4. Case Studies

4.1. Case Study 1

4.1.1. Background

The first case study company is the vendor of one of the world's best-known brands of PC. Since spinning-off its manufacturing operations, they have focused on globally marketing their brand-name products: mobile and desktop PC's, servers and storage, LCD monitors and high-definition TV's, peripherals, and e-business solutions for business, government, education, and home users. The company ranks first in the computer, peripherals & software wholesale industry in Taiwan, and their total sales in 2005 were approximately 129 billion NTD.

4.1.2. IT Capital – Input

The case company has separately calculated the IT budget, IT human resources and performance of IT in Taiwan, China, and other areas. They total them just at the company level. There are 150 staff members in the IT department. The service tenure is 4 years on average. The turnover rate is not very high and the salary bonus is twice as much as the industry average. In the IT department's budget, the main expenditure consisted of personnel costs and consultant fees, usually accounting for 50% of the total. Hardware expenditures and maintenance costs of hardware and software take the other half, of which software expenditures make up nearly a quarter.

The case company has four major information systems. The first is the enterprise resource planning system, which was started three years ago and is the most important corporate reengineering project of the company. Five sets of heterogeneous enterprise resource planning systems were integrated into an exclusive one, which was developed by outside consultants and inside IT staff members together. In the industry, success of this kind of special project is rare, because of its complexity, and the costs of time, money, and human resources are very huge. In addition, the risks and the difficulty level of technology are very high. The IT department and other user units must work in concert to integrate five systems into one global enterprise group ERP system. At the same time, the centralized IT infrastructure combined with each part could still support the global development of the case company group, which has distributed business units. The case company transformed their business of hardware manufacturing into the information product service, logistics marketing, and the business of electronic services about five years ago. Therefore, the reengineering of the ERP system has influenced and been helpful to their transformation.

The second is the global financial information system which is in planning at the present. With the cooperation of international system companies and professional consultants, the system is completed in several stages. From the headquarters to each

business unit's IT department, they carry out the implementation of systems step by step. The phase 1 of the system is helped by the consultant group and the cost is quite high. After phase 1, the IT department will take over. Consequently, the knowledge, skill, and experience will be practically recovered by the organization. They can work toward the development of the international enterprise during the following expansion, maintenance, and response of business.

The third is the global supply chain management system. Due to the thin profit margin and the various global product lines in the high-tech electronic industry, a global SCM system transforms the form of large orders, large deals, and large deliveries into a form that a business can handle regardless of size. They are able to deal with all large and small orders, and turn small orders into large delivery forms. Flexibility and combination are very important in the SCM system. The case company adopts the system which can deal with multiple goods of a single order and many orders delivered by a single container. Not only can they quickly modify the orders, but also can trace all kinds of order statuses using the procedure.

The last is the product lifecycle management system. The system is focused on quality and feedback of new products during the life cycle of R&D, marketing, transaction, and customer service. The system is used to support the strategic transformation from manufacturing industry into marketing service industry. The main propose of the PLM system is to understand and gather market information, customer behavior, and industrial trends, so that they can lead the new product, new service, and new business model in terms of the modification and improvement of the business process. In addition, they can have more control over cost of raw materials, fill the requirements of environmental protection, and then accumulate knowledge management and R&D intellectual property. The key IT competitiveness of the case company is determined by these four development and operation information systems, and other important information systems, including the computer-aided manufacturing system, human resources information system, and the office automation of the internet/intranet.

The primary business operation of the global enterprise's IT department is supporting information access of marketing, accounting, and finance, and connecting with suppliers, shippers, and sellers all day, every day. Therefore, the abilities of operations and trouble-shooting are very important. It can mainly be divided into two parts. The first is trouble-shooting of the system, including software and hardware problems. The IT department usually need to fulfill the demands of automated production and automated receipt orders, and to solve the pure system problems in a half or full day. If the problem is related to operations and business processes, they will need to understand the complexity of the system problem and how it combines

with operations, or how it connects with other systems, in order to determine how to handle the problem. They have to decide whether the problem should be divided, whether they need help from the original manufacturer, and whether they need to test or simulate separately to discover the cause of the problem. The time cost may be from one day to one week.

