

Business System on B-to-B Website in Japanese Manufacturing Industry

A Case Study of NC Network

Takuya Miyamoto *

Faculty of Commerce, Kurume University, Kurume, Japan

* miyamoto0808@gmail.com

Abstract

Many electronic B-to-B markets were established in Japan at the end of the 1990s. However, most of them have already closed except the NC Network. This paper focuses on the business system of NC Network, the most successful electronic B-to-B market, with more than 13,000 registered companies.

NC Network provides a search engine based on production technology (not on a price auction), a bulletin board fostering reciprocity, and an infrastructure highlighting unique production technologies that supports adequate competition and reduces opportunistic behaviour. These services are highly related to the economic and social institutions for registered companies in this electronic market.

This study demonstrates why a successful electronic market should contain appropriate economic and social institutions by adopting case study as the research methodology (Yin, 1994). This paper also describes the business system of a successful electronic market serving the Japanese manufacturing industry. Unlike unsuccessful electronic markets, NC Network's business system effectively promotes matching, facilitates knowledge exchange, and provides an appropriate infrastructure.

Keywords

Electronic B-to-B Market, Japanese Manufacturing Industry, Business System, Economic and Social Institutions

Introduction

Today both B-to-B and B-to-C electronic markets play an important role in business. In Japan, towards the end of the 1990s, many B-to-B websites, such as O-net, were founded. However, these websites gradually disappeared, except for NC Network. In sharp contrast to the failure of B-to-B websites, B-to-C websites, such as Rakuten Inc., have been successful.

The Japanese manufacturing industries involve a peculiar business system known as 'Keiretsu'¹, which means a long-term contract between a parent company and its

¹ The institutions based on Keiretsu are explained in Asanuma (1989).

suppliers—subcontractors that are small and medium-sized enterprises (SMEs). Recently, however, closed-type B-to-B transactions based on Keiretsu have had to confront change. The Keiretsu system is growing weaker, and an SME is now able to transact business freely and openly with many companies apart from its Keiretsu parent. In line with this economic tendency, B-to-B websites have emerged as tools that would promote open-type transactions.

Most B-to-B websites in Japan have already closed, leaving NC Network as the only successful one. The unsuccessful websites concentrated the market for goods, while NC Network concentrates the market for technology. However, an earlier study noted that very little is known about how these markets would function (Arora et al. 2001). Moreover the business system's operation, such as the mechanism of services and their effect on registered companies, is unclear. This paper therefore attempts to generalise a successful business system for B-to-B websites by examining the case of NC Network.

Transaction Costs and Electronic Markets

Chesbrough (2003) asserted the importance of open innovation in this knowledge economy, and Chesbrough (2006) implied that the intermediate market plays an important role in open innovation. The assertion of the importance of market activities, especially for electronic market activities, leads back to Malone et al. (1987), who predicted a transition from traditional business models to electronic markets due to the reduction in transaction costs. They also asserted that as transaction costs fall, market activities increase.

Therefore, because electronic markets provide companies with opportunities to transact business easily beyond the walls of Keiretsu, electronic markets should naturally replace Keiretsu. Companies can thereby obtain the benefits of an open market, which promotes better matching of companies.

The Keiretsu system's advantage is that a long-term relationship between a parent company and its suppliers develops trust and eliminates the need to search for new partners, which is an element of transaction cost. However, Keiretsu's disadvantage is that it promotes collusion and complacency, because a supplier cannot transact business openly with other companies in order to find a better fit. Although Keiretsu has this disadvantage, the parent company and suppliers gravitate towards its advantages and hesitate to break the system. Before the advent of the Internet, transitioning to an open market inevitably entailed a high transaction cost, as in traditional market economics. The Internet's introduction of a radical change in economic conditions promoted the collapse of Keiretsu and enabled many companies to seek a new business system that would fit optimally with the institutions of the Japanese manufacturing industries.

Lee and Clark (1996) found that electronic markets lead to a reduction in transaction costs. Because electronic markets bring companies together with low-cost searches (Wigand and Benjamin, 1995), the Japanese manufacturing companies transitioned to the full use of electronic markets, rather than Keiretsu.

