

Business Architecture for Program & Project Management

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Abstract

In this paper, the business architecture is explained, which is the requisite when considering Program & Project Management. The business architecture is the fundamental plan for the whole business, and shows the blueprint of business played by many organizations. It can be applied not only for the manufacturing industry but a distribution industry, service business, etc. The business architecture focuses especially on the relationships between business activities, and how to design the interfaces between the activities. In this paper, prior researches are surveyed first, and it is shown that these researches mainly focus on the statistical viewpoints about business architecture. Then, the dynamic angle of the business architecture is considered, which is how to control the relationships, and how to reconstruct the business architecture. This is the originality of this paper. In particular, relationships between the business architecture and the competitive advantage of business are discussed. Finally, guidelines to practitioners are studied.

Section 1. Change of the relationship between companies by modularization,

1. Evolution of information and communication technology, and modularization

Various indications are made about the effects which the evolution of today's information and communication technologies have had on competitive environments of companies, and they are as follows.

At first, it is the velocity of the change of competitive environment. This comes from the velocity of evolutions of information and communication technologies. Innovations have been made one after another especially in the IT industry and many industries using IT, and various players entered and various products and services became to be offered. By these changes, the life cycles of products and/or services became shorter, and it became difficult for companies to remain in the existing technologies.

Also, the advances of information and communication technologies bring global competition. Competitors who were not anticipated appeared from all over the world. Prices of products and services shift toward the global prices. Even the rules of competition may change to global ones which are different from the domestic ones.

Moreover, various players especially in electronic communication and related industries compete together based on internet protocol by evolution of the digitization, which is one of the keywords about the advance of today's information and communication technology. Generally, digitization causes the following changes. Copy and transfer of information became easy, information moves and become common earlier, and competitive advantages of holding information may be lost easier by imitating, and advantages of enterprise by asymmetry of information may be lost by consumers' access to information

being easier.

As the impact of changes of the competitive environment, such as speed-up, globalization, and digitization, the technologies and market changes faster, highly-developed and became complicated, the amount of information which companies should take into consideration, such as rivalry, became expanded, and it became difficult to complete offering products or services only in own and group companies. Companies rather prefer to select and centralize their domains, and have tried to plan the strategic alliance with various external companies. The strategy to open the architectures and interface rules between parts about products or services, and make cooperation with various external companies became more desirable than closed strategy. Companies narrow down products and services to the specific areas of value chain, and try to standardize the interfaces of products and services, so that they can be used by many other companies. Companies try to make their products and services modules, which is the components using standardized interfaces.

Fig. 1 shows that the interfaces between the parts are customized for each finished products, and the parts used for certain finished products do not suit other finished products in the vertical integration type architecture. Also, the interfaces between the parts are standardized, and they suit different finished products in the module type architecture. It becomes easy by such modularization to internalize the parts in which a company has advantage and make them to be source of profits, and cooperate with the parts in which the other company has advantages.

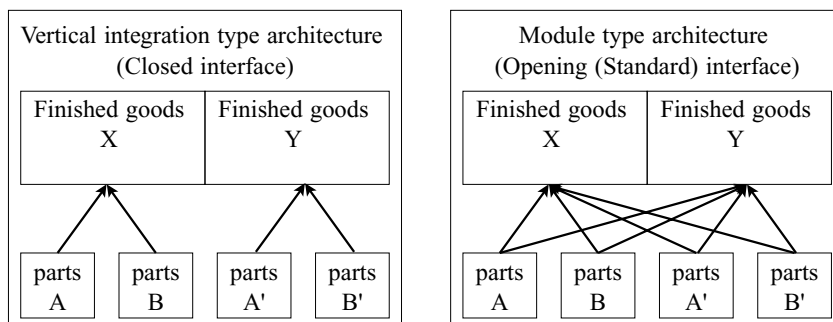


Fig. 1 Product Architecture and Interface

Moreover, by modularization of products and services, modularization of organization, in other words, modularization of business architecture, becomes easy to progress (Fujimoto, *et al.* [2001]). By standardizing Interfaces and modularizing, performances in own module parts can be raised without adjusting specifications between the products and services of the other companies each other. Then, communication like transferring information, negotiating specifications, is completed in own company, and little calibrations over the companies are necessary. Since the merit on communication is not fundamentally obtained even if the company internalize over the scope of the module as long as the architecture itself is not improved, it is thought that differentiation of organizations tends to progress so that scope of each organization is coincided with the architecture of product and services.