IT department organization of the case company tends towards flat hierarchy structure. The Information Manager is under the CIO, and the next is an engineer who is responsible for everything, including system analysis, development, implementation, and maintenance. The IT department takes the training for systems and technology more seriously than the training of business and professional work, with approximately twice the amount of hours and money invested in it. The whole enterprise and business organization becomes a matrix. Therefore, there are IT departments in Taiwan headquarters and IT groups in the global branches. The IT department is responsible for large-scale core information system R&D, implementation, and support, while IT groups determine the use of developed platforms, and hardware and software for small-scale and distributed systems by themselves. This is very important for the multi-national corporation. Because of the competition for management, a company must have enough flexibility to grow and improve the profit margin. As for the customer, it is necessary to have a single window, a single IT platform, and a single system to process orders and service. No matter the status of the orders, they must have a single window to face these customers which all have different business models and processes. Especially for the international customer, the company does not divide and dispatch a single order until the process is internal, so the customer has more confidence and feels a benefit in doing business with them.

4.1.3. IT Capital – Output

The IT department proposes thousands of items every year. It is sometimes difficult to distinguish the size of a proposal. These distinctions are only based on whether the proposal is involved with IT infrastructure, business model, and process in order to distinguish the level of complexity and innovation. Generally, proposals to be implemented on existing systems take more time than others. There are some uncertainties on the scheduling and budget, owing to maintaining the normal operation of existing systems. If the proposal is a new system or has limited influence on existing systems, the scheduling and budget will be more easily handled and more quickly completed. The time spent may be three months to nine months. As for the aforementioned proposals concerning existing systems, they may sometimes need half a year and sometimes three years to complete the work in all parts of the world.

The performance assessment of the IT department should be based on suggestions and opinions from the CIO. The characteristic and responsibility of the IT department, unlike the business units, could be described as a spectrum. Towards the user's end of the spectrum, the IT department is responsible for the system's usability and that it provides a benefit to the user while being user-friendly. Towards the system end of the spectrum, their responsibilities are to develop application systems using adaptable platforms and technology, to understand the real demand of the user, and to propose innovative system designs or application projects. In the middle of the spectrum, depending on the degree of combination of system and procedure, measurement should focus on either the abilities of user application and management or the abilities of the IT department's R&D and construction. Therefore, it should be adaptable to assess the user section using the financial performance indicators as ROI or CBA. The system performance indicators are more suitable to assess the IT department, such as the probability and duration of system halt, system response time, comprehensive and correct data in time, the optimization cost of the IT software and hardware facilities, and the IT staff's productivity and turnover.

4.1.4. IT Capital – Management

The case company's CIO indicated that in some companies using ROI to assess each department may be based on the CEO's viewpoint. However, it is not adaptable to every industry, especially manufacturing or OEM industry. Because the supporting or engineering role of the IT department is very obvious, it is an issue that transforms from the cost reduction purpose into the benefit purpose. What is their final purpose if they transform? It may be hoped that the IT department either optimizes the whole company's cost or, in the future, creates a new independent firm and services the enterprise group or other firms' IT outsourcing. This is a strategy issue to discuss.

4.2. Case Study 2

4.2.1. Background

The second case study company is an international manufacturer of computer notebooks. They have established branches in the PRC, South Korea, England, and the U.S., and have wide range of computer and communication products. The company ranks third in the computer manufacturing industry of Taiwan, and the total sales in 2005 were approximately 211 billion NTD.

4.2.2. IT capital – input

How does one manage IT capital? IT departments should have concepts of cost to manage IT resources. Think of an IT department as a factory or a company to be

managed, and adopt the views of “utilization” and “efficiency” to manage and distribute limited resources and time. At the same time, IT has its own value chains and supply chains that need to be managed. There are many supplies offered to IT departments, such as software, hardware, networks, host computers, advisors, connection, etc. An IT department, like a factory or a company, needs to manage its supply chain and supplier efficiency.

4.2.3. IT capital – output

How does one manage IT capital? First of all, ask whether or not the degree of IT department cooperation is strong enough when the company has new customers or new products to go on the market. Is the IT department part of the group or an onlooker? Can it fully cooperate with organizational change and innovation? Can the IT department voluntarily understand and become familiar with the characteristics, fields, processes and models of the industry, and offer integrated strategy?

The IT department is a support department in the company, and originally is meant to help other departments manage and reach goals. As long as IT plays its own role well, it can become a part of the larger community, along with every other department. The philosophy of the IT department should be “Make Thing Happen!” This will not happen if the company is unwilling to invest in IT continuously and it will lose IT competitiveness rapidly.