However, some market mechanisms like open innovation are crucial. Earlier, the Japanese manufacturing companies conducted business under the vertical transaction system of Keiretsu, which was not consistent with open transaction mechanisms. Later, they did business with other companies based on context-dependent technical knowledge—a kind of knowledge that cannot be specified and demonstrated in the electronic market. Finally, they

conducted complex business activities based on trust and long-term relationships². Further, because the overly rigid protocol of transactions in the electronic market could not be adapted to the Japanese manufacturing industry, an infrastructure for business transactions that could ensure the element of trust would be necessary. Therefore, electronic markets had to provide these characteristic customs of transactions in the Japanese manufacturing industry.

Institutions for Electronic Markets

According to some economic theorists, the market itself cannot achieve anything without institutions. Macmillan (2002) asserted that for facilitating transactions, markets need adequate institutions and regulations, without which no one can make proper deals and gain market benefits.

In addition, Putnam (1993) noted the inherent flaws of information technology. First, people can enter and exit cyberspace so easily that many of them do not develop the reciprocal relationship that leads to trust-based trade. Second, in cyberspace, people are confronted with a flood of information, which prevents them from finding the right information efficiently. Lacking an institution that facilitates access to diverse information sources, people tend to rely on the familiarity of similar information sources; this cocoon-like phenomenon weakens the potential of electronic markets. Third, cyberspace is open to free riders³. Putnam (1993) regards the lack of reciprocal relationships in cyberspace as the most important factor. His conclusion notes the importance of social capital in electronic markets. Therefore, social institutions are needed to develop social capital.

Macmillan (2002) refers primarily to the economic aspects, while Putnam (1993) focuses on the social aspects, but both agree on the importance of institutions. Therefore, to promote e-commerce, electronic markets should be equipped with a business system that contains adequate economic and social institutions, without which the 'network effect' does not work because companies fear opportunistic behaviour and are thus reluctant to do business in these markets. Although Bakos (1991) asserted that due to increased competition in the electronic marketplace, prices would be lower, excess competition (price war) prevents potential suppliers from joining an electronic market. Further excess price wars might promote opportunistic behaviour among registered companies. Therefore, by constructing a business system containing adequate institutions, competition can be controlled.

According to Whitley (1992), a 'business system' includes effective forms of business organization and their interdependence with key institutions. In this context, the term 'institution' refers to economic and social factors, such as market mechanisms and culture. This paper calls attention to the fact that a business system for electronic markets has a huge effect on registered companies' management operations. In the B-to-B model in particular, coping with an electronic marketplace service's business system requires a registered company to adjust its strategy and management. For example, if an electronic market uses a business system that leads registered companies to compete according to the criterion of

² For example, when a customer orders a component from suppliers, the suppliers can sometimes modify the industrial design. When the suppliers understand the complete structure of their customers' products and gain their trust in their technical knowledge, they can modify the design of components to improve the customer's final product.

³ Bichler (2001) pointed out the difficulty in setting price because of the complexity of product descriptions and product attributes. Therefore, in B-to-B websites, which deal with highly complex products, opportunistic behaviour tends to occur.

price, those companies will be encouraged to cut costs to participate effectively in this particular electronic market's environment, causing a price war. On the other hand, if an electronic market's business system leads registered companies to compete according to the criterion of high technology (i.e. technological innovation), such companies have to improve their use of technology and develop creative applications; therefore, traditional assumptions about business systems are not adequate for B-to-B electronic markets.

Kagono and Inoue (2004) asserted that the key purpose of a business system is the adequate coordination of activities between organizations. Therefore, based on their discussion, B-to-B websites must coordinate their service with registered companies' activities by constructing economic and social institutions in the electronic market. In fact, the most important issue in this discussion is that the business system in an electronic market should match traditional customs and institutions in the Japanese manufacturing industry.