Moreover, evolution of communications technology, such as the Internet, has brought about the rise of end consumers' data collection capability and information dispatch capability. Very many kinds of companies are required to position such end consumers as one player on a value chain and create new

related structure, and such skill has been a subject in connection with the success or failure of business.

2. Modularization of supply chain

The viewpoint of the modularization stated for the preceding clause is the architecture of the product echelon, which is that the interface between two or more parts which constitute one finished goods standardizes, and by modularized parts, the necessities to internalize many products in one organization decreases, organization tends to specialize for each moduled product. However, modularization of business architecture is advancing not only in the product echelon, but also the whole supply chain from suppliers to the end consumers similarly.

In the relationships between the companies on the supply chain, the same kind of contest of change of the business environment as products accerates modularization on the echelon of those business processes. Outsourcing of the business processes is one of the examples which the series of activities of value chain, such as research and development, purchasing, production, and distribution, in one company dissolve, and become in cooperation with the outside of company. Then, there can be two types of external companies providing some parts of business process, one providing the standard interfaces, and another providing the customized interfaces for each company, and the former case can be called modularization of the business processes on a supply chain (Fig. 2).

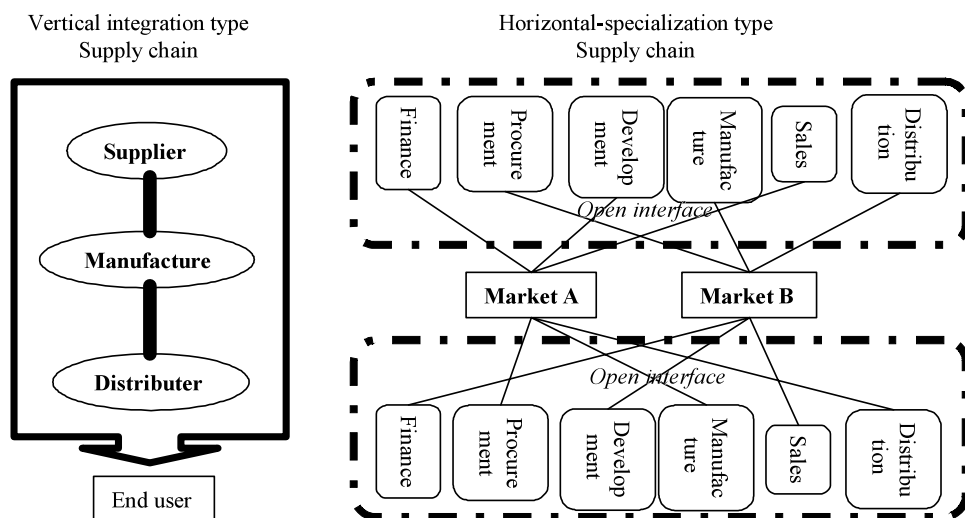


Fig. 2 Modularization of Supply Chain

By modularization, the business processes can be connected with many companies, which are materials flows, money flows, and information flows, and the scale merit and externality of network can work strongly.

Section 2. Modularization and the change of Competition Structure

1. Significance of 4C Model

In order to considers competitive strategy under the situation where modularization progresses, 3C

Model (Customer, Competitor, Company), generally used until now, is inadequate, and it is necessary to see by 4C Model (3C + Complementor) which added products and/or services companies which has some complement relations.

If modularization of products and services of the company progresses and differentiation of the whole value chain progresses, it will be more important for competitive strategy what kind of other companies to cooperate with, and how to offer the complement products and services by the other companies. The focus of competitions also may shift from competitions between individual firms to competitions between the supply chains, i.e., from the competitions about the state of the value chain of individual companies to competitions about the states of the value chains of the whole companies on the supply chains. And, the attention will be gathered for management of inter-organizational relationships.