The definitions of “utilization” and “efficiency” in managing and distributing resources are as follows. Which units do resources of the hardware have? What cost is there in the hardware platform? After the structuring of the hardware is optimization. Which units of business use it? Which modules are used? What is the consumption and use situation? As a result, the customer of Department A probably brings 30% of the contribution, but only consumes 10% of the IT resources. The customer of Department B brings 10% but consumes 30% of the IT resources. The IT department has the responsibility to distinguish and to make better resource allocation decisions for the company. For example, the IT department usually uses an activity-based cost (ABC) system to track and record information of these objectives

How does IT capital create value? First, it integrates with the commercial process and model to produce innovation and results. In the notebook computer industry, big international companies, such as HP, Dell and Toshiba, require different IT abilities and B2Bi demands, but all requirements for the automation of C2O, CTO or BTO are of the same strictness and complication in order, delivery and direct production. Therefore, according to different customers, differences and effectiveness of the commercial process and model are very important and valuable. For example, if ten minutes were formerly needed to deal with an order originally, but now only one

minute is needed. Another example would be that in the past, orders could only be placed during business hours, but now can be done anytime. IT helps to deal with this complicated process in order to lighten the loads of other departments, to lower the costs of operation and to reduce processing.

IT has a major responsibility for quickly integrating a heterogeneous information platform. The CIO should play a supporting role in helping the company transit, update and expand constantly through IT utilities. The greatest challenge for IT is to allow the boss to spend money in an efficient manner. It is also the IT department's responsibility to help the boss make changes and solve problems. What the boss needs most is not a perfect program, without bugs, and a computer that will not crash, but a process that has been improved and a goal of company that has been reached.

Other departments need to understand IT. The more people understand the IT department's expertise and work, the higher the value that the IT department will have. When others understand IT, the IT department can be used by other departments and be integrated with them. The IT department hopes that through working hard, day-by-day, it can obtain the trust and respect of other departments and the worthiness of IT investment.

4.2.4. IT capital – management

There is a practical method that comes from the OEM notebook computer industry. Although Taiwan is an OEM kingdom, the gross profits of OEM are generally very low. The present situation of the company in question is third or fourth place, among the competition. In order to keep or obtain a leadership position, every OEM strictly controls costs. Because this is very hard to maintain, OEMs must be concerned about the benefits of every dollar. When the IT departments of the OEM industry propose the budget for IT, it will suffer the challenge of other departments and the chief executive. IT departments need to use the views of investment to persuade the company to allot the funding. The method, in this case, is through setting up an IT steering committee, which consists of the vice president of each business unit, the executive vice president and the CIO of the company. The executive vice president is the chairman, and the committee verifies the priorities and determines the amount of IT expenditure and investment.

After the IT investment budget is sent to the IT steering committee, the CIO is queried and challenged by every committee member. He has to produce exact facts and figures to persuade them. In the phase of quantitative measurement, he uses the ROI, CBA and IRR methods, but in the others, such as procedure and customer service improvement, he adopts different methods between using IT before and after. The latter needs others to cooperate or to change, so it is not easy to persuade each

committee member. It relies mainly on making a consensus.

4.3. Case Study 3

4.3.1. Background

The third case study company was selected as one of the top 10 manufacturers in Taiwan, and as 21st in the “Global IT 100” by *Business Week* in the U.S. They have complete product lines and strong integration capability with their suppliers and customers. Their global top 6 products include power supplies, imagery, modems, LED’s, and digital displays. Their notebook adapters have made them stand in the first position among all manufacturers. Besides, photo couplers which belong to the LED product family, gained a 12% global market share and have made them the biggest supplier in the world. The company’s total sales in 2005 were approximately 19 billion NTD.

4.3.2. IT capital – input

The value of IT depends on three parts. Firstly, the investment cycle of IT is short-term or long-term. Secondly, the business model of that industry is production manufacture oriented or service marketing oriented, and the higher ration of business is B2B or B2C. Thirdly, IT role, which CEO regarded as, is cost oriented or strategy oriented. The cost oriented CIO and project is different from the strategy oriented, so the resources received and the results are different obviously.

However, the most important questions are, whether CIO understands the business, whether he can control the business requirements, and whether he has set up the business case. Although industries and business models are different, there is a factor, which cannot be changed and neglected. That is whether CIO can help CEO to solve the problem.