Analytical Framework

This study's analytical framework is based on the preceding descriptions of how electronic markets provide an opportunity for open transactions beyond the walls of Keiretsu and an electronic market's need for a business system that contains adequate economic and social institutions.

Bakos (1998) elaborated a framework that is very similar to this study's topic, asserting that electronic markets have three main functions: to match buyers with sellers; to facilitate the exchange of the information, goods, services and payments associated with transactions; and to provide an institutional infrastructure, such as a legal and regulatory framework. However, Bakos focussed only on economic and not social institutions. Therefore, Miyamoto (2010) modified the analytical framework as follows.

1. Promote Matching: an electronic market should be equipped with a user-friendly search engine.
2. Facilitate Exchange: an electronic market should facilitate the exchange of information among its registered companies.
3. Provide Infrastructure: an electronic market should have regulations to discourage free riders.

Employing this framework, this study analyses the business system of electronic markets that contain economic and social institutions.

This paper presents a case study. According to Yin (1994), the case study is the most appropriate method for describing observable phenomena (e.g. the successful business system of an electronic market).

Analysis

NC Network was founded in 1998 by Yasuo Uchihara. Prior to this, he had been the executive director of an SME, so he was very familiar with the Japanese manufacturing and with the position of SMEs in the industry. He set up an electronic market for SMEs that were then serving as subcontractors for large manufacturing companies (parent companies) under the Japanese supply chain system, Keiretsu. This electronic transaction organiser, NC Network, responded to the suppliers' initiatives. The number of companies registered with it increased steadily, and it became Japan's largest coordination website for electronic

transactions, with more than 13,000 registered companies. NC Network strongly emphasised collaboration among suppliers beyond the walls of Keiretsu. Keiretsu is a subcontract and supply chain system based on parent companies, but NC Network tried to facilitate registered companies' (SME's) open transactions and exchanges of technical knowledge with other suppliers.

Table 1 shows the specific services it provided to realize this ideal. In this electronic market, both large manufacturing companies and SMEs gain benefits. For example, using NC Network, a large automobile company was able to develop and manufacture a biped walking robot. In another case, a small company received many orders from various industries beyond the walls of its Keiretsu parent company's business sector.

NC Network launched a number of services. First, it enabled users to search for specified technologies possessed by partners in various sectors. The search engine, EMIDAS, accesses more than 13,000 registered suppliers as their partners. Users can then narrow their search from generic classifications (such as mold designing, machine manufacturing and metal casting) to more precise classifications (such as metal cast designing and industrial equipment), and eventually even to a specific trade (such as press cast designing). Users can enter specific requirements and be directed to the websites of suppliers that meet those requirements (Figure 1). The results from the search engine are presented in a sequence according to the quality of the technology and according to the member's ongoing record of previous orders via user feedback.

For example, if I search for micro-machining, more than 100 suppliers appear in the search result. However, the sequence in which these suppliers appear is based on the quality of their technology and their record of previous orders. Therefore, those registered companies with the best technologies and highest reputations will appear at the top of the search results, while those with low technologies and poor reputations will seldom attract attention of search engine users.

NC Network also launched a service called the Excellent and Unique Technology Pick Up. This service aims to boost orders for high value-added products by introducing suppliers' unique technologies to manufacturers in diverse industrial sectors, thereby enabling suppliers to make their own evaluations. For example, some suppliers describe manufacturing operations with extremely tight deadlines, while others promote their own micro-machining of aluminium materials. Then, through Excellent and Unique Technology Pick Up service, registered companies can be made aware of cutting-edge processing technology. This enables them to know more about their competitors, and to decide on their future actions. Therefore, registered companies compete with each other based on their unique technologies. For example, when a company offered a processing technology that required a few microns on Excellent and Unique Technology Pick Up service, another company tried to develop a processing technology for even smaller microns. The important aspect of these actions is that the suppliers have no intention of engaging in sales battles; they simply provide their technical information and wait for high value-added orders to arrive.