2. Change of quarry of Competition advantage

Progressing open and modularization of the products and inter-organizational relationships have merits for companies, such as entry of various players, and exploitation of the network externality.

On the other hand, as those considerations, if open and standardization of interfaces progresses, differentiation by internalizing of the sources of the competition advantages become difficult, and convergence of competition, to lapse into a price competition, tends to take place.

Especially it is so about information resource, and it becomes impossible to consider the state of information resource for gaining the competition advantage as before ways. I became difficult that information resources is the source of differentiation, competitive advantages only by protected with the wall of organization because of open and modularization of organization, and the ease of spreading information by evolution of information and communication technology and digitization.

Under status where open and modularization progress, each company can internalize the source of the competition advantage and make profit by the performance of each module, or the way to combine modules. That is to blackboxize technologies in the module, which are difficult to be copied by the other companies, or to grasp the leadership to build the rule to combine each module and build the product architecture to be convenience of the company, i.e., make it using the modules or technologies of its company.

Then, information which can be the source of competition advantage is information which is difficult to spread openly, information which is hard to be digitized. For example, it is such as information kept by the inferential property right, the personal and knowledge level information, primary and scarcity information obtained by consumer's exploitation experience, etc.

Section 3. Required Ideal Model of the relationship between companies

In this section, Ideal models are discussed to reconstruct the new or existing business, to build and evolve relationships with the players of 4C through the whole supply chain against the background of the modularization accompanying evolution of information and communication technology. Especially evolutions of information and communication technologies do not allow companies to remain in the existing business domain and companies needs to innovate one after another. The subject here is the

business's dynamic methodologies how to continue performing evolution by such innovations, cooperating with other complement companies, how to compete, and how to keep the customers.

Regarding these issues, it can be considered as the directions to obtain the competitive advantage to compete and expand the business domain horizontally by the competitive advantage of each module (Platform), and/or to compete and expand the business domain vertically by the competitive advantages of ways of integration of modules (integration).

Also, when expanding horizontal business platform, it is necessary to build complementary relationships with the various players on the value chain vertically.

In this paper, the ideal model to build complementary relationships with the various companies vertically, evolve the whole value chain, and continue expanding the values of the whole business industry for the customers is named as virtual project type of supply chain.

The virtual project type of supply chain is defined as the cooperation with the players of other layers in the value chain based on the own business platform, and which specifies the horizontal and vertical business architecture.

By the virtual project type of supply chain functions well, business platform is expanded, and the benefits of the players on the business platform are expanded. For that purpose, however, the difficult subject occurs, which is that to progress the innovations of whole players on the supply chain one after another toward the desirable directions and by the desirable pace for the leader of the virtual project type of supply chain, by cooperating with the various players, who may not have any capital relation, whose profits or losses may be opposed each other, and entry and leave one after another. Hereafter, such subjects are examined by the viewpoints of horizontal and vertical cooperation of ideal model.

Section 4. Platformizing of the relationships between companies

1. Business platform

First, the business platform, which is a component of ideal model of the virtual project type of supply chain, is defined.

“Platform” means a base or a basic skeleton literally, and also as language of computer systems, means operation system and etc. which offers the interface various software and hardware use in common. Furthermore, the common part used as the base which opts for architecture of the body of car etc. is also called a platform.

The business platform in this paper does not mean the platform in one product, such as personal computer or car, but is the platform in business process. That is, platforms of such as personal computer means the basic parts which two or more finished parts use in common, business platform is some activities on business processes for which two or more companies use in common. Therefore, the object of business platform is not a business process in one company, but it is the whole processes on the supply chain. It may offer not only the interface for peculiar to keiretsu, for customized products or services, but also offers the common interfaces. By standardizing the interfaces, the business platform offers the functions available for two or more companies in common.

Functions which the business platform here offers are not the entirety of a series of value chain, such

as development, procurement, production, and distribution. There is significance in specializing in some specific activities, and providing them to many companies as common. It decides the method of concentrate modules and specifications of interfaces in modularization of organization going. While industrial structure horizontal-international-specializationizes, it can be called what raised the degree of integration by specific functions.

