

Chapter 2 A Study of Inter-Organizational Relationships and the Creation of Innovation: Focusing on Case Studies of Japanese and German Industry

2.1 Background to the Study

Recently, a few rays of sunshine have penetrated the clouds by which the Japanese economy has been beset, but it is still in a critical condition. Japanese companies experienced sustained rapid growth and development until the 1980s, dominating markets worldwide, but their performance swiftly deteriorated in the 1990s, in parallel with the downturn in the Japanese economy, and since then they have been taking decisive action to implement sweeping corporate downsizing initiatives and management reforms, with the aim of achieving economic recovery.

Incidentally, the strength of the Japanese economy and Japanese businesses has until now been manufacturing, but with the rapid globalization of the economy and the progress of the IT revolution in recent years, this too has begun to falter considerably. What will be vital to strengthening and regenerating the international competitiveness of the Japanese economy and Japanese businesses? Fundamentally, the most important thing is attempting to create innovation. This is because innovation is of decisive importance for the survival and development of companies, as well as being the source of their competitiveness. However, although it is easy to say “aim for innovation”, there are challenges in a range of domains. For businesses, there is innovation in such diverse fields as economic strategy, systems, management systems, personnel and technology. In an environment such as the current one, which experiences sudden changes on a global scale, it is necessary for businesses to attempt to achieve innovation in all these areas, with technological innovation probably the most crucial of these challenges.

But how can businesses create technological innovation? First of all, the acquisition, accumulation and creation of new knowledge and infor-

mation are essential. It is possible that technological innovation will emerge from the process of adding new knowledge and information to existing knowledge and information. Accordingly, the “invisible resources” of knowledge and information have in recent years been recognized by businesses to be important and they are attracting a substantial degree of interest. In the 21st century, developed countries are becoming knowledge-based economies, so it is thought that knowledge and information will become even more critical economic resources for companies in the future.

The methods of acquiring the knowledge and information that are the source of such technological innovation can be broadly classified as follows: i) developing this knowledge and information within the company; and ii) acquiring it from outside the company. The former method takes advantage of existing knowledge and information possessed within the company, while the latter involves the acquisition of new knowledge and information from other companies and research institutes.

Although these methods exist for acquiring the knowledge and information necessary for technological innovation, there are limits to the development of information within the company, in the environment of today, which undergoes sudden, complex changes on a global scale. There are limits to the management resources, such as people, physical resources and money, that are available to a single company and it is not so easy to implement technological innovation swiftly. Furthermore, in such a situation, the risks involved in failure are great. Consequently, the acquisition of knowledge and information from outside the company is both effective and advisable.

2.2 The Analytical Framework of the Study

Thus, amidst the acute, rapid changes of recent years and the climate of global competition, it is

technological innovation by working in partnership with other companies, universities and re

necessary for companies to acquire and create new knowledge and information and promote search institutions. This is, in other words, an attempt to create innovation through building new inter-organizational relationships. As is widely known, inter-organizational relationships have been being built in Japan for quite some time, through the formation of company groups such as conglomerates (*zaibatsu*) and business groupings (*Keiretsu*) that bring companies together with firms with which they do business, as well as uniting parent companies with subsidiaries and other related companies. However in recent years, these inter-organizational relationships, which are characterized by tight vertical links, have gradually been falling apart, as has been seen in the automotive and household electrical appliance industries. The new inter-organizational relationships that we have recently seen in place of these in many industries involve the formation of networks of businesses or industries, which place greater emphasis on loose horizontal links between organizations.

However, even if companies build relationships and exchange management resources with external organizations through collaboration, this alone will not enable them to acquire and create knowledge and information that will lead to technological innovation. In order to acquire and create new knowledge and information and bring about technological innovation, inter-organizational learning is necessary for companies. Only when companies learn systemically from other organizations will it be possible for them to acquire and create new knowledge and information and bring about technological innovation. In this sense, inter-organizational learning on the part of companies is extremely important, as it is essential for technological innovation.

In fact, leaving aside the issue of whether it was explicit at the time, inter-organizational learning on the part of companies could be said to have been behind the growth and expansion of Japanese companies until the 1980s. Having steadfastly sought to catch up with European and American companies after the war, many Japanese companies avidly studied advanced technology and management know-how by visiting

developed the ability to implement modern, Western-style management, they also succeeded in producing high-quality, internationally competitive products at a low cost.

