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### The competitive advantages of Quanta Computer - The world's leading notebook PC manufacturer in Taiwan

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## The competitive advantages of Quanta Computer – The world's leading notebook PC manufacturer in Taiwan

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Quanta was founded in 1988 by an Electrical Engineering (EE) engineer with the objective to manufacture laptop PCs. After a decade of dedication, positioning and evolution in the personal computer industry, Quanta has become the world's largest notebook PC contract manufacturer. This paper explores the business strategies and core competencies that have made Quanta the chosen manufacturing partner by nine out of ten of the global notebook PC vendors. Quanta's operating efficiency is compared with that of other major Taiwanese notebook PC manufacturers as a gauge of Quanta's competitive edge. The risks of Desknote as a threat to existing notebook PC business as well as the opportunity for Chinese domestic IT product demand and low cost manufacturing are also addressed. This research analyses Quanta's best practices as benchmarks for other companies in the IT business.

**Keywords:** Quanta; notebooks; competitive advantage; contract manufacturer

### Introduction

Founded in May 1988, Quanta became the largest notebook PC (NB) manufacturer in Taiwan by 1996, then went on to become the world's largest notebook (NB) manufacturer with sales units of 4.35 million NBs in 2001. In 2005, Quanta manufactured over 15 million NBs, which accounts for 25% of the global NB market.

Quanta's principal product line, notebooks, contributed approximately 90% to net sales in 2002. Other PC-related products manufactured by Quanta include desktop PCs, PC components and peripherals, such as motherboards, TFT-LCD monitors and slim-type optical disk readers. Under its vertical integration strategy, Quanta invested 48.75% shares in Quanta Storage, Inc., which includes R&D and manufacturing in slim-type CD-ROM drives, CD-RW drives and DVD drives. To ensure an inexpensive and reliable supply of LCD panels, Quanta invested 31.25% shares in Quanta Display, Inc., one of the top five TFT-LCD manufacturers in Taiwan. After becoming the leader in the global NB contract manufacturing market, Quanta also expanded into the cellular phone business in an attempt to maintain the momentum of revenue growth and high margin profitability.

Owing to the emerging trend of integration between information products and communication products, Quanta has developed new products such as web pads with wireless data communications capability, smart phones and network attached storage servers. Currently under development are emerging new technologies that integrate third-generation (3G) wireless communications functions of cellular phones into notebook PCs, tri-band GSM cellular phones and digital data devices that can access the Internet via broadband wireless connections. New product development is an important

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driver of business growth. It can be used as a competitive weapon and as an opportunity to reposition a company in the eyes of its customers (Gregory & Sohal, 2002).

To be the most successful full-service NB Contract Manufacturer (CM), Quanta has focused on its core competencies in product design and manufacturing efficiency. Quanta deliberately avoided selling NBs under its own brand name in order not to get into direct competition against its major customers. As NB product life cycle becomes shorter and more versatile, having the capability of helping clients launch new products swiftly becomes a key success factor to win orders of contract manufacturing. Quanta's business strategy is to build long-term mutually beneficial relationships with major clients. Working closely with its clients to understand their requirements and jointly develop new products, Quanta places paramount emphasis on providing responsive services.

Quanta has provided contract manufacturing for nine out of the world's top ten NB vendors, including Apple, HPC (Hewlett Packard & Compaq), Dell, IBM, Fujitsu-Siemens, NEC, Gateway, Acer and Sony. Four out of Quanta's eight business units (BUs) are dedicated to serve specific NB vendors; the fifth BU develops enterprise solutions such as servers; the sixth BU makes LCD monitors for desktop PCs; the seventh BU makes mobile phone products; and the eighth BU involves other wireless communication products. Each business unit is a profit center and has dedicated sales personnel to serve its own customers. Without compromising services to customers, the BUs also cooperate, as long as it is mutually beneficial, in areas such as component sourcing, research and development, manufacturing and after-sales services, finance and investment, etc., to benefit from economies of scale and synergies.