That is to say, if CIO can represent the ability to solve problem, he will be valuable naturally. He will gain “BUY IN” of CEO and get support and respect of business group and the executives of other departments too. Since IT itself does not have special value, it will just be valuable when it integrated with the users. IT is using the technology to help everybody solve and reduce the question. In this way, IT produces the value that everybody admitted.

Some CEO may not understand IT very much. However, if you help him to solve some important problem that he feels headache, he will continue observing your ability and adopt your suggestion at the critical moment. You will be the key person. In fact, no matter what the background of CEO is, IT should create new value constantly. Because this is a real world and everything is very practical, the problem that IT can be solved and the conclusion that IT can be produced and improved should

be said very clearly. Such as business process reengineering, global checking out, and supply chain predicting, all these are the projects which CEO and executive are very care and the KPI which is very important. Although CEO does not clearly know how IT should be used to reach the objective, IT department can integrate the resources to solve the difficulty and really set up the plan.

4.3.3. IT capital – output

The general users do not clearly know how to improve the procedure, to shorten the checkout time, to predict the supply chain and sale. Only CIO is most familiar with the system who knows the main procedure and the keys of minor procedures, and knows how can be optimization. Only CIO can propose the suitable technology, which can solve the problem. This is an advantage of CIO. CIO can certainly persuade the boss, and the thing that must to do can be in the boss' top list. Then, they can get the "BUY IN" of boss, have cooperation with other business unit, and have investment. Otherwise, user's units do not care about these, and they do not mind it. In this way, the user and IT are both lost.

Customers of IT are cross-departmental. CIO must have ability to integrate cross-departmental, and let IT and business be integrated to create new value together. IT must have some real achievements and successful cases to persuade others. CIO has to persuade the other business unit, let them accept your integration, and make them think that this is everybody's goal, not the CIO's, and it can be integrated successfully.

If the user cannot promise anything, they do not know the reasons and the persons they are fighting for that project. If they do not know what benefit will be produced when installing system, this project will not succeed. They have to find out the KPI and business problem. They should master the business procedure and propose the technology solution, and then IT and user units will go on together. IT project needs to be successful on every level. After planning, preparing, being agreed, installing, and being on-line are the complete procedure that a successful case must be involved.

These have to become the system and the standard because if there is no system, investment of IT will become the waste. In fact, the investment of IT is to help the enterprise produce the different benefits at different stages, such as procedure benefit, operation performance, cost-effective, etc., and these benefits all have to be assessed and quantified.

If IT wants to be the driver, it must act as a role of leader to lead the organization to do the right thing and initiate the business project of organization kernel. This is the strategy of CIO. Sometimes, when CEO and President have strategy sight and

appreciate IT value very much, the investment of IT will be an essential goal (mandate). However, if the situation is not like this, it will depend on cognition and cooperation between CEO and CIO to determine.

4.3.4. IT capital – management

"BUY IN" strategy of CEO is the key of CIO and IT project to be successful. Why will the CEO make "BUY IN" strategy? What is the reason?

In other words, the value of IT was not offered by organization but developed and trained by IT itself. Therefore, IT people must understand business and industry very much, except for having technology background. They should have higher sensitivity and the same heart for users' carelessness or complaint.

Great investment of IT should be tried one's best to capitalize. It is because after capitalizing, more business products will be produced. This is the benefit of capitalization, and IT project will just be valuable. CIO accumulates these professional abilities on ordinary days. They enhance the new technology and knowledge constantly, pay attention to everything of management and business, and learn all their life to take. This is a series of development, and the value of IT will just be lighted up in this way.

CIO should have strict training to quantify the IT benefit. The result of project must be able to measure. It is not necessary to be very detailed, as long as the great procedure can be proved. On the practice, the achievements can be seen certainly and measured objectively. If the result of IT has a part of not quantification, there will usually be many adjectives. All these methods are unacceptable by management because they are all professional managers. They want to see the thing happen and see that IT has the ability to quantify the business project, even to be financial. The part of not quantification should be reduced. The relationship of

CIO, CEO and the trust, which both sides set up on the work, will be used in the acceptance of the intangible benefit.

The role of IT is usually divided into aspects of strategy, management and operation in the scientific theory, but it is very difficult to define clearly in practice. A project of IT may include any other things about strategy, management or operation. It depends on which angle to view and different persons may have different understanding. Therefore, IT people have to try to see themselves by strategy and get back to enterprise's goal. To see what is organization doing. To see what is the strategy of company. They should not set their own role at the beginning. They should see themselves with enterprise's strategy goal and regard the whole and essence of organization as IT all.