Until they met with a challenge from Japanese companies in the international marketplace in the 1970s and 1980s, Western companies were not all that enthusiastic about inter-organizational learning, because they had dominated these marketplaces as world leaders. In addition, their contact with Japanese companies had been undertaken from the standpoint of a “teacher”. However, as Japanese companies grew rapidly in the 1970s and 1980s, entering the world market and becoming powerful rivals, Western companies underwent a transformation in their attitudes and began actively to learn from Japanese companies. In particular, companies in the automotive industry began to learn from Japanese production methods, such as QC circles and lean production methods. At the time, this was in marked contrast to some Japanese managers, who declared that, “There is nothing more that we can learn from the West”. As a result, US companies, which had been struggling, particularly in the 1970s, began to bounce back in the latter half of the 1980s and have achieved a spectacular recovery.

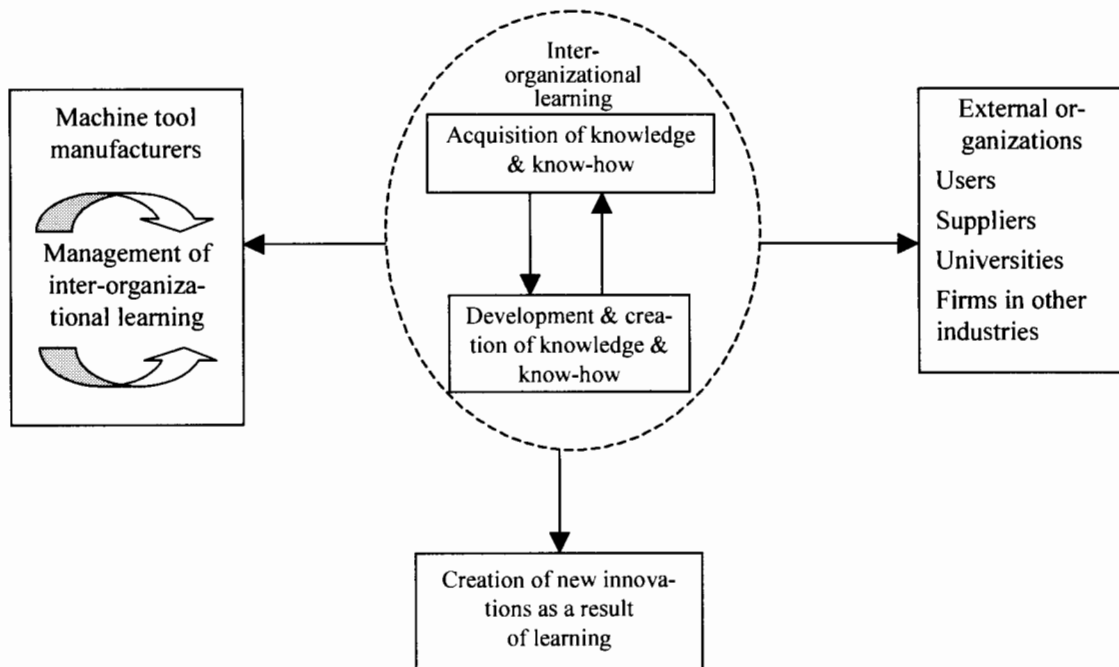
As such examples indicate, the construction of inter-organizational relationships and inter-organizational learning arising from this are coming to be of paramount importance for innovation in companies. The prosperity experienced in regions across the globe that have recently been the focus of attention in cluster theory, such as Silicon Valley and Northern Italy, has actually resulted from the fact that the companies, universities and research institutions in those regions have built inter-organizational intellectual relationships and learned from each other in order to try to create innovation. Thus, the management of such inter-organizational relationships that promote inter-organizational learning is now becoming an important issue in the management of businesses.

