Analysis of the business architecture of ASUS and Quanta Computer

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Abstract

This research examined ASUS and Quanta Computer as cases study, and analyzed how the company selects an appropriate business strategy or model, according to the features of its product system structure. In particular, what types of transaction relationships exist between companies to gain competitive advantages in industrial value chains, product developments, and component procurement activities? Moreover, what is the state of such relationship between businesses?

Keywords : *Business architecture, ASUS, quanta.*

1. ASUS company history

Before 1990s, there were three types of motherboard manufacturers (Chou, 2008). The first type is large-scale system builders, such as IBM, Compaq, Acer, and MiTAC, which manufacture motherboards for their own systems. The second type is OEM/ODM professional motherboard manufacturers of high quality and high price strategies, such as Micronics (merged in 1998). The third type is motherboard manufacturers in Taiwan, which grew rapidly along with compatible PCs and followed the specifications of advanced manufacturers for R&D, without concerning their own technologies. There were hundreds of these manufacturers at the peak time.

ASUS was established in 1990 by four former engineers of Acer. Shortly after its establishment, the self-developed Cache386/33 and

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486/25PC motherboards were introduced to the market, and were widely acclaimed. The 486/25 high-end motherboard was launched simultaneously with international brands, such as IBM and ALR, setting a major milestone for PC technology development in Taiwan.

As the profit of high-end motherboards was as high as NT$10,000-20,000, the ASUS management team came to realize that using technology to create "something different" could help engineers without any sales or business experiences to find their core competitiveness.

Afterwards, ASUS continued to utilize its advantages in technologies to develop new models. In 1993, it introduced the SMT automatic production line. In 1994, it bought the Taoyuan Luchu Plant, and later established the Nankuan Plant in 1997, to achieve a productivity of 800,000 pieces per month. The company was ranked No. 18 in the Top 100 IT companies worldwide, and No. 1 in Asia by U.S. Business Week. In 2003, the output of motherboard reached 28.5 million pieces, accounting for over 23% of the global market share. In addition, MIC of the Institute for Information Industry predicted that, in 2003, the international OEM/ODM market share of Taiwan motherboard manufacturers would be as high as 90%, in which the top four manufacturers (ASUS, ECS, MSI, and Gigabyte) would account for 65%. According to the latest statistics, the motherboard output of ASUS in Q1 2004 reached as high 10.2 million pieces, which is almost the combined outputs of its major rivals, including ECS, MSI, and Gigabyte.

2. Quanta company history

In 1988, Barry Lin established Quanta Computer with NT$30 million. With technical transfers from the Industrial Technology Research Institute, and its own research and development, the company implemented *Enterprise Resource Planning* (ERP) and automatic manufacturing equipment of *Surface Mounted Technology* (SMT). It first developed 9kg models, and continued to develop thinner, lighter, and more powerful machines. It was certified by ISO-9002 in 1994. Since 1995, it has begun to focus on the European market, and regards itself as a professional OEM/ODM.

3. ASUS motherboard product system structure and product life cycle

The motherboard is a major modular component of a desktop computer. A motherboard has about 800 components, including CPU Socket, 3-5 memory slots, 3-6 interface card slots, several types of ports, battery,

south/north bridge chip set, and hundreds of electronic parts, such as resistors, capacitors, and semiconductors. The price of motherboard (excluding CPU) accounts for only 20% of that of the desktop computer, but it determines the processing speed of the computer, and supports several major functions, such as sound and image cards.

Although the desktop computer motherboard is a modular product, due to the generation replacement of the above mentioned components, such as CPU, south/north bridge chip set (controlling the interface card, memory, BIOS, keyboard, and mouse), companies that can develop motherboards for the latest CPU can gain high profits through early stage marketing.

As the design of main layout of the motherboard entirely depends on the CPU and the specifications of the south/north bridge chip set, Intel, the leading manufacturer of CPU and chip set, determines the design of the main layout of the motherboard. The major components and circuit design structure of motherboard are as shown in Figure 1. The motherboard manufacturers can only determine the design of specifications of other components (semiconductor, battery, slot, expansion slot). Therefore, it is important to maintain a good relationship with Intel to win the competitive advantages in motherboard manufacturing.