IT can transcend the role of the enabler, and become the role of transformer. The

transformer will change enterprise's constitution, find out the position of strategy, find out the right thing to do, and take the strategy thinking into the organization and personnel inside. They will let everybody produce the common understanding and transplant to the structure and procedure of company. These will bring the change in essence, produce the model to shift, and create enterprise's leading advantage.

4.4. Case Study 4

4.4.1. Background

The fourth case study company is a world-leading manufacturer of large-size thin film transistor liquid crystal display (TFT-LCD) panels, which are currently the most widely used flat panel display technology. The company ranks first in the optoelectronic materials, components & products industry of Taiwan and the total sales in 2005 were approximately 165 billion NTD.

4.4.2. IT capital – input

The key work of IT includes four aspects. The first is the IT infrastructure of every factory; the second is inspecting information assets regularly and restructuring the assets continuously; the third is integration of new systems and old heterogeneous systems; the fourth is reserving IT energy and abilities from the period of stability or high development.

4.4.3. IT capital – output

When the CIO of a case study company in the TFT-LCD industry was asked about what is the IT capital of his company, he replied with the following questions. "Could ERP installed successfully be regarded as IT capital? Could the successful transaction be regarded as IT capital? Could the data, which can be reusable, be regarded as IT capital? Could influencing or helping operational decisions be regarded as IT capital? Could accurate data be regarded as IT capital?" Because the factories of this company are spread around the world, they depend on IT for connection. This is managed almost entirely without paper, as the operation is totally online. Without IT, the company would be unable to react instantaneously. It is more appropriate to define IT capital in this manner.

The TFT-LCD industry is a manufacturing industry. What makes it different from a service industry is that IT has to integrate manufacturing and production procedures and make manufacturing, not marketing, a priority. Therefore, internal support is more important than external, through such methods as emphasizing internal commercial procedures and seamless productive automation. In the TFT-LCD industry, MES is a key component of CIM. CIM is like the brain and nervous system

of the company, and it is responsible for obtaining, collecting, managing, and controlling information and making policy for integration with commercial operation.

IT is used well in cost analysis and automation service in terms of both speed and quality. But for the manufacturing industry, not the service industry, the influence of IT on the strategy is very limited. On the one hand, the two industries are different, and on the other the proportion of entity manufacture is very high in the manufacturing industry. Its business model has been already stable and not easy to change, so the contribution of IT for the strategy is not presently apparent.

When a production line or any information system is cut off, its influence should be reduced as time passes. This is the main KPI of IT and the place where the CEO takes notice of the IT department. When resources or time are limited, the IT department will use ROI concepts to calculate the priority of investments, to deal the special project development which is less clear, and to persuade the executive with figures and other evidence.

There are two directions for IT in the future. One is to drive comprehensive integration and the other is to pay attention to innovation. Enterprises especially must choose whether to move towards internationalization and maximization or not. Therefore, IT will be relied on more deeply and more will be expected of it. This means that IT should play more of a strategic role, such as formulating new policies, improving the operating SOP, and offering higher use value of ERP and MES functionality. It will not be only the question of equipment, but also the more important question of user and manager direction. The space of chance and growth that IT can display on strategy, in the future, is very large. However, the more important factor of IT capital is the CEO’s authorization and trust in order to touch off IT’s intangible benefit.

4.4.4. IT capital – management

Currently, the TFT-LCD industry is in a period of high growth. The industry not only regards IT as essential equipment but is also increasing investment in IT during this good economic environment. Due to the high development and independent practices of IT in every factory, overlapping investment and resource waste form a gradual, inconspicuous problem. During periods of high growth, it is difficult for the TFT-LCD industry to manage elastically and regularly at the same time. Overlapping control will depress growth and it will be hard to manage due to the excessive elasticity. As a result, it is very important for the TFT-LCD industry to balance the above two methods.

4.5. Case Study 5

4.5.1. Background

The fifth case study company has a wide range of 3C products, such as digital displays, mobile phones, scanners, keyboards, digital projectors, storage devices, wireless technologies, and electronic components. The company ranks 4th in the computer manufacturing industry of Taiwan, and the total sales in 2005 were approximately 148 billion NTD.