There are many issues involved in the management of inter-organizational relationships that promote inter-organizational learning. Firstly, it is necessary to create factors that will promote

European and American companies and collaborating with them, and introduced this technology and know-how within their own companies. As a result, while Japanese companies inter-organizational learning and build the mechanisms required for this. The former include leadership on the part of top management, the clarification of the learning targets of the organization, the deve-

lopment of learning ability and the creation of a learning culture, while the latter include the creation of a forum for learning within the organization, communication between organizations and employees, and the devolution of power from the top. However, research into such issues has only just begun in academic and industrial circles within Japan and overseas.

Diagram: The Analytical Framework of the Study



2.3 Outline of the Study

As outlined above, technological innovation from the viewpoint of building new inter-organizational relationships and promoting inter-organizational learning is becoming necessary in order to strengthen and revitalize the international competitiveness of today's Japanese companies, but what is the current situation with regard to this? And what is the current situation with regard to Western businesses? These are major issues that were uppermost in our minds in conducting this study.

In order to ascertain the current situation with regard to Western businesses, we focused on German companies. As the reader is doubtless aware, German companies have traditionally emphasized manufacturing and even now boast a high level of technological skill. Furthermore,

acquisitions on the part of big business and the formation of cross-industrial groups, and active moves are afoot to regenerate industries and businesses. Moreover, in Germany's leading companies, initiatives aimed at the development of new technology through collaboration between the worlds of industry and academia are flourishing. In this sense, there are quite a few things that Japanese companies ought to learn from German businesses. Accordingly, we decided to conduct a study of the machine tools, automotive and chemical industry sectors in Japan and Germany.

(1) Joint Development and Inter-Organizational Relationships Among Machine Tool Companies in Japan

An analysis of the current situation in Japan's

market reorganization has progressed rapidly as a result of the progress of the globalization of companies in recent years, mergers and machine tool industry from the perspective of environmental changes and profitability suggests that innovation on the part of machine tool manufacturers is necessary, as well as indicating the direction that this should take. This section deals with two cases of successful joint development on the part of Japanese machine tool companies (development in partnership with a company in a different industry), which face numerous challenges: i) joint development of multi-functional photon machining center; and ii) joint development of control units, which can be described as the heart of machine tools. In addition, this section explains the background to the decision of these companies to embark upon joint development, ways of transferring knowledge and know-how, useful strategies in implementing management aimed at promoting inter-organizational learning and factors influencing the success of joint development.

The case study of multi-functional photon machining center is one in which joint development was initiated in order to solve the problem of how to achieve greater precision by processing prototypes using lasers, with the aim of developing a strategic product. The machine tool manufacturer is skilled in cutting and has also developed and accumulated knowledge and know-how within the company concerning lasers. However, it was necessary to acquire knowledge and know-how concerning changes in conditions when actually using them in processing from the electronics manufacturer, which had already put together a test model. Furthermore, the issue of alignment accuracy in laser processing, which is a non-contact method, was resolved by attaching to the processing head a CCD (Charge-Coupled Device) camera that incorporates knowledge and know-how in the field of image data processing, which is the one of the strengths of the electronics manufacturer.

As a result of this, an innovative strategic product was created, which halved the time required to manufacture moulds; in addition, the knowledge and know-how generated in the de-

velopment of the product was applied to other strategic products, while building up a database within the company. Furthermore, consideration is being given to the possibility of diverting this knowledge and know-how to a new joint project uniting the worlds of industry, government and academia, focusing on processing equipment for precision flat panel material. In addition, the company lends trial models of its machinery to small and medium-sized enterprises, with a view to increasing its clients in the future.

The transfer of knowledge and know-how through this joint development initiative was achieved through establishing closer interpersonal relationships, but merely having a mechanism for transferring knowledge and know-how between organizations is not enough unless this mechanism can be utilized within the organization and can incorporate the strengths of one's own company. In order to do this, it is necessary to devise management methods that enable external knowledge and know-how to be imported to the company and utilized. The factors influencing success in management that can be inferred from this example are as follows: i) leadership on the part of the top management, which recognized the potential of laser technology and ensured that this principle spread throughout the company; ii) the fact that a specialist organization was established in the form of the Laser Promotion Section, with efforts being made to accumulate knowledge and know-how concerning lasers and an improvement in "absorption capacity" being sought; iii) the organization was flattened out in order to ensure that the knowledge and know-how acquired was not unevenly distributed and concentrated within a single division of the organization and the flow of information was improved, while organizational reforms, such as the delegation of authority to middle management, which is the nodal point for information, were also implemented in order to ensure that information flowed in all directions, both vertically and horizontally; and iv) the existence of an organizational climate that encouraged attempts to create innovation without fear of failure.