Quanta has two factories in Taiwan and one in Shanghai, China. There are three service centres located in Amsterdam, the Netherlands; Fremont, USA and Augsburg, Germany respectively. The mission is to provide technical services and responsive replies to customer demands.

In order to secure supply and drive key component costs down, Quanta has implemented an upward vertical integration strategy: invest in Quanta Storage, Inc., in February 1999, Quanta Display, Inc., in July 1999, and Quanta Network System, Inc., in March 2000.

The rest of this article is structured as follows. The next section describes the current status of the NB contract manufacturing industry in Taiwan; the section after describes the business strategy and core competencies of Quanta. The fourth section discusses the strengths and challenges of Quanta, while the fifth section compares the operations efficiency of Quanta versus other Taiwanese NB manufacturers. The final section concludes our findings.

### **Notebook contract manufacturing industry in Taiwan**

According to statistics provided by MIC (2001), Taiwan is the dominant supplier of several IT products, including NBs, LCD monitors, CD-Rs, CD-RWs, DVDs, PC cameras, ADSL modems, wireless LANs and ethernet cards. Since the IBM PC era in the 1980s, a PC industry cluster was established in Taiwan. There were a large number of Taiwanese vendors that were developing the majority of components required by PCs and NBs. Ample domestic supply of major components, such as TFT-LCD panels, DVD-ROMs, driver ICs and Backlight modules drove the costs down, making the Taiwan NB contract manufacturing industry more competitive.

In 2002, the top ten global name-brand NB vendors were Dell, HP, Toshiba, IBM, Sony, NEC, Fujitsu Siemens, Acer, Apple and Gateway. The first five dominate about 60% of the global NB market share. Due to the flexibility, efficiency and cost competitiveness of Quanta, nine out of the top ten NB vendors contracted Quanta to provide a manufacturing service. Table 1 shows the top ten global NB Original Equipment Manufacturers (OEMs) and their partnering Contract Manufacturers (CMs) in Taiwan.

Table 1. The relationships between NB OEMs and CMs in Taiwan.

OEMs	Dell	HPQ	Toshiba	IBM	Sony	NEC	Fujitsu	Acer	Apple	Gateway
CMs	Quanta Compal Wistron	Quanta Compal Inventec Arima	Compal Inventec	Quanta Wistron	Quanta Asus	FIC Quanta Arima Mitac	Quanta Compal Wistron	Wistron Compal Quanta	Quanta ECS	Quanta

### Business strategy and core competencies of Quanta

To maintain long-term partnerships with first-tier NB vendors is Quanta's priority business strategy. To ensure success, Quanta's core competencies include high quality product design, quick time-to-market, persistent cost reduction and efficient global logistics and services.

#### *High quality product design*

Nowadays, a NB CM must be good not only at manufacturing technologies and process control to ensure good product quality, flexibility, low cost and responsiveness, but also at product design and integration capability to create added value for OEM clients. Barry Lam, Chairman of Quanta, who has an EE background and was an R&D engineer, believes that R&D capabilities are vital to the survival of Quanta, which has to evolve into an intelligence-intensive company (MIC, 2002). To maintain its leadership in NB manufacturing and new NB development, the Quanta Research Institute (QRI) was established in 2001 to enhance its competitive advantages in design capabilities. QRI is planned to staff 5000 R&D engineers in Taiwan and will integrate Quanta's global R&D resources in the USA, the Netherlands and China. The goal is to transform Quanta's manufacturing base in Taiwan into a technology R&D centre. The mission of QRI is to develop technical capabilities that can provide total solutions to Quanta's customers. By then, Quanta will really become a global high-tech company, not just a CM of NB OEMs.

New NB models replace old ones every few months. First-tier NB vendors will only partner with CMs who have superb design capabilities that can shorten the design cycle and have the manufacturing technologies to produce a large quantity of products efficiently. With its mission of continuous R&D efforts, Quanta has the capability to meet this end. Sousa et al. (2005) proposed similar research results, that the company needs a continuous improvement process to change the way of conducting business.

