CHAPTER 2

LITERATURE REVIEW AND BACK GROUND MATERIALS

2.1 Information Systems (IS)

According to Andreu et al. (1992), Information Systems (IS) is understood as:

" The formal group of processes that, operating on a collection of data structured according to the needs of a company, complies, elaborates and distributes part of the information necessary for the operation of the company, and for the related management and control activities, supporting, in part, the decision-making processes necessary to carry out the business functions of the company. "
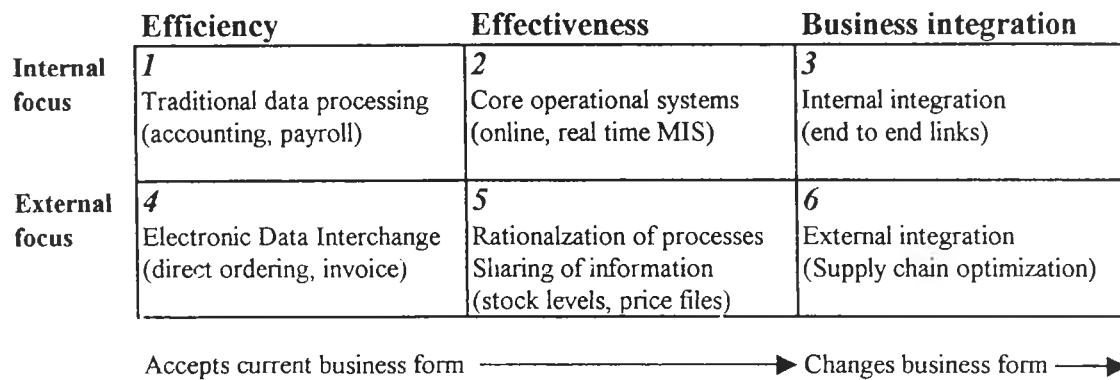
Generally, most companies need certain information to flow in order to coordinate their business activities whereas specific information must be arrived timely to support decision-making process. This information also provides guideline for people who responsible for controlling activities, so that they know if there is any departure from established plans. In doing so, all activities in the business can be done as coherently as possible with the company's goals.

Phrommapan (2000) suggests that an information system is an organized combination of hardware, program, data, people, and procedures. The machinery of information systems is input, processing and output. The input process collects data from within the organization or external environment. Then these data will be processed or converted into a more meaningful or understandable form. The out put process then transfers the processed information to people or activities where it is needed. Information systems therefore play a vital role in making decision, controlling operations, analyzing problems or creating new products in the business.

Edward et al. (1995) identify that Information systems can be classified by several different ways such as:

◆ By the degree of formality (formal or informal).
◆ By the degree or extent of automation applied to them (manual or computer-based systems).
◆ By their relation to decision making (strategic decisions, management control decisions, and operational decisions).
◆ By the nature of input and output.
◆ By the sources and degree of tailoring.
◆ By the value to the organization.

Throughout the last three decades, information systems have been evolved dramatically. The evolutionary model in figure 2-1 illustrates how the application of information systems and the benefits obtained have developed over six stages.

	Efficiency	Effectiveness	Business integration
Internal focus	*1* Traditional data processing (accounting, payroll)	*2* Core operational systems (online, real time MIS)	*3* Internal integration (end to end links)
External focus	*4* Electronic Data Interchange (direct ordering, invoice)	*5* Rationalzation of processes Sharing of information (stock levels, price files)	*6* External integration (Supply chain optimization)

Accepts current business form ————————————▶ Changes business form ——▶

Source: Adapted from Edwards et al. (1995)

Figure 2-1 The Evolutionary of Information Systems

◆ Stage 1: Internal Efficiency

About 30 years ago, most organization focused on developing systems for improving internal efficiency. Many tasks such as invoicing, accounting, and order processing were computerized in order to replace the manual activities normally done by clerks. Systems flexibility though was not quite important as systems developed did not change very much through time.

◆ Stage 2: Internal Effectiveness

In stage 2, attention was going towards using the information stored in the computer for the purpose of management information. However, many problems developed because the user's needs change and tools available to develop systems were those used for data processing. The personal computer was therefore came up to support different needs of users. Systems were developed independently and not much sharing data between department.

◆ Stage 3: Internal Integration

There were many attempts to integrate systems by way of sharing data between the various functions of the business. Many organizations were beginning to realize the value of integrating the information in the business rather than fragmenting it into functional subsystems. In doing so, departments can be merged and responsibilities can be allocated according to the information movement.

◆ **Stage 4: External Efficiency**

Moving to stage 4, computers owned by different organizations are connecting to form networks. Orders, invoices, product specifications and many important documents are being transferred electronically, and thus eliminating many inefficiencies and redundancies of paper works. This stage is quite similar to stage 1, but it has focused on the external instead of internal efficiency. Electronic Data Interchange (EDI) is a good example of such systems.