The second case study involves the joint development of control units, in which field few

machine tool manufacturers have been successful. In Japan, there are a great many machine tools with control units manufactured by Fanuc Ltd., which is a major competitor in global markets. However, the machine tool manufacturer in this case wanted to develop its own control unit, so that it could incorporate its own processing know-how and modify the options available in the unit according to its own strengths. Moreover, the machine tool manufacturer and major electronics manufacturer in this case study have been partners in development for more than 20 years, with this relationship being sustained solely through building mutual trust, rather than being governed by strictly worded contracts or other formal documents.

The advantages of joint development from the perspective of the machine tool manufacturer are: i) the fact that its representatives are permitted to visit its partner's research institute and so can study trends in cutting-edge technology; and ii) it could build the next generation of production systems and develop new areas of business based on these.

Factors influencing the success of the joint development project in this example include: i) the fact that the company focused only on the provision of processing know-how, rather than becoming involved in the development of the control units themselves (the hardware); ii) the fact that control units require knowledge and know-how concerning both machine processing and software, and the fact that the company had personnel with technological know-how concerning both mechanical and electrical/electronic systems (the company has traditionally employed many generalist engineers); iii) a personnel training and education system that focuses on the interaction of mechanical systems and electrical/electronic ones; and iv) the existence of marketing-oriented engineers.

These two examples suggest that it is necessary to couple inter-organizational learning with learning within the organization. The specific factors that are important in influencing the success of joint development initiatives are as follows: i) clarification of the direction of joint de-

velopment by top management; ii) the establishment of a specialist organization for the transfer, application and development of knowledge and know-how; iii) the flattening of the corporate structure and devolution of power to middle management; and iv) the creation of a corporate culture that promotes inter-organizational learning.

(2) The Current Status and Characteristics of Academic-Industrial Collaboration in Germany: Focusing on a Case Study of the Machine Tool Industry

One characteristic of the creation of innovation in Germany is the use of collaboration between industry and academia. Compared with the situation in Germany, there are apparently many obstacles to and problems involved in academic-industrial collaboration in Japan. In addition, looking at attitudes to academic-industrial collaboration in the machine tool industry, although a trend towards focusing on collaboration with universities in the field of cutting-edge technology is discernible, particularly in basic research, there are few cases in which this is actually functioning well.

The collaboration between academia and industry on the "Research for the Industry of Tomorrow" project is being led by the BMBF (Federal Ministry of Education and Research) (during the period 2000 – 2004). This project does not stop at the development of cutting-edge technology, but is more comprehensive, focusing on ways of making corporate changes, strengthening collaboration between companies, and personnel training. More specifically, around 260 projects have been initiated (including some that have already been completed), on the following themes: i) market orientation and strategic product planning; ii) technology and manufacturing facilities; iii) new forms of business collaboration in the manufacturing industry; and iv) companies with the necessary human resources and the ability to implement reforms.

The main factors influencing the success of academic-industrial collaboration in Germany are as follows: i) the situation in the university, which

has to run its research departments using external funding, in order to overcome budget limitations and the qualities of academics who can exercise a spirit of entrepreneurship; ii) projects created with commercial viability in mind; iii) the establishment of projects that respond to specific needs; iv) the existence of institutions that function as an intermediary between industry and academia (the Fraunhofer-Gesellschaft institutes and industrial associations); v) the consistency of knowledge and know-how (participation by graduate students in projects implemented in collaboration with business); and vi) the creation of social networks of researchers through personal connections and academic networks.

(3) Modularization and Inter-Business Relationships in the Japanese Automotive Industry

The theme of this section is modularization and inter-organizational relationships in the Japanese automotive industry. Firstly, it explains the concept and processes of modularization, in which the automotive industry has demonstrated a great deal of interest in recent years. Next, in addition to clarifying the concept and processes of modularization in the automotive industry, it explains about knowledge concerning car products and production (knowledge of components and knowledge of systems). Based on these fundamental issues, this section analyses the current status of modularization and the dispersal of knowledge among Japanese car manufacturers and parts suppliers.