4.5.2. IT capital – input

Most information systems for the high-tech OEM industry were self-developed, not involving the software of the big vendors. The main systems include PLM, ERP, SCM, Logistics, Workflow Engine and HR. The reason is that the enterprise software sold by international companies mostly does not fit the production and management procedures of local OEM industry. Their systems need more customization as the environment often changes or evolves. In buying mainstream software and then customizing it, there is not enough time, internal control, response time and security.

IT people generally employ an engineering-type style. They will just say a percentage of what is finished. Hence, IT people are often low-key on their contributions in the department. They often do not say out loud if something is finished and therefore do not get proper feedback.

The tangible and intangible benefits of IT can actually be seen everywhere. The simplest examples are the E-mail server, internal network and applications of VoIP. If there is any problem in the system and service is lost, the company is totally paralyzed. Once the service has trouble, the benefits, both tangible and intangible, of IT, will suddenly disappear. Organizational operation totally depends on IT infrastructure and system service and it is these results that link personnel, work and procedure. It is impossible to calculate IT's value separately.

For example, the iPod has been phenomenally successful. The iPod uses iTunes, which is its most important technology. If we ask what the value of iTunes is, it may be difficult to calculate. Because iTunes and the iPod are bundled together to display their greatest value in a synergy; one plus one is greater than two. Therefore, the tangible and intangible benefits of IT must be evaluated by the users.

In a frequently merged and dynamically organized environment, the IT department's focus is carrying out the goals and strategy of the new organization in the shortest time. CIOs need to know whether IT resources are spent on crucial items, especially human resources. Where do IT people spend time? Do they teach users how to use the system, solve user problems, develop new projects, or research new technology? What percentage is each part? What is the optimal ratio of IT manpower and work? How does one integrate goals and strategy effectively? The decision of the

CIO is how to distribute resources to reach the greatest productivity. This will be the biggest contribution. IT is always in a high pressure environment, where demand is larger than supply.

4.5.3. IT capital – output

At present, the high-tech OEM industry uses financial and quantitative performance indices to measure IT investment benefits, with strong recommendations for ROI. The industry generally considers the value of IT in three respects, which all need to connect with financial performance. These aspects are strategy, cost, and productivity. Strategy refers to options and choices. Can IT enable future plans? If a strategy is to create an own-brand, go international, or be the first in the whole world, IT already needs to be working on it. Cost refers to manpower saved, lost orders and procedure steps reduced. Productivity refers to the fact that if IT information is correct, exact, transparent, effective, and can be collected in a timely manner, the production line can take a simulation and use it to optimize planning and scheduling. At that time, the ratio of product utilization, factory automation, and staff productivity can be figured.

The value of IT must be evaluated by the user, because the user is the person who most clearly knows where the value of IT is. In IT investment planning, the company will require users to propose their demands first. Then, the IT department proposes the budget. The department hopes that there is an automatic and transparent mechanism. The mechanism lets the IT demand of other departments pass to the IT department, and the IT department fills in cost parameters after optimization and common understanding, with every department, directly on this system. Seventy or eighty percent of IT projects should be checked and evaluated automatically, and the others that can’t be automated are completed by interdepartmental discussion and voting. Hopefully, cost-effective measures and the priorities of IT investment can be processed and standardized.

There are not many companies in the high-tech OEM industry using balanced scorecards (BSC) and performance indices (KPI) at present. Generally, they only practice the greater and higher-level indexes. For example, how many percentage points of revenue should be increased? What percent of profit rate should be greater? How many percentage points of gross profit rate should be increased? According to these indexes, short-term or medium-term objectives are established. However, they do not usually carry out the objectives of ground level employees or medium-level executives. In other words, they only have the enterprise’s goal, while most departments have no detailed performance index of goals to practice. Because of dynamic growth in the industry, organizational change and learning, and constant

integration and merging, especially international merging, there are a lot of different changes at each stage in institutional structure, management systems and standardization procedures. These changes are exciting and unprecedented, so it is unsuitable to adopt balanced scorecards and to implement overall performance indices at this stage. This is different from the financial holdings industry from which these measurements originated.