In addition, NC Network provides a service called Forest of Technology, which is a bulletin board on which any registered member can seek technical advice from suppliers from across various industries. When suppliers handle orders from various industries, they may have trouble because of the differences among the industries. For example, if a supplier dealing with mobile phones receives an order from an automobile company, it will probably

struggle to make components appropriate to the design of the automobile, which are larger than the usual components of a mobile phone. These differences across the boundaries of industries are a serious hurdle for small companies attempting to transact with diverse companies. Forest of Technology, however, enables suppliers to cope by discussing these differences. This bulletin board sometimes even leads to new transactions as a result of someone providing technical advice. For example, when a medical equipment company asked for advice about precision machines, a supplier provided information. Through this consulting, the two parties were first able to establish trust, and consequently began doing business with each other.

Table 1 NC Network Services

Service	Description
EMIDAS	This is not a mediator of components or devices, but a search engine of more than 13,000 registered suppliers as potential partners for processing classification. We can search for potential partners based on set conditions ranging from large to small classifications. Search results show the home pages of suppliers that meet the conditions we set. So we can search for not only components or devices, but also new technical partners.
Excellent and Unique Technology Pick Up	This is a service that introduces suppliers' most skilful or unique technologies accompanied by pictures and text, to attract orders. We can also search for technology by keywords.
Forest of Technology	This is the bulletin board on which every registered member can seek technical advice from several suppliers of various industries. Some queries that are answered on the bulletin board help in solving a technical problem.

From Matsushima et al. (2008)

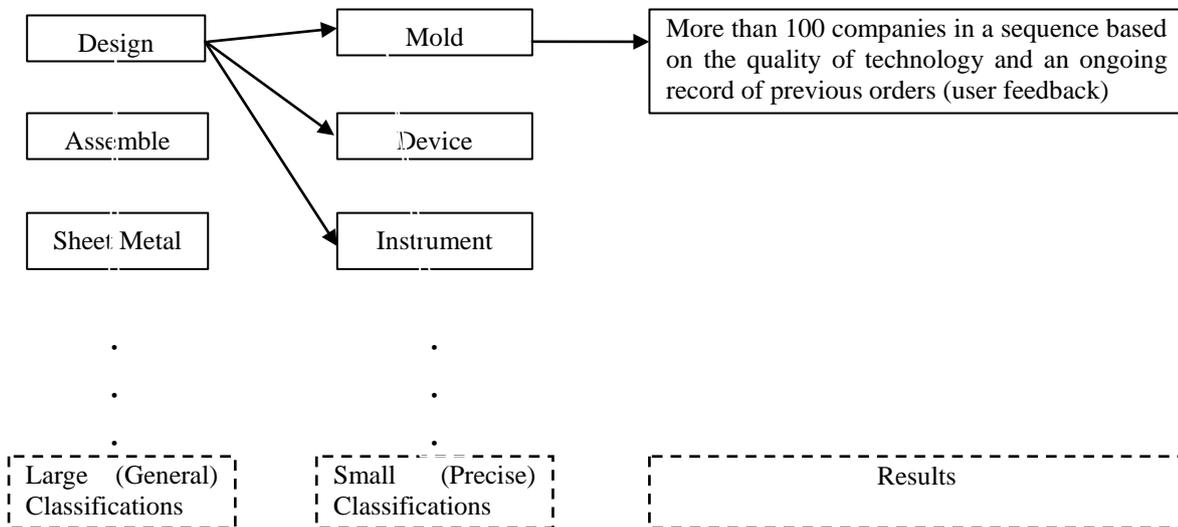


Figure 1 EMIDAS

Discussion

The first advantage of NC Network business system is its search engine. Instead of being based on the product as the only criterion, it provides results based on the processing technology. This criterion enables a user to find relevant registered companies, as the search spans various industries. For example, an automobile component company was able to

develop a low-cost clutch by ordering some components from a home electronics company. The other unsuccessful electronic markets used the end product as the only criterion in their search engines. In fact, most registered companies are subcontractors who have been connected to a single industry, and they have never manufactured components for another industry. However, some of these subcontractors have the skill and ability to manufacture diverse components for other industries. A search engine based on the criterion of the product only cannot discover such companies because they will not appear as search hits for products that they have never manufactured. Therefore, NC Network's search engine is consistent with the customs of vertical transaction under the Keiretsu system and seeks open innovation.