Following this are case studies of joint development of fuel pump modules and centre cluster modules, demonstrating the trend towards joint development in the development of modules in the Japanese automotive industry. Based on the results of this study, this section reveals that inter-organizational relationships are being built in the Japanese automotive industry as well, between manufacturers and parts suppliers, as well as among parts suppliers, with attempts being made to develop modules through the transfer of

knowledge and know-how and intra-organizational learning. Management-related issues encountered in this process include building abilities and mechanisms that will make use of the knowledge and know-how of manufacturers and parts suppliers in the automotive industry.

Trends in and the direction of modularization in the Japanese automotive industry can be summarized as follows:

- i) Looking at overall trends, modularization in the automotive industry is at the stage preceding the standardization of interfaces, with a shift taking place from structural modules to functional modules that integrate various functions.
- ii) The most important fact in the Japanese automotive industry is the shift towards common parts in the lower levels of the system and the increase in the degree of alignment in terms of functional and structural interdependence. In this sense, the current stage is a process of integrating knowledge that is currently dispersed among suppliers, systems and car manufacturers. Accordingly, joint research is an effective measure, but the creation of abilities and mechanisms that make use of suppliers' knowledge and know-how under the leadership of car manufacturers is an important management issue.
- iii) In relation to the question of Make or Buy, it is thought that the ability to link differing components within a single module and the ability to absorb knowledge of related components are the core organizational abilities for module suppliers in charge of specific module areas, with the ability to make proposals the key to business in the future. Consequently, knowledge of the car structures and car body technology that are the domain of car manufacturers will also sometimes be necessary. Furthermore, it will also be important to respond to the needs of end users and to have abilities that can be applied to modules. It is highly likely that supply systems will evolve considerably due to these factors.

- iv) It is thought that the question of whether to manufacture in-house or contract out will hinge on the strength of car manufacturers' existing supply networks, as well as suppliers' abilities to make proposals, geographical factors and car manufacturers' strategies with regard to technology.
- v) While fuel cell-powered cars remain outside the mainstream, the modularization process could have the hitherto unforeseen advantage that it broadens the scope of components, thereby giving rise to the integration of parts and functions in ways that had not previously been thought of, which could, in turn, lead to an unexpected ripple effect. In this sense, it is an evolutionary process that proceeds through continual trial and error, rather than advancing in a constant, complete form, and is based on progressive innovation. In addition, plastics technology is one technological element that will be effective in driving the integration of components.

(4) Innovation and Inter-Organizational Relationships in the German Automotive Industry

The development of global competition in the automotive industry demonstrates different aspects to those seen hitherto and major car companies in Japan, the US and Europe are making progress with a variety of responses to these. Amid this situation, lean production systems are one thing that has had a significant impact. In particular, European car manufacturers – especially those in Germany – have tried a variety of responses in the process of learning lean production methods; some elements involved in this include international alliances, a multi-brand strategy and the adoption of a modular production method. In other words, there are many things that we should learn from Germany's automotive industry: one of its strategies for responding to relentless global competition was to introduce external know-how in the form of the lean production system and applied its essential characteristics to its own production and management, while also demonstrating further progress.

In particular, in terms of the exploitation of ex-

ternal resources in the modular production system, the transfer of knowledge and know-how from car manufacturers to mega-suppliers is believed to have played a significant role in improving the technological level of car part manufacturers. Insofar as these points are concerned, it does not differ all that considerably from the relationships between car manufacturers and parts manufacturers in fields from design and development to production, which the Japanese automotive industry has built up over many years; however, it is worth noting that the existence in Europe of independent, innovative car parts manufacturers has had a significant effect on efforts to build up the automotive industry as a network of specific specialized groupings.