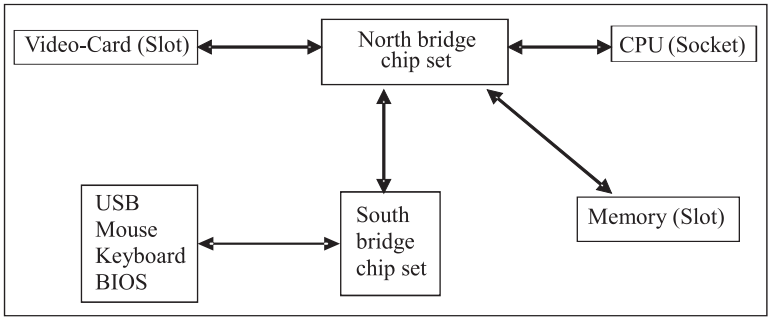


Figure 1

Motherboard major components and circuit design structure

Laptop computers have a shortened product life cycle; the current life cycle of a motherboard is about three months. Thus, how to renew the product according to the speed of the CPU and develop high-end motherboard products for the latest CPU, in other words, having preemptive development and marketing speed, are critical to motherboard manufacturers.

An ASUS procurement manager stated that, the entire company, from top to bottom, is making efforts towards the goals of Taiwan's speed, China's price, and Japan's quality

4. Quanta product system structure and product life cycle

Fujimoto (2001) analyzed the PC system structure analysis from the perspective of business architecture, and suggested that it belongs to the module-type structure and open business-to-business relationship. However, as laptop computers become more compact, most major components are unable to adopt standardized and modular specification designs as desktop computers. For example, the development of the housing and motherboard should take into full consideration of the overall circuit design. In addition, given various product specifications, there is no standard motherboard or housing on the market, thus, they are designed and developed independently by each manufacturer. Therefore, the product system structure of highly integrated technology of the laptop computer and the business-to-business relationships are different from those of desktop computers.

As the technology advances, the product life cycle of a laptop computer has been shortened to 1-2 years (i.e. the development of high-speed models, such as CD-ROM, DVD-ROM, and generation replacement of CPU), from 2-3 years in the early stage. In recent years, it has even shortened to 3-6 months. In this trend, only products of Time to Market can make profits before the price drops and avoid the malicious cycle of low price competition.

Given the laptop computer product system structure and the feature of a shortened product life cycle, a business-to-business relationship and speed become vital elements that affect the success or failure of laptop computer manufacturers.

5. ASUS and domestic component supplier relationships

As Quanta, ASUS, founded in 1990, is only responsible for product development and assembly. All the necessary components for the motherboard are procured. Except for a small number of high-precision accessories (such as chip set provided by Intel) and passive components, which are purchased from abroad, most of the components (including PCB, passive components, connectors, and semiconductors) are procured from domestic suppliers (ASUS has over 300 suppliers), about 90% of

which are concentrated in Taipei, Taoyuan, and Hsinchu, thus having fast delivery capacity, within 1-2 hours. These suppliers and ASUS form a supply system of the vertical division of labor.

When selecting suppliers, ASUS is mostly concerned about quality (such as the quality control system), followed by whether the product development direction and company strategy are in line with ASUS. In addition, the supplier must meet price, delivery schedules, and quality specifications of ASUS to become an official supplier. Components that can be manufactured in Taiwan must be procured domestically. ASUS and its suppliers are linked by the computer network MRP, which provides the demands for the upcoming 1-3 months so the suppliers can prepare the materials in advance and maintain flexibility. Even in case of any emergency demands from ASUS, suppliers can add night shifts to increase production. The procurement manager indicated that, Japanese suppliers prepare the materials and start production after the orders are received, unless there are finished components in stock, indicating their rigid supply system. (Kawakami, 1998).

ASUS also provides technical guidance, management support and even assign a team to help domestic suppliers in production line and layout design. It also cooperates with the suppliers in R&D, ASUS develops the blueprint specifications for suppliers to make samples or modifications. However, ASUS does not provide any machinery or equipment (such as tooling development) to suppliers.

ASUS maintains long-term transaction relationships with its suppliers, and there are many suppliers growing with ASUS. It is not efficient to change suppliers because high quality is based on a stable supply relationship. However, is it difficult to lower the price in case of long-term supply cooperation? The procurement manager stated that, the prices mostly follow the market trends. Except for some special components (such as chip set), new manufacturers of various components are introduced to keep the pressure on the existing suppliers. Therefore, ASUS is not in a one-on-one exclusive supply system with its domestic suppliers; instead, it is in an open system with market competition mechanisms.