4.5.4. IT capital – management

Because IT and procedures must be closely integrated, the organizational framework of IT is not distinguished by the functions of system development but by the organizational functions and professional fields. In other words, it is to synchronize the function with the department. What the CEO pays attention to is whether IT can save costs and manpower. Although it is difficult to quantify everything, there are still many parts that can be done. For example, in the high-tech OEM industry, there are very long value chains; from getting materials ready to producing goods. It is a channel (pipeline) that is linked together. If there is little to no IT to connect the value chain, it is not easy to estimate necessary manpower, material resources, and financial resources. There will be a lot of over planning and waste. Consequently, IT offers users the important states of flow, stock of supply and demand that is real, immediate, and exact. It can greatly reduce the uncertainty of each link in the pipeline and reduce the buffer that various kinds of value activities need. Furthermore, it can greatly reduce the accumulated cost and operational risk. These can be not only quantified but also estimated. That is to say, the whole pipeline would store manpower, financial resources, and material resources, estimated at about 9 billion, for 30 days, in the past. Because of IT, one can perfectly follow the trace of supply and demand, everyday. As long as IT can help to shorten the budget for one day, a company can save 300 million. That amount of money is considerable, and IT investment is quickly retrieved.

4.6. Case Study 6

4.6.1. Background

The sixth case study is a world-leading semiconductor foundry, specializing in the contract manufacturing of customer designed ICs for high performance semiconductor applications. The company ranks second in the semiconductor manufacturing industry of Taiwan, and the total sales in 2005 were approximately 117 billion NTD.

4.6.2. IT capital – input

In this case, the IT division supports individually the factory, building and function. IT departments separate them along internal or external factors into several parts, including e-commerce, electronic enterprise departments, ERP departments, SCM departments, and IT infrastructure departments. The information system divides into CIM (computer integrated manufacturing), BS (business support), and ITI (information technology infrastructure) systems. CIM relies mainly on MES (manufacturing engineering system). BS relies mainly on ERP, SCM and CRM, while ITI relies on the server, database, network and telephone.

4.6.3. IT capital – output

The semiconductor industry manufactures, does research & development and designs primarily by IC. Different departments and managers assess the performance of IT differently, so there is no standard to assess IT. The assessment of IT is mainly considered in two respects. One is whether or not the IT works well with the factory and the second is consideration of how the IT can be expanded, especially in profitable times.

Most importantly, in the semiconductor industry, are the production systems of each factory and district. They need to integrate IT resources of every function, check information assets, and reorganize the asset system and procedures that can be standardized, in order to determine strategy. Managers could choose outsourcing and further improve the cost-effectiveness of a company. But, if IT is separately developed by function and factory, it will not be easier to introduce the strategies of standardizing and outsourcing.

This case strongly acknowledges the importance of Knowledge Management (KM). It involves use of the file database, adds the mechanism of sifting, and cooperates with management and their applications so that personnel, knowledge and experience may be preserved within the organization. The effect of KM is determined by the degree of attention of the department manager.

As a benefit, IT offers financial and accounting information systems, as well as the ERP system. In innovation, a set of automatic procedures is offered, as well as encouragement of intellectual property and patent rights. In procedure efficiency, computer integrated manufacturing systems are used. Lower costs are facilitated through the calculation of the reduced cost of each month and are verified by the executive each season. In the relation between supplier and customer, connection to the supplier's complicated B2B procedure is handled through the information system. IT has helped the procedure flow, but as to whether IT is sure to reduce the cost, it is not guaranteed. When IT makes the flow smoother or helps the department to simplify and improve procedures, one finds that the user's demands have changed. The user

might even think that the demand offered before was incorrect, and the expenditure in the indirect cost may not be reduced. According to a preliminary estimate, the improvement of procedure via IT is limited to 10% at most, and the other part may not be made by IT.

The most important value of IT is ‘Enabling’. IT can enable the semiconductor industry to have many innovative and varied abilities, as well as enabling a lot of B2B high-order and complicated commercial procedures, customer service quality that is continuously guaranteed, making new competitors encounter obstacles and also producing the essence of IT capital.

If IT only focuses on lower costs, there are few benefits and influences obtained. The focus should be on what kind of capabilities IT can enable. How can the benefits and feedback be increased five fold, or even more than ten fold, and be seen in customer count, sales, and earning capacity?

4.6.4. IT capital – management

Through the objective and systematic processes of quantification, the highest manager's trust can be obtained. The semiconductor industry adopts tangible, quantifiable and financial methods to assess performance, especially ROI, and the results of this implementation have worked well. For benefits that are difficult to quantify or are non-financial, the narrative method is used. The user participates and states the observed benefits, and tries to use the system data to support these quantitative or qualitative performance assessments.