#### *Quick time-to-market*

Product life cycle or the market window for new NB releases has become compressed. Missing the critical time-to-market means revenue loss or even write-off of obsolete products by OEMs. Therefore, OEMs always choose CMs with a short time-to-market cycle. Quanta's team of dedicated and skillful engineers with extensive experiences in NB product design has established a culture that fosters continuous pursuit of product innovation. Since Quanta has devoted a great deal of effort to NB manufacturing processes, such knowledge enhances NB design-to-manufacturing. Benefits are not just cost savings, but also better quality, higher production yield and faster time-to-market. Because Quanta maintains long-term partner relationships with first-tier NB vendors, early communication of market demand, technology trend and design concepts can facilitate the development process and shorten time-to-market of new NBs.

***Persistent in cost reduction***

Quanta manufacturing puts great emphasis on developing efficient, flexible and disciplined standard operations procedures, all of which are basic to achieve cost reduction. With advanced process technologies and dynamic production capability, Quanta can allocate its production resources flexibly and react quickly to technology or market demand changes. Its production lines can be adjusted quickly to manufacture different specifications of NBs requested by OEM clients. Quanta continuously presses the ramp-up time required for mass production of any new products. Currently, its time-to-volume production is less than 15 days from initial trial run to manufacturing in full capacity. In addition, Quanta has established strict quality control measures, which are designed to ensure high production yields and minimal defect losses. Pressing relentlessly on speed, yield and flexibility, Quanta has the lowest manufacturing cost in the NB contract manufacturing industry worldwide. Further, to take advantage of tax incentives as well as low labour and utility costs in China, Quanta has shifted production of less technologically sophisticated products to its production facility in Shanghai, China.

A direct advantage from striving to become the largest CM of NBs in the world with an extremely large volume of production is Quanta's bargaining power for component prices due to economy of scale.

Vertical integration has also enhanced Quanta's overall competitiveness by securing a reliable and low cost supply of key components. Other contributing factors include joint R&D, early design-in and quality assurance that key components satisfy the specific needs of Quanta. With technology transferred from Sharp, Quanta founded Quanta Display, Inc., which produces TFT-LCD panels. LCD panels are not only used as NB displays, they are replacing CRT monitors for desktop PCs and have great potential to become the preferred display for next-generation TVs. Quanta also founded Quanta Storage, Inc., in 1999, which produces NB-spec slim-type CD-ROMs, slim-type DVDs and slim-type CD-RW drives. Once the two key component companies can produce products with good quality and competitive costs, they can contribute to increasing the competitive advantages of Quanta. Now Quanta Storage, Inc., has become the largest slim-type CD-ROM provider in Taiwan and has sold to six out of the world's top ten NB OEMs, including HPC, Dell, IBM, Fujitsu-Siemens, Gateway and Sony. Even Quanta's competitors, e.g. Compal and Wistron, also buy from Quanta Storage.

***Direct shipment global logistics***

Quanta strives to be a full-service provider that provides services from product design, component sourcing, production, assembly, quality control, packaging, labelling, distribution to end-users and after-sales services. In March 1999, Quanta launched the Taiwan Direct Shipment (TDS) logistics system, which not only manufactures according to client's specification but also provides direct shipment of fully assembled PCs and NBs from Taiwan directly to end-users in various parts of the world. To offer full service provision required Quanta to overhaul its internal information management framework. Efficient management and precise control of the supply chains of all components are important to the success of a global logistic system. Production operations must be flexible enough to adapt to each of its client's unique requirements.

To ensure timely availability of components and production capacity, Quanta installed an electronic data interchange (EDI) system and established communications links with all of its major clients and suppliers. A customised supply chain tracking system monitors the exact inventory levels of input components and finished products.