◆ **Stage 5: External effectiveness**

In this stage, the use of the systems involves using data collected in stage 1, 5, sharing information between organizations, and transferring data electronically to the mutual advantage of organizations such as sharing the stock level to all interested parties.

◆ **Stage 6: External Integration**

Turing to stage 6, sharing information then can lead to a dramatic change in the form of the industry. Customers can take on tasks normally done by suppliers such as invoicing themselves. Like wise, suppliers can also raise purchasing orders on behalf of the customer. This can be possible only if both have access to information of each other.

2.2 Strategic Information Systems

Wiseman (1985) defines strategic Information Systems (SIS) as systems that can support or shaped the firm's competitive strategy. A SIS is characterized by its ability to significantly change the way in which the business is operated [Turban et al. (1999)]. SIS does this through its contribution to the strategic goals of the company and/or its ability to increase performance, productivity, and effectiveness significantly.

Neumann (1994) maintains that conventional information systems, if used in innovative ways, can become strategic. Originally, strategic information systems were used to compete externally in the industry like providing new service to customers or suppliers to overcome competitors. But starting in the late 1980s, strategic systems are also used internally to increase the competitive position of the company by improving employee's productivity, teamwork and communication. Besides the internal and external use, strategic alliances where two or more companies share a SIS are also considered as another dimension to SIS.

2.3 Information Systems Planning

Generally, there are five possible approaches as shown in figure 2-2 that a company may take to IS planning. These approaches are ranged from basically no formal planning at all, traditional IS planning, reactive IS planning, linked IS planning and strategic information systems planning (SISP).

Planning Type	Approach
1. No planning	No formal plans are produced for either business or information systems. A amount of informal planning may occur I the heads of top management.
2. Traditional IS planning	Traditional business planning and budgeting takes place. IS planning also occurs but in isolation from the business planning process.
3. Reactive IS planning	IS plans are developed to reflect changes in the business policy, although they are not dependent on the business plan.
4. Linked IS planning	Corporate planning takes place, followed by IS planning. The IS plan is derived directly from the business plan. There is only one-way communication from the business plan to the IS plan.
5. SISP	Corporate planning and IS planning are combined to form a single process. Each is dependent on the other. Thus there is an extensive two-way impact on plans.

Source: Adapted from Remenyi (1991)

Figure 2-2 The Five Approaches to IS Planning

Remenyi (1991) identifies that a SISP is a process of establishing a program for implementation and use of IS in such a manner that it will optimize the firm's information resources and use them to support the objectives of the whole corporate as much as possible.

The concept of SISP has been evolving over the last decade. People have realized that only the hardware and software requirements approach to IS planning was not enough for the company. In fact, SISP involves matching the IS applications with the objectives of organizations. Earl (1993) summarizes that SISP includes the following areas:

♦ Aligning investment in IS with business goals.
♦ Exploiting IS for competitive advantage.
♦ Directing efficient and effective management of IS resources.
♦ Developing technology policies and architectures.

The first two areas involve with information systems strategy whereas the third and fourth are concerned with information management strategy and information technology strategy respectively.

2.4 The strategy Formulation Models

According to Hofer and Schendel (1978), strategic formulation process can be considered as one kind of problem-solving process for identifying an organization's strategy. Basically, many major strategic formulation models include the seven steps: strategic identification, environmental analysis, resource analysis, gap analysis, strategic alternatives, strategy evaluation, and strategic choices, either explicitly or implicitly.

Primarily, the major strategic formulation models differ in the extent of detail, explicitness, and complexity in each step of strategy development. Andrews (1971) developed a simple model, as shown in figure 2-3, yet helpful to organizations, especially with those that are just beginning to develop formal procedures for formulating strategy. Many evidences have shown that a small organization that had no previous experience with formal planning often faces difficulties understanding the complex, two-level strategy formulation models.
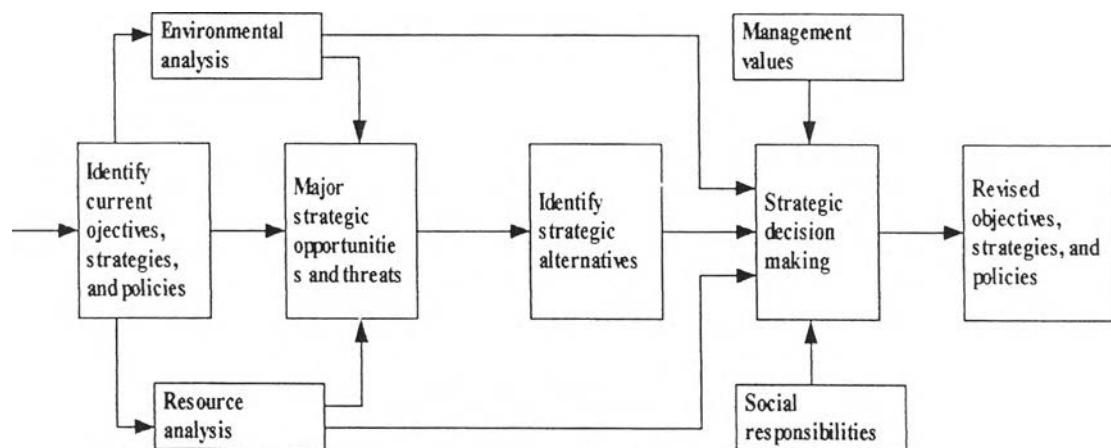
Note: This model was constructed by Hofer and Schendel based upon Andrew's ideas
Source: Adapted from Hofer and Schendel (1978)