The second advantage of NC Network is its service that exchanges and information among its registered companies. NC Network facilitates the exchange of information among its registered companies. Through its Excellent and Unique Technology Pick Up service, registered companies can know their competitors' technical knowledge and decide on their future actions. This service improves competition not on price but on technology, and thus registered companies can gain high value-added orders. In addition, this service solves the problems of context-dependent technical knowledge. While the Japanese SMEs (subcontractors) obtain such knowledge, ordering companies have difficulty in searching and evaluating subcontractors' knowledge. Through these services, however, ordering companies can search and evaluate the SMEs' technologies, as the technologies, which NC Network screens and introduces on this service, should be with high quality.

The third advantage of NC Network is its transaction infrastructure. EMIDAS shows search results based on the criteria of the quality of technology and the record of previous orders. Users of the search engine can thereby avoid technologically low-quality suppliers or companies exhibiting opportunistic behaviour because they do not appear as search hits. The Excellent and Unique Technology Pick Up service also improves the on-screen results because it introduces only technically excellent companies. Together, these two services function as a kind of economic institutions that substitute for legalistic regulations. The fundamental principle is that if registered companies want to use the electronic market to boost their high value-added orders, they must compete on the basis of high quality and unique processing technology. To boost high value-added orders, NC Network excludes companies with bad reputations from its search engine. If searchers do business with technically low or free rider companies via NC Network, they will not want to order high value-added orders later. To further support this emphasis on high quality technology, Forest of Technology enables suppliers to cope with the technical difficulties encountered in expanding their businesses into diverse industries. This aspect of mutual assistance is also important for the infrastructure of an electronic market. By utilizing these infrastructure elements, ordering companies can transact with new subcontractors safety. These characters should be shown at table 2.

Table 2 Characters of Business Systems

	Traditional Keiretsu System	Unsuccessful Electronic Markets	NC Network
Transaction Customs	Vertical transaction	Open transaction (both vertical and horizontal)	Open transaction consistent with vertical transaction
Information of Transaction	Previous records of transaction	Price	Technology with high reputation

Infrastructure of Transaction Character	Trust based on long-term relationship	Immature	User feedback (Trust)
	Closed transaction	Markets for goods	Markets for technology

Conclusion

This paper clarifies electronic markets as a resource enabling the recombination of networks (Ciborra, 1996) in the form of transactions that go beyond the walls of Keiretsu. Bakos (1991) asserted that electronic markets would enable buyers to benefit from low search costs (a kind of transaction cost), whereas sellers would be confronted with price wars. Therefore, most electronic markets in Japan were unsuccessful because SMEs were reluctant to join them. However, the business system of NC Network avoids price wars and facilitates competition on the basis of high quality and unique processing technology leading to high value-added orders, thereby benefiting highly skilled SMEs and encouraging them to join.

Unless the electronic market founders and the registered companies create adequate economic and social institutions, the market cannot provide the potential benefits, such as the network effect and openness, sought by e-commerce marketing. Therefore, this study focused on three functions of the business system in a successful electronic market (NC Network).

NC Network promotes matching by providing a superior search engine, whose criterion is based on the processing technology, and not on the product.

NC Network aggressively promotes information exchange about unique technologies among its registered companies through Excellent and Unique Technology Pick Up service.

Overall, NC Network provides the necessary economic infrastructure for open transactions and a social infrastructure that fosters trust. Using the increased competitiveness created by high technology in its registered companies, NC Network screens technical companies and prevents opportunistic behaviour by free riders. It also provides a social infrastructure of reciprocal relationships through Forest of Technology, which enables registered companies to obtain another industry's technical knowledge that they need in order to produce that industry's components. NC Network's critical elements for success are summarised in Table 3.