The significance of offering the standard interfaces is deeply related with modularity as showed. It is mutually connected that modularization progresses and that standardization of the interface between modules progresses. Here, progressing standardization means that the player using the specifications of the interface between modules increases. As the business environment changes to the modularization, the necessity for standardizing the interfaces between modules increases, and business platform is what realizes it.

The business platform is premised not on vertical integration model but on horizontal specialization model, and the interfaces are both for vertical and horizontal. The viewpoint of the business platform of this paper is to offer standard which specifies the architecture of the whole supply chain, specializing in specific function on a supply chain. That is, relationships between various players on the supply chain, from suppliers to the end consumers, are specified based on the business platform. Through the business platform, various players cooperate, and materials flow, cash flows, and the information flows are produced (Fig. 3).

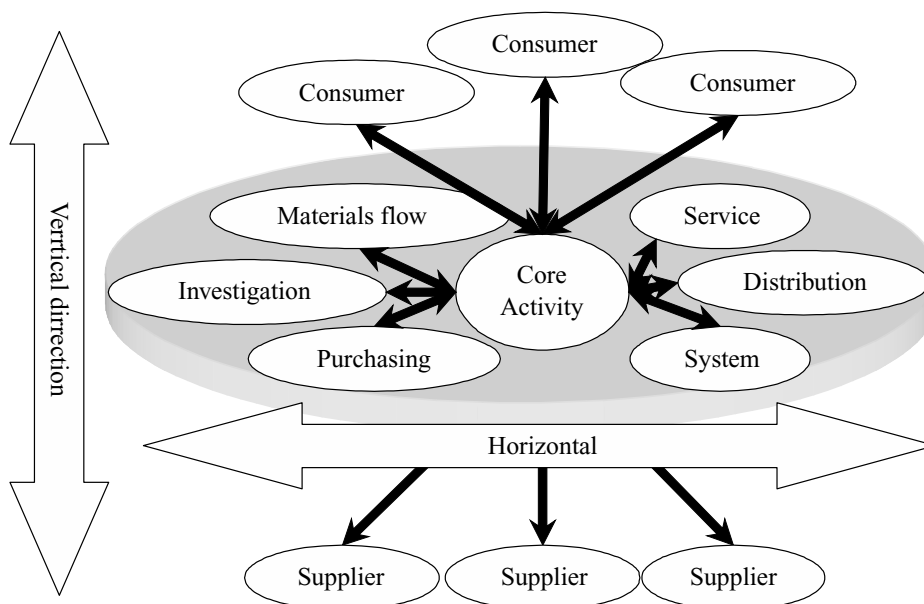


Fig. 3. Concept of Business Platform

The interfaces of the business platform are also divided into following two types.

- A) Vertical interface: The interfaces between the players of vertical directions like supplier-maker-wholesale-retail-consumer.
- B) Horizontal interface: The relationship with other players in the same layer of the horizontal direction.

Here, the more modularization progresses in a supply chain, namely, the trends to select and concentrate the business domain to some of the activities constituting the value chain becomes strong, the more important the subject how to set up the interfaces to tie them up is between companies.

Horizontal cooperation is the complementary relationship which companies concentrate resources on their competitive activities, such as research & development, production and distribution, which constitute the value chain, and depending for other activities on the other companies. It is the business platform which is specializing in some specific activities, and standardized the interfaces by its own rule¹.

The business platform expands its activities of the value chain horizontally and vertically, by reorganizing supply chain. It expands horizontally by making the complementary relationship with other companies, or by competing with other companies' business platforms, which are going to specialize in the same activities of the same layer. Also, it expands vertically by reorganizing the layers of the supply chain, from suppliers to the last consumers, exceeding the layer of itself, and becomes complementary relationship with or compete with other companies on the other layers of the supply chain.

A business platform is the place at which information of two or more companies on a supply chain gathers, and also some innovations are started. Information of more players can be collected by offering the standard interfaces. The business platform is the mechanism to collect such information.