Whenever a vendor receives a NB order from an end-user, a purchase order is immediately passed via the Internet to Quanta and subsequent component purchase orders are transmitted to relevant suppliers from Quanta based on the EDI format. Appropriate manufacturing capacities

will also be allocated. After manufacturing, the finished products are grouped into several batches and shipped to locations designated by customers. Manufacturing to order minimises inventory for finished products; however, configuring each NB specifically to an end-user's specifications is a great challenge for production flexibility. With Quanta's global logistics delivery, it promises to ship to a customer within 48 hours after getting an order (Einhorn, 2001). The TDS logistics model helps Quanta establish a stronger bond and closer relationship with its first-tier NB OEMs that is difficult for Quanta's competitors to break.

### **The strengths and challenges of Quanta**

During the past ten years, Taiwan has become the world's major manufacturing base for PCs and NBs. Nevertheless, competition from Mainland China is becoming eminently fierce. China has cheap labour, an abundant supply of land and other resources, as well as favourable tax incentives. Such incentives are irresistible for multi-national corporations worldwide to set up manufacturing operations in China, even those from Taiwan. Low tech and low margin industries were among the first to emigrate from Taiwan to China, starting in the mid-1980s. Concerned that domestic industries relocating manufacturing operations to China would have negative impact on local economy and employment, the Taiwan government restricted high tech industries, such as TFT-LCDs, NBs and the IC foundry, from setting up manufacturing operations there. However, in reaction to global NB vendors' constant push to drive costs down, Quanta was pressured to move some manufacturing operations to China in order to take advantage of the cheap resources offered by China and to stay competitive. In 1999, the Taiwan government reluctantly approved Quanta and other NB CMs setting up production lines in China. It is widely known that several Taiwanese NB CMs had already started manufacturing in China before the Taiwan government officially approved it. Understandably, such gun-jumpers have gained some advantage over Quanta.

Another push to move NB manufacturing operations to China has resulted from the growing demand for PCs/NBs in the Chinese domestic market. Dell, IBM, HP and others are expanding their China operations. When Quanta starts manufacturing NBs in China, it can provide local services efficiently and cost effectively to its OEM clients interested in the China market.

After China became a member of WTO, foreign companies felt that their investment in China would be more secure than before. Even once conservative and cautious Japanese companies, such as Sony and Toshiba, established production sites in China in 2002. If first-tier NB vendors start manufacturing in China or contracting domestic Chinese companies to become their low-cost manufacturing service providers, it will pose a serious threat to Quanta and other Taiwanese NB CMs.

So far, the technologies and know-how of NB production of Quanta and other Taiwanese manufacturers are ahead of local Chinese manufacturers. However, the latter are catching up fast, so the Taiwanese edge is narrowing. To strengthen further its competitiveness in the world market and maintain its edge, Quanta should make quick use of China's low-cost resources. The following sections analyse the strengths and challenges of Quanta.

### **Strengths**

#### *High entry barrier*

Compared with desktop PCs, NBs are more compact and more sophisticated and therefore have more stringent quality requirements than PC manufacturing. Consequently, the entry barrier into PC manufacturing is relatively low. Taking advantage of this fairly easy shift, motherboard manufacturers, e.g. Asus, USI and Gigabyte and home appliances vendors, e.g. Tatung and Sampo,



have evolved to produce desktop PCs. On the other hand, the entry barrier to becoming a NB producer is quite high for several reasons. First, there are fewer NB manufacturing companies than PC manufacturing companies. Experienced NB design engineers are scarce. Second, NBs require a high degree of integration of components on the circuit board. Therefore, each NB is different in mechanical design and circuit layout while PC designs are more standard. Third, because the market window for each NB release is very short and the cost of development is very high, no NB manufacturer with the technology and capital would be interested in cloning brand-named NBs. Finally, in the global NB market, popular brand names belong to several well-known multinational IT companies. It would be very difficult to establish new brand names in this highly competitive NB market. For example, Asus has put great efforts in promoting its NB, however its market is still limited to Taiwan and its profits have been less than expected. In short, the barrier to entering the global NB market is very high for any newcomer.