In other words, the automotive industry has hitherto taken a self-sufficient approach, in which car manufacturers have covered almost all areas, whether alone or in partnership with car parts manufacturers. However, we should probably take note of a new structure in the automotive industry of the future, in which there are networks of numerous companies with a high degree of expertise, and also engineering service companies that act as new experts and sometimes hubs of expertise that are involved in exchanging knowledge with these company networks, as well as compensating for any areas where knowledge is lacking. Nevertheless, for the moment, the Japanese automotive industry may not need engineering service companies that act as a hub. As demonstrated by the guest engineer system, the sharing of knowledge and know-how between car manufacturers and parts manufacturers in the Japanese automotive industry has progressed to an extremely high level.

In addition, as can be seen from the development of modules that integrate functions in modular production, many innovative products are being applied in this area. Given this situation, it is thought that Japan's car manufacturers and parts manufacturers each carry out the functions of engineering service companies and complement each other. Further reflection is needed in order to determine whether this network system will become common in Japan. Nonetheless, with progress being made in the development of cars designed with the environment in mind and

intelligent traffic systems, it is certain that few car manufacturers will be able to acquire such technology working alone and that vast sums of money will be required in order to procure it. It has been said that this was one of the factors behind international mergers and acquisitions. In order to address this situation, there is a distinct possibility that the development of an automotive industry network consisting of independent specialists will progress.

(5) Management of Inter-Organizational Relationships in German Businesses:

The Case Study of BASF

Unlike many chemical manufacturers, BASF, a German chemical company, has adopted a strategy of focusing on a comprehensive range of business domains and discovering its core competences from within that range. To put it another way, the company has adopted a strategy of making the broad scope of its business domains one of the main factors in its competitiveness (the Verbund strategy). To be more specific, this is a strategic concept in which all functions are integrated, including research and development, production, distribution, marketing (sales) and financial accounting, with the aim of interlinking the company's business know-how. This is in complete contrast to the recent strategy of Japanese companies, which aim to be specialist companies, under the banner of "select and focus".

Furthermore, BASF is not only focusing on internal resources but is also forming partnerships that actively utilize external resources. It is making use of its strengths as a generalist, while adeptly joining forces with external businesses in order to enrich its internal resources. This section

2.4 Summary and Implications

In conclusion, what implications can be gathered from this study of these industries and businesses? Let us outline them in order:

(1) Endeavoring to create continual innovation

Streamlining management and increasing efficiency through restructuring is important in the regeneration of Japanese businesses, but it is im-

perative that companies also endeavor to create continual innovation. Above all, efforts to achieve constant technological innovation are essential for Japanese companies, which have achieved international competitiveness in the field of manufacturing. It is precisely this innovation that will enable Japanese companies to manufacture better prod-

focuses on its joint venture (vitamins business) with Takeda Chemical Industries, and points out the factors that caused the inter-organizational relationship established through this collaboration to be successful. Initially, BASF had a strategic intent to develop its vitamins business as a core business, while Takeda Chemical Industries was devising a restructuring plan. The joint venture was led by BASF and there were some who expressed concerns at first, about the effect that cultural differences would have on the morale of employees; however, BASF's strength lies in the chemicals field rather than in health and medicine, while Takeda has accumulated advantages in the fields of pharmaceuticals and healthcare for Japanese people, so the two companies have achieved strong business performance by pooling their resources.

From these case studies, it can be seen that the factors influencing success in these new types of collaborative relationships are as follows: i) clarification of one's company's core businesses (selection of a partner whose core business is in a different realm); ii) clarification of the duration and scope of the collaboration (if the scope of collaboration becomes too broad, the cost of coordination and integration between the organizations increases. A sense of urgency can be created by specifying the duration of the collaboration); and iii) differences in the strategic directions of the collaborating companies (the existence of clear differences in the fields in which the outcomes of the joint venture will be utilized. Ensuring that rivalry does not occur even if management resources are enhanced through the learning effect of the collaboration).

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ucts than foreign companies.

(2) Strategic perspectives and reviewing strategy

While constant innovation is important for the regeneration of Japanese businesses, this is utterly meaningless if a company does not have a strategic perspective. Only by striving to achieve innovation from a strategic perspective will a company be able to develop business and manufacture goods with a competitive advantage.

