shacho/20090707_001704.html. (in Japanese)

[15] Noguchi, A., Masuda, A., Murakami, M., Sakata, T., Sato, Y., Tatsuki, N., Yo, Z., 2010. The service innovation in electronic government and the information infrastructure, Master thesis, University of Tsukuba. (in Japanese)

[16] Sato, R. and Fukunaga, Y., 2008. Managing Innovation for Service through System Concept, Systems Research and Behavioural Science, 25, pp.627-635.

[17] Sato,R. 2010. On the Mode of Service System, Proceedings of the 7th International Conference on Service Systems and Service Management, pp367-370.

[18] Sauber, T. and Tschirky, H., 2006. Structured Creativity: Formulating an Innovation Strategy, Palgrave Macmillan.

[19] Service Industry Innovation Committee, 2009. Service Innovation, Seisansei Shuppan. (in Japanese)

[20] Suzuki, Mitsuo, et al. 2008. Analysis of transportation service of port and its related facilities through innovation architecture, Master thesis, University of Tsukuba. (in Japanese)

Ryo Sato

is Professor of Yokohama National University, Japan. He received his Ph.D. in Systems Science from Tokyo Institute of Technology. He acts as a member of the executive board of the Japan Society for Management Information. His research interests include business process engineering, corporate and service innovation strategy, management system, enterprise information system.

Ayako Kawai

is Assistant Professor of Takachiho University, Japan. She received her Ph.D. degree in engineering from University of Tsukuba. Her research interests include supply chain management, strategic master data management, service development.

Yasuto Fukunaga

is a Research Director of Mitsubishi Research Institute, Inc. He received his master degree in mathematics from Ehime University. He was engaged in the “Survey on the Current Status and Market Size of Electronic Commerce ” of Ministry of Economy, Trade and Industry (METI) from FY2000 to FY2005 in ECOM.