Table 3 Business System of NC Network

Analytical Framework (Business System)	Service	Function of the Service as Institution among Registered Companies
Promote Matching	Search engine based on production technology	Registered companies can avoid price wars and promote high value-added orders based on high technology.
Facilitate Exchange	Excellent and Unique Technology Pick Up	Registered companies can devote themselves to the competitiveness of high technology as they can know their competitors' technical knowledge and decide on their future actions. In addition, ordering companies can search and evaluate the SMEs' complicated technical knowledge.
Provide Infrastructure	Method of listing search engine results (the criteria of quality of technology and a record of previous orders)	Registered companies can avoid low-technology companies and opportunistic companies and show only high-technology and high-reputation companies.

	Technical advice bulletin board (Forest of Technology)	Registered companies can obtain another industry's technical knowledge.
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NC Network has constructed a successful business system, which contains economic institutions that reduce opportunistic behaviour and social institutions that foster reciprocal relationships, facilitating open transactions in an electronic market. Unsuccessful electronic markets, such as O-Net, did not contain institutions similar to that of NC Network. In conclusion, this study demonstrates that an electronic market cannot function by itself unless it contains the elements of an economic and social institution.

References

- Arora, A., Fosfuri, A., & Gambardella, A. (2001). *Markets for Technology*, MIT Press.
- Asanuma, B. (1989). Manufacturer–supplier relationships in Japan and the concept of relation-specific skill. *Journal of the Japanese and International Economics*, 3(1), pp. 1–30.
- Bakos, J. Y. (1991). Information Links and Electronic Marketplaces: The Role of Interorganizational Information Systems in Vertical Markets. *Journal of Management Information Systems*, 8(2), pp. 31–52.
- Bakos, J. Y. (1998). The emerging role of electronic marketplaces on the Internet. *Communications of the ACM*, 41(8), pp. 35–42.
- Bichler, M. (2001). *The Future of e-Markets*, Cambridge.
- Chesbrough, H. W. (2003). *OPEN INNOVATION*, Harvard Business School Press.
- Chesbrough, H. W. (2006). *Open Business Models: How to Thrive in the New Innovation Landscape*, Harvard Business School Press.
- Ciborra, C. U. (1996). The Platform Organization: Recombining Strategies, Structures, and Surprises. *Organization Science*, 7(2), pp. 103–118.
- Kagano, T. & Inoue, T. (2004). *The Business System Strategy*, Yuhikaku (Japanese title: Jigyuu Sisutemu Senryaku).
- Lee, H. G. & Clark, T. (1996). Impacts of Electronic Marketplace on Transaction Cost and Market Structure. *International Journal of Electronic Commerce*, 1(1), pp. 127–149.
- Macmillan, J. (2002). *Reinventing the bazaar: a natural history of markets*, W. W. Norton.
- Malone, T. W., Yates, J., & Benjamin, R. I. (1987). Electronic Markets and Electronic Hierarchies. *Communications of the ACM*. 30(6), pp. 484–497.
- Matsushima, N., Urano, M., & Miyamoto, T. (2008). Institutional change and the emergence of electronic transactions in the Japanese manufacturing industry; Beyond the dichotomy of technical efficiency and social legitimacy in institutions. In Hara, T., Kambayashi, N., & Matsushima, N. (Eds.), *Industrial Innovation in Japan*, pp. 38–68, Routledge.
- Miyamoto, T. (2010). The business system of B-to-B websites in Japanese manufacturing industries. *Proceedings at 3rd International Colloquium on Business and Management 2010*, Bangkok, Jan. 25–28, 2010.
- Putnam, R. D. (1993). *Making democracy work: civic traditions in modern Italy*, Princeton University Press.
- Wigand, R. T. & Benjamin, R. I. (1995). Electronic Commerce: effects on electronic markets. *Journal of Computer Mediated Communication*, 1(3).
- Whitley, R. D. (1992). *Business systems in East Asia: Firms, Markets and Societies*, SAGE.
- Yin, R. K. (1994). *Case Study Research: Design and Methods (2nd edition)*, Sage Publications, Inc., CA.