#### *Close relationship with OEMs*

Before an OEM releases an order to a specific CM, a lengthy qualification process has to be passed in order to ensure that all requirements and expectations can be met. The qualified CM may have to customise its production line to satisfy any special OEM requirements, or have to dedicate production lines for different OEMs in order to protect proprietary interests. The willingness to shoulder these expensive changes makes the OEM and CM relationship a valuable asset for CMs.

Since 2001, over 50% of NBs sold worldwide were manufactured in Taiwan. The top ten global NB vendors have contracted with less than a dozen Taiwanese companies for NB manufacturing because these Taiwanese companies have the experience, facilities and cost advantages. As the market share of the world's top ten NB vendors increases, the NB contract manufacturing business of existing Taiwanese CMs can also be expected to grow. Quanta is the leading NB CM in Taiwan, which has mastered the key success factors and core competencies in the NB CM business. The close OEM and CM relationship is one of Quanta's valuable assets.

#### *The clustering effect of the Taiwan IT industry*

Through the Taiwan government's favorable IT industry development policy and encouragement measures, the Taiwan IT industry has flourished over the past 20 years and has grown into the world's major manufacturing centre. Quite a few of Taiwan's information products have dominated the world's market share, including NBs, monitors, motherboards, power supplies, keyboards, mice, sound cards, VGA cards, scanners and wireless LANs. From the support of the upstream integrated circuits (IC) industry to the abundant suppliers of all kinds of components and accessories, the Taiwan IT industry has benefited from the suppliers and buyers clustering effect and has become the world's best one-stop shopping centre for PC-related products. Even though quite a few IT manufacturers have set up production facilities in China or South-Eastern Asia, Taiwan IT companies still enjoy the competitive advantage of the synergy resulting from the convenience, flexibility and efficiency of being a member of the Taiwan IT cluster, which has been accumulating and developing over 20 years.

### **Challenges**

#### *Insufficient supply of talent*

Quanta's goal is to transform from a contract manufacturing company to a high technology company. This transformation will require many good quality engineers and scientists who



can do applied engineering and basic research. However, because most Taiwanese technology industries' competitive competence has been focusing on manufacturing processes, the majority of science and engineering graduates in Taiwan have been devoting their knowledge and energy into production-related jobs. Consequently, in Taiwan there is a shortage of talent experienced in design and research.

Due to the trend of shifting manufacturing activities to China, most Taiwanese companies, within the NB industry or not, have adopted a similar technology upgrading strategy to Quanta. This strategy makes the R&D talent shortage even worse. Because the annual number of science and engineering graduates in Taiwan is only about 20,000, which is the maximum pool of talent Taiwan industry can draw on to innovate and upgrade. Clearly the talent pool in Taiwan is inadequate for Quanta to maintain a lead position. To become a significant high-tech company in the global market, Quanta will have to master the art of molding and training talents in China.

#### *Declining profit margins and heightened competition*

The global market shares of the top ten NB OEM vendors are increasing. In part, this growth reflects their increasing bargaining power with the CMs such as Quanta. Because the number of units of NBs in each contract manufacturing order is very significant, no CM can afford to lose orders from top-tier NB OEMs. Consequently, fierce competition among Taiwanese CMs has squeezed the profit margins of manufacturing NBs.

Hon-Hai, the largest revenue manufacturing company in Taiwan, has announced its plans to expand its business scope by entering the NB market. Since Hon-Hai has the well-known reputation of investing in extremely large production capacity and capitalising on its cost-cutting expertise derived from mass production, a bloody price war among Taiwanese NB CMs can be anticipated. Given the size, determination, and the pinch and scrape capability of Hon-Hai, Quanta will have to push even harder to enhance its manufacturing efficiency and to upgrade its technology edge in order to cope with this new challenge.

#### *The emergence of the Desknote market*

Top-tier NB OEMs have been pushing for new models of high-end NBs to be thinner, lighter, more compact and integrated with more accessories and functionalities. This push has become a race between design and manufacturing technologies and an endless pursuit of qualities. Hence, the prices have stayed on the high side.