In order to collect many players, it is required for the business platform itself to have any inducement. It is considered to be required for the business platform to have any competitive advantages itself, and offer common interfaces of some activities of the value chain to two or more value chains.

The fundamental earnings model of the business platform is the charge of the players which participate to the business platform. The more players use the business platform which offers the standard interfaces, such as transferring process of information on the supply chain, the more revenues of the player which offers the business platform increases.

2. Formation of business platform

This chapter is to consider the dynamism of expansion of the business platform to the horizontal and the vertical direction. That is the mechanism of expansion of the complementary relationships and the competitions between the companies of the same layer and the other layers on the supply chain.

Under the business environment in which modularization progresses, business platform-ization tends to progress and it can be the advantageous strategy option for the companies. Because it is thought that quotation of the domain between companies becomes easy to be performed when modularization progresses, and it is thought that horizontal growth strategy tends to progress rather than growth to the vertical direction. Also, since the evolution of modularization may tend to promote regimentation of interfaces' specifications in the product architecture, and the standardization in business architecture, it is rather considered the horizontal business platform-ization by which the product becomes

¹ Although Porter (1980, 84) is used here about the activities which constitute value chain, it is not necessarily to limit to it. For example, connection, certification, charge, etc. can be so at telecommunications industry.

regimentation and standardization, and is used for more players tended to progress than the strategy of customization for every individual customer company.

By a company forms the business platform, the company occupy some closed area of the specific layers on the value chain. When the open architecture progresses, each company may be exposed to competition with other companies which copies and enters into the same domain and the source of the profit may be lost. It becomes the source of the profit for the leader of the virtual project type of supply chain that internalizes the source of the competition advantage in the business platform, and creates the area which is difficult to be copied.

Therefore, companies compete with other companies' platforms of the same layer to expand the business platform horizontally. This competition to expand the business platform is to standardize by its interface. It is the competition to (1) expand the complementary relationship with other players of the same layer, and (2) take in the players of other layers. The more a business platform is expanded, the network effects work strongly, and the more enclose the player of other layers.

If the standard specification can be controlled by own company, the power relationship to other players become to be strengthened. When a company tries to make its interface specification to be the standard and form a business platform, the relationship with the players of other layers could be complementary or competitive. The companies could adjust the specifications of the interfaces each other, and expand both interfaces in cooperation², or offer the standard interfaces of own company and take in the players of other layers. These are embodied, for example, by the vertical competitive relationships between manufactures and distributors in the supply chain etc. (Fig. 4).

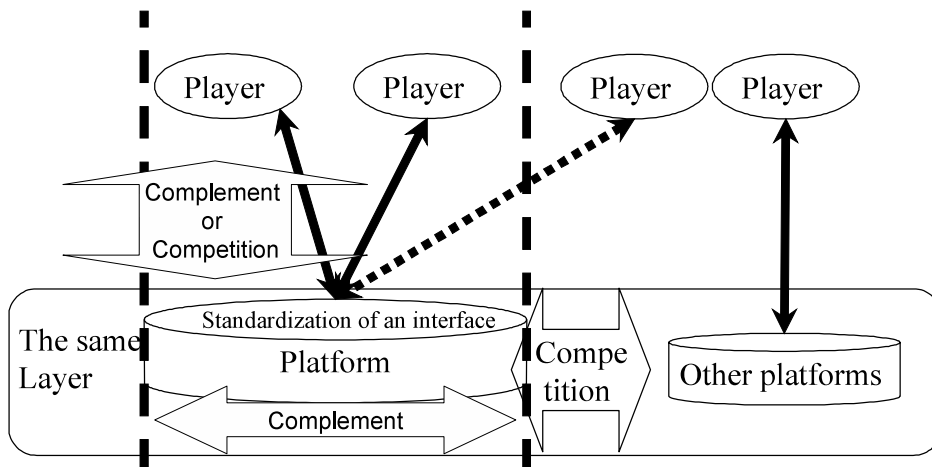


Fig. 4. Growth directions of Business Platform and complementary and competitive relationship