6. Relationship between Quanta and its component suppliers

Started as a small business, Quanta relied on procurement strategies for the components and subsystems of laptop computers. In other words,

it did not adopt the self-sufficient closed vertical integration strategy, and instead, used the open procurement model. At present, it has about 300-400 suppliers, which can be categorized into three types. The first type contains about 200 local manufacturers that provide plastic, metal, cast, PCB, and molds. The second type contains 100-200 electronic suppliers that provide CPU, various IC, and passive components. The third type contains about 40 modular component suppliers that provide HDD, CD-ROM, LCD, and memory.

As foreign manufacturers mainly provide modular components, Quanta's domestic suppliers account for only 30-40% of the total cost, however, they provide a wide range of components that meet design or refinement requirements. During component transactions, face-to-face communications, collaborations, negotiations, and development are very important. Since the information technology industries are concentrated in northern Taiwan, these suppliers are within a one-hour ride from Quanta, and thus, have the advantage in delivery speed and save significant transaction and transportation costs.

What kind of transaction relationship should Quanta maintain with the domestic components manufacturers, based on full competition or the foreign modular component suppliers based on oligopoly? According to the procurement managers, once a qualified supplier has had no problems in quality and delivery transactions, and its price is not higher than the industrial average, Quanta tends to maintain a long-term transaction relationship (3-5 years or more).

By continuously introducing new suppliers, with lower prices, puts pressure on the existing suppliers, and maintains an open relationship (the more open it is, the more capable of maintaining transaction relationships with more than two suppliers, in terms of competitive price, quality, delivery, and high collaboration); and long term (the longer it is, more capable of reducing transaction costs, transitional costs, and promoting reliance, cooperation, and technical exchange relationships) coexistence relationships (see Figure 3).

Compared with a "series" of insider- transactions of large Japanese corporations (such as Fujitsu and NEC) or self-sufficient closed supply systems of the Korean consortium (such as Samsung and Hyundai), the American companies prefer open and short-term transactions, which are significantly different from Taiwanese companies.

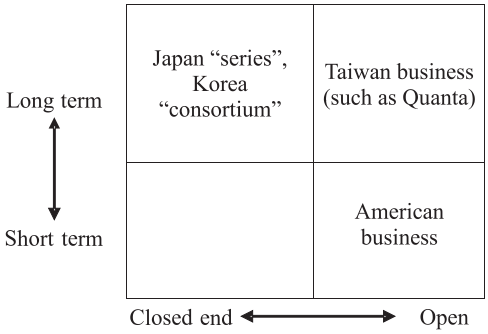


Figure 2

Transaction relationship between system assembly manufacturers and component supplier

7. Relationship between ASUS and Intel

As mentioned above, Intel determines the main design specifications of motherboard because it is the leading manufacturer of CPU and chip set. According to the procurement manager, "Intel needs to test its new CPU and chip set before launching, thus, Intel often sends a new CPU sample to ASUS to test for performance and stability on the motherboard. Another CPU sample is kept in the Intel Central Lab for testing. Intel will compare the test results of the two samples, and refine details according to the suggestions of ASUS".

This indicates that ASUS and Intel have already surpassed the short-term transaction relationship as often seen in the market, and developed a partnership of long-term collaboration and cooperation.

The senior manager of Intel Taiwan also stated, that "since the ASUS start-up team had the experience of developing the 386PC in Acer, they could quickly develop the motherboard for the 486 CPU. Such excellent development and design abilities were recognized by Intel, thus Intel granted ASUS the preferential treatment of Direct Account at its early stage. When promoting Pentium CPU in 1994, Intel selected only three motherboard makers across the world for collaboration. ASUS was the first to successfully manufacture the motherboard, which confirmed Intel's faith in ASUS.

After becoming an Intel Direct Account, in addition to preferential terms on procurement, ASUS can obtain information on the latest CPU or chip set specifications and design information before other manufacturers do.

For example, Intel would provide ASUS with specifications and design information of its latest products 4-6 months in advance for ASUS to design the circuit and layout. The CPU sample would be sent to ASUS for testing 2 months earlier. Intel values new product development and design capacity of suppliers because Time To Market means Time To Money, and winning the market opportunities means more opportunity for repeat orders. For example, Japan's PC industry is too closed and slow. NEC may receive the technical specifications of the latest versions at the same time, but it would take longer time to develop new products.