Nevertheless, a different type of notebook PC, which may be referred as a 'Desknote', emerged in the market in 2002. Instead of pushing for high-end NBs, Desknotes are targeting the less expensive low-end NB market. Compared with high-end NBs, Desknotes will be thicker, heavier, bulkier and possess only standard desktop PC CPUs and components. There are two major product design philosophies: one is using exactly the same components a desktop PC uses. Not only is the supply abundant, but the costs are the same as desktop PCs. The second design philosophy is to squeeze desktop PC components into as small a box as is reasonably possible. With an LCD display, this shrunk-size desktop PC becomes a portable notebook PC, except its size is relatively larger than high-end NBs. Desknotes are positioned to replace the traditional desktop PC market. The price is comparable to a desktop PC plus a LCD display, and it has the advantage of portability just like a high-end NB.

Desknotes are expected to erode part of the NB market. Especially in the China market, where consumers are more price-sensitive but less quality-sensitive, Desknotes look to have the right market positioning. Since the manufacturing processes of Desknotes are similar to those of desktop PCs, existing desktop PC manufacturers can easily enter this market. Asus

and Elite, the two leading PC motherboard manufacturers in Taiwan, have already found their niche in entering the Desknote market.

Should Quanta also pursue the Desknotes market? If yes, Quanta would have to identify its competitive advantages in producing Desknotes against the already large group of desktop PC manufacturers both in Taiwan and China.

### *Key components supplies*

For Taiwanese NB manufacturers, some key parts and components of NBs, such as LCDs, CPUs and hard disk drives, are imported from key Japanese or US suppliers, such as Intel, Seagate, Toshiba and IBM. The delivery date, volume and costs are variables in Quanta's production operations that need to be managed. Naturally, expanding the volume of production can increase the bargaining power when dealing with suppliers. Quanta has done well in this respect because it is already the largest manufacturer of NBs in the world. Nevertheless, the feeling of unease will always exist as long as there is dependency for key components or parts on critical suppliers. Quanta plans to address this unease.

Driven by the desire to be independent, Quanta has invested in Quanta Display, Inc., (QD) in order to secure the supply of TFT-LCD panels for the displays of its NBs. If Quanta Display can produce LCD panels of a satisfactory quality at a competitive price, this investment would be the right strategic move. However, if Quanta Display, for some reason, could not produce LCD panels at a quality and yield comparable with other LCD manufacturers or at lower cost than other LCD manufacturers, this investment would be the wrong strategic move.

The LCD business characteristically requires repeated heavy investment to purchase the latest manufacturing technologies and facilities to generate the least cost per unit output. Whether Quanta is prepared to make huge investments in the LCD business, or whether Quanta has the technical capability to perfect LCD manufacturing are challenges Quanta must face. In 2006, Quanta decided to make a strategic alliance with AU, the largest panel maker in Taiwan, to reduce its operational risk.

## **The performance analysis of Taiwan's top five NB manufacturers**

### ***Using the DEA method to compare overall operating efficiency***

This section compares the efficiency of Quanta's operating performance against that of the other four leading NB manufacturers in Taiwan, i.e. Compal, Inventec, Arima and FIC. The traditional financial analysis method can be used to calibrate the efficiency parameter of the performance of a single output versus a single resource input. However, a company's overall operating efficiency should be measured by the performance of its multiple outputs under its multiple resource inputs. The Data Envelope Analysis (DEA) method can work effectively to analyse the overall operating efficiency of a company (Charnes et al., 1978; Banker et al., 1984; Andersen & Petersen, 1993; Doyle & Green, 1994). In this analysis we used the D&G model of the DEA method proposed by Doyle and Green (1994). The D&G model has the advantage of adopting a more objective peer-appraisal analysis than the traditional self-appraisal analysis of other DEA models.

Considering the multiple outputs and inputs of the five companies under comparison, the DEA method can generate an Envelope of Efficiency. Companies with values of inputs and outputs closer to the envelope are more efficient than companies with values of inputs and outputs farther from the envelope.