An expression as economy of standard is suitable for such competition. Unlike vertical integration type of intercorporate competition being explained by economy of scale and/or economy of scope, a different axiom, the economy of standard, is effective for the business platform type intercorporate

² For example, the relationships between Intel Corp. and Microsoft etc. are so on the PC architecture. The specifications of Intel Corp' MPU and Microsoft' OS are adjusted each other mutually, and those combination offers the interfaces which determines the architecture of the whole personal computer.

competition strongly. The characteristic of this economy of standard is beforehandization of competition, and one of the ways for it is strategic alliance. Beforehandization of competition refers to that the stage of the competition is moved forward to the prior relationships between companies, unlike de facto standard competition before; the issue is decided at the stage of competition in end consumers.

In such economy of standard, in order to become a leader in the virtual project type of supply chain, a prior investment type of competition is required, which is that to expand itself as the result by benefiting other players. Making the partners in the industry based on temporary self-cost and the planning the incentive to other companies for it is required.

And, the strategic alliance for economy of standard is the strategic alliance about information resource, such as intellectual property. The connotation is that both of spreading the standards of the product architecture and the interfaces widely, and defending as intellectual property right become objective on strategy. The methodologies for that are open-architecture-izing as stated above, OEM, cross licensing, patent pool, formation of consortium, open sourcing, etc.

Also, there is incentive for business platform to expand not only horizontally but vertically in order to internalize the resource for competitive advantage and the source of profit. The added value is raised and it can become advantageous at horizontal competition by that the business platform expand vertically, and internalize the high interdependent area on value chain. Since the players of the near layers become cooperative relations and/or become rivalry, the skill of calibration of the conflicts of interests determine the success or failure as the leader of the virtual project type of supply chain.

Section 5. Formation of Virtual Project in the relationships between companies

Virtual Project is defined as the cooperation with other players based on own business platform, and that specifies the horizontal and vertical architecture.

Also, there may be two or more players forming business platform at each layer on value chain. Virtual project decides the ways of the cooperation between those business platforms. It does not internalize the resources vertically, but specifies the ways of cooperation. It is the virtual, project, ad hoc relationship with various players, who may enter and/or exit. It is dynamic relationships for the business platform to expand and/or relate with flexibly to horizontally and vertically so that the virtual project type of supply chain functions and grows.

The business platform becomes complement and/or rivalry with the other players on vertical direction and horizontal direction. The virtual project type of supply chain is the whole complementary relationships through the whole supply chain, and the business platform expands horizontally and vertically to make complementary relationships with horizontal and vertical various players in a virtual project type of supply chain. It means that, as stated, (1) dissolution of vertical multilayer structures and reorganization of activities of the supply chain, (2) expansion of horizontal, specializational relationships, and (3) conquest of vertical competitive relationships.

Section 6. Guidelines to Practitioners

1) Key insights and contributions

In this paper, the insight about the change of the relationships between companies, which constitutes a supply chain, by digitization and internet is offered. The insight is the important requisite to consider supply chain management. The key conception is modularization. Although there are many researches about modularization of the product architecture, it has considered about the impact of it to the supply chain management in this paper.

Also, an ideal type of the business model to be the supply chain leader, who conceive, develops, and expands the supply chain under such business environment, is shown. The key conception is virtual project. It's the viewpoint is the eco-system to raise the competitive advantage and develop the whole supply chain in which the own company plays the core role, and grow its own company.

2) How to apply the methodology or the technology to real-world situations

The Ideal type of supply chain management shown in this paper is not restricted to specific business. In various industries, modularization of the architecture of products progresses, and business process outsourcing (BPO), global off shore development, etc., are progressing. The ideal type of business model can be applied to such industries. And this paper shows the check points which should be examined to become a supply chain leader.

3) Future possible extension of research for practitioners

In order to make the ideal type of modularization of a supply chain shown in this paper to be practical, RFID is the key technology to be attracted attention as one of the effectual measures to manage the operation of a supply chain. For future research, some case studies about the supply chain management using RFID are needs to be done.

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