8. Quanta vertical division of labor system

The "zero component" procurement strategy adopted by Quanta is a type of professional core capacity that mobilizes rare resources on its own, and thus, it takes advantage of vertical division of labor. This differs from the findings of Kawagami's conclusion (1998) that Taiwan's PC industry development is mainly characterized by the division of labor between companies. The vertical division of labor system can be composed of the upstream component suppliers, middle system assembly manufacturers (such as Quanta), and the downstream branded manufacturers. The various manufacturers and suppliers in the upstream, middle, and downstream of the supply chain accumulate and utilize their own professional or core capacities, while the rest are outsourced to other manufacturers or procurement.

This study examined the vertical division of labor relationship between computer housing manufacturers and Quanta (Figure 4). As seen, housing manufacturers are only responsible for projection, assembly, and quality inspection. Other processing activities, such as mold development, plating, heat processing, and casting, are performed by upstream professional manufacturers or suppliers. For the easy control of quality and pursuit of speed, outsourcing is generally limited to level two suppliers.

9. Materialization of "cluster collaboration network"

Quanta has been building factories in Mainland China since 2000, and requested some major component suppliers to deliver or set up their business in Mainland China. In other words, even when moving business out of Taiwan, Quanta still expects to maintain the current supply system and relationships to satisfy the fast, inexpensive, stable, and high quality

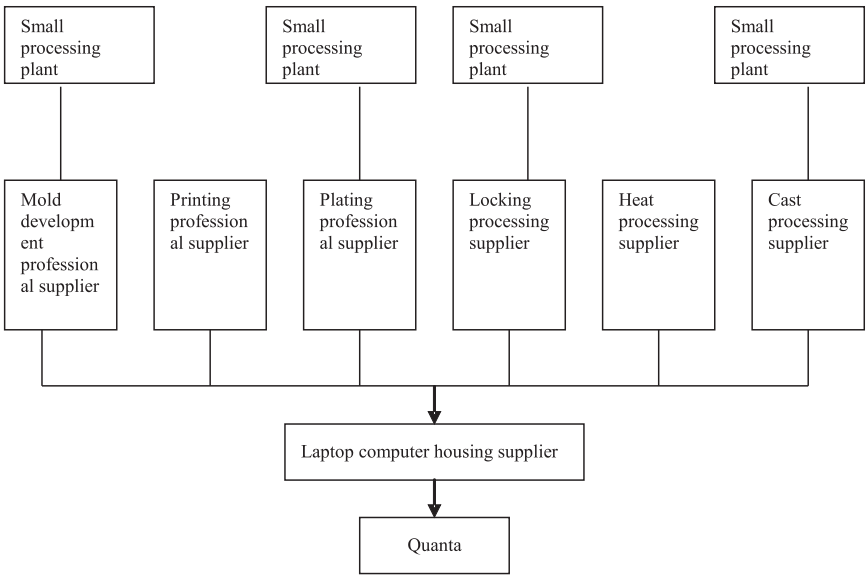


Figure 3

Quanta and outer case suppliers vertical division of labor system

(Source: Yung (2003), p. 199)

purchase requirements of large numbers of components. Only by integrating the IT industry's "clusters", with vertical divisions of labor and network structures, can the "cluster collaboration network" bring about the maximized overall effects (Yung, 2003). Quanta, within 10 years, can grow from a small-scale startup business to the biggest laptop computer manufacturer in the world.

10. Conclusions

Han (2001) studied modular type products of low interdependence (such as car dashboard), and found that it would be more efficient to adopt the "modular type development organization" of high independence because of the necessity for adjustment of suppliers and assembly manufacturers may be reduced during the development process.

However, this study suggested that, in the development process of modular type products of low interdependence (such as motherboard), the coordination between suppliers and system builders is still important. System builders need to maintain good relationships with key component suppliers (such as Intel that provides CPU and chip set). Before the com-

mercialization of the various latest components, close coordination, communications, and collaboration are crucial. In other words, adopting the "integrated development organization" could improve product quality, speed of R&D, and speed of market launch, in order to achieve a win-win situation.

The system structure of laptop computer products in the development trend of "thin and light" is different from the pure modular structure of the desktop computer. Instead, it is closer to a complex structure with highly integrated technologies in some components (such as outer case design). Therefore, regarding the development of the so called integrated type product with partial high-degree interdependence in function and structure (such as outer case design, processing and computer assembly), Quanta adopts the "cluster collaboration network" (Yung, Lee and Lai, 2009) of close collaboration, cooperation, and coordination between suppliers and system assembly manufacturers to improve the overall product functionalities and stability, as well as shorten the development and time to market times.

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