The three input items considered are fixed assets, total capital investment and operation expenses. The six output items considered are revenue, operation income, earnings before income tax (EBIT), earnings per share (EPS), ratio of EBIT to revenue (EBIT%) and return on assets (ROA%).

Table 2. Relative efficiencies of five companies using D&amp;G analysis model.

DMU	D&G efficiency indicator	Ranking
FIC (1998)	0.2487	19
FIC (1999)	0.3840	17
FIC (2000)	0.4504	15
Compal (1998)	0.5355	13
Compal (1999)	0.6472	10
Compal (2000)	0.8909	6
Compal (2001)	0.8770	7
Inventec (1998)	0.5685	11
Inventec (1999)	0.6861	8
Inventec (2000)	0.9481	4
Inventec (2001)	0.6808	9
Arima (1998)	0.3974	16
Arima (1999)	0.4530	14
Arima (2000)	0.5484	12
Arima (2001)	0.2820	18
Quanta (1998)	0.8940	5
Quanta (1999)	1.0380	3
Quanta (2000)	1.0694	2
Quanta (2001)	1.4431	1

Because only five companies were analysed, the number of reference data to construct an Envelope of Efficiency was not sufficient. We treated each company in different years as a unique unit. For example, five companies in a period of 4 years (1998–2001) can be treated as 20 unique units. Since the EBIT of FIC in 2001 was negative, it was removed from consideration. Hence, there were a total of 19 operating efficiency measures to be compared.

The relative efficiency of the 19 units analysed by the D&G model of the DEA method is shown in Table 2. The result shows that Quanta (2001), Quanta (2000) and Quanta (1999) were the most efficient units compared with other companies in the same four-year time period.

### *Using the financial analysis method to compare operating efficiency*

We also use three traditional financial analysis indicators, i.e. EPS, EBIT% and ROA%, to compare Quanta's operating efficiency against that of the other four companies. The three financial indicators of Quanta, Compal, Inventec and Arima were averaged over a four-year period (1998–2001). Since the EBIT of FIC in 2001 was negative, FIC's three financial indicators were averaged over a three-year period (1998–2000). Table 3 lists the three financial

Table 3. The average financial indicators of five NB manufacturers in Taiwan from 1998 to 2001.

Companies	EPS	EBIT%	ROA%
FIC*	0.08 NT	0.44	2.25
Compal	4.23 NT	10.38	14.50
Inventec	2.98 NT	6.77	11.79
Arima	4.66 NT	6.62	15.77
<b>Quanta</b>	<b>10.17NT</b>	<b>12.91</b>	<b>28.46</b>

\*FIC's data are covered over three years from 1999 to 2001.

indicators of the five NB manufacturers in Taiwan. Quanta's EPS, EBIT% and ROA% are the highest compared with the other four companies.

### Conclusion

This paper addressed Quanta's business strategy and core competencies that have led the company to become the world's largest NB manufacturer. Given that the global NB market shares of the top ten NB vendors are expanding, these vendors have gained more bargaining power to squeeze Quanta's profit margin.

The close relationship between NB OEMs and their partnering CMs acts both as a risk and a strength to Quanta. As Quanta has already become the CM for nine out of the top ten first-tier NB vendors, the room for growth is limited while the risk of loss of one or two major OEM clients could mean a significant drop of revenues. However, Quanta has strived hard to establish an efficient supply chain management system with its upstream component suppliers and its downstream OEM clients. Such a strong bond has built a high entry barrier for competitors.

The emergence of Desknotes represents an innovation, using an old technology to make a new product targeted to satisfy an existing market, part of which the existing NB OEMs and CMs – including Quanta – target. This new development poses a threat to all.

China is rushing to become the world's primary manufacturing center with her various low cost advantages. China's domestic demand for IT products will also expand quickly as the percentage of the financially capable population increases. Quanta must accelerate its China strategy to take advantage of this opportunity.

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