Today, with global competition intensifying, companies in all industries are creating competitive advantages through strategic international alliances and mergers and acquisitions, in pursuit of survival and expansion. Since the 1990s, many Japanese businesses have switched to a strategy involving their transformation from general to specialist companies, under the banner of "select and focus". However, it is not necessarily the case that this is the only strategy appropriate to the current business environment. As can be seen from the example of BASF, a strategy that takes advantage of the breadth of one's business domains as a general manufacturer is also effective. In addition, this makes collaboration with other companies of even greater value. From the example of BASF, we can see that important factors in such collaboration include: i) the clarification of one's own company's core business; ii) the clarification of the duration and scope of the collaboration; and iii) differences in the strategic directions of the collaborating companies. Accordingly, it is necessary for the Japanese companies of today to review their strategy from this perspective.

(3) Constructing new inter-organizational relationships and promoting joint development

In the current environment, which changes rapidly at the global level, it is becoming difficult for companies to achieve technological innovation and expand their business independently. Therefore, as has been seen throughout this study,

it is necessary for companies to collaborate with other businesses, as well as universities and specialist research institutes. As stated above, Japanese companies have been building inter-organizational relationships for quite a while, through *zaibatsu* and *keitetsu*, but today what is needed are not these conventional inter-organizational relationships, but the construction of inter-organizational relationships focused on networks with flexible horizontal linkages.

In this study, such new inter-organizational relationships have been seen in the machine tool industry, where the joint development of products has taken place, and also in the automotive industry, with regard to modularization. Moreover, in relation to this, it is necessary to build networks of independent engineers (experts), which transcend the boundaries of organizations; in this regard, the existence of engineering service companies that act as the hub of a network, as seen in the German automotive industry, is worthy of attention. Therefore, we can say that creating such new inter-organizational relationships and promoting joint development of products and production technology are the key to the regeneration of Japanese businesses.

(4) Promoting collaboration between academia and industry

Collaboration with universities and specialist research institutions is also essential for the regeneration of Japanese companies. Recently, there has been lively discussion in Japan regarding the necessity of such academic-industrial collaboration and methods of achieving it, but in fact, it is still in its infancy. There are not a few things that can be learned from Germany, which has somewhat greater experience of such collaboration.

Looking at the German machine tool industry, we can see that there is a clear division of roles among companies, universities and research institutions, with each one functioning organically. In particular, research institutions (such as the

Fraunhofer-Gesellschaft institutes) play an extremely important role in Germany, as an intermediary between industry and academia. This is another major characteristic of academic-industrial collaboration in Germany. Accordingly, we can say that the establishment of such research institutions is required, in order to activate collaboration between academia and industry in Japan and ensure its success.

(5) Promoting inter-organizational learning

Even though collaboration with universities and specialist research institutions is essential for the regeneration of Japanese industry, this alone is not sufficient. The acquisition, accumulation and creation of new knowledge and information are essential for the development of new technology and products. In order to achieve this, companies must acquire new knowledge and information from external organizations. This must be achieved through systematically learning from other organizations the knowledge and information that one's own company lacks. In this sense, in this day and age, when organizations are working together to develop new technology and products, inter-organizational learning is coming to fulfill an important role in companies.

As can be seen from the development of new products by Japanese machine tool manufacturers (combined processing machinery for rapid metal prototyping and control units for machine tools), the introduction of lean production systems by German car manufacturers and the development of modules in the Japanese and German auto-

omotive industries, inter-organizational learning is now becoming extremely important. Although Japanese companies were originally skilled at learning from other businesses, it is perhaps necessary for them to think seriously about this inter-organizational learning once more.

(6) Managing inter-organizational relationships

In order for Japanese companies to build new inter-organizational relationships, promote learning between these organizations and create innovation, management of these relationships is necessary. In other words, it is necessary for companies to create the factors and mechanisms that will promote inter-organizational learning. This study has revealed that the necessary factors are: i) clarification of the direction of joint research by top management; ii) the establishment of specialist organizations for the transfer and application of knowledge and know-how; iii) the flattening of the corporate structure and devolution of power to middle management; and iv) the creation of a corporate culture that promotes inter-organizational learning.

Academic research into the management of these relationships in such a way as to promote inter-organizational learning has only just begun, both in Japan and overseas. Accordingly, the results will have to wait for another study in the future. Whatever the results may be, this kind of management is coming to be of decisive importance in the regeneration of Japanese businesses.