Figure 2-3 Andrew's model of the strategy formulation process

2.5 The linkage between business strategy and IS/IT Strategy

2.5.1 Integrating information systems and business strategy

In the past, information system strategy of many organizations was derived from the existing business activities and plans. The development is usually bottom-up rather than leaded by business-driven plan and that often results in an inefficient use of resources and missed opportunities. Edward et al. (1995) identifies a number of problems resulted from the lack of a coherent IS strategy as follows:

➢ Competitors, suppliers, and customers may gain advantage over the organization.
➢ Business goals will become unachievable due to system limitations.
➢ Systems are not integrated thus causing duplication of effort, inaccuracy, delays and poor management information.
➢ Priorities and plans are being changed continually producing conflict among users and IS staff, and poor quality.
➢ Technologies chosen do not integrate and even become a constraint to the business.
➢ No means exist to establish appropriate IS/IT resource levels, to evaluate investment and to set priorities consistently.
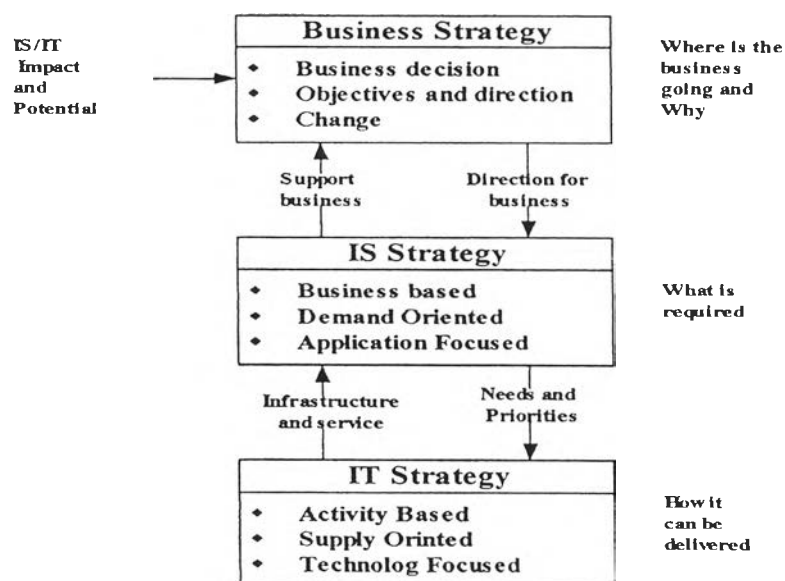
Source: Adapted from Ward and Griffiths (1996)

Figure 2-4 The relationship between business, IS, and IT strategies

Therefore, the planning of IS/IT strategy must be made accordingly to the business needs. A strategy can then be linked to the business environment and goals of the organization. In fact, IS/IT should be considered in the process of formulating strategy, in terms of what it can enable the business strategy to be. Integrating IS and business strategy must therefore include the considerations of the potential impact that IS/IT can have on the organization and its business environment. This is equally important to the considerations of external environment factors in formulating the business strategy. Figure 2-4 shows the relationship between business, IS, and IT strategies.

2.6 Strategic Planning frameworks and tools

2.6.1 The Porter Competitive Forces for Industry Structural Analysis

Porter (1985) identifies that the state of competition in any industry depends on five basic competitive forces: the entry of new competitors, the threat of substitutes, the bargaining power of buyers, the bargaining power of suppliers, and the rivalry among existing competitors. These competitive forces reflect that competition is not limited only the established companies. In fact, customers, suppliers, substitutes, and potential entrants are all considered as competitors to companies in the industry. All of these five forces also determine the intensity of industry competition and profitability. Understanding these competitive forces is therefore very important to the formulation of strategy. Companies, through their strategy, can influence the five forces and shape the industry structure. Many successful strategies have shifted the rules of competition in this way.

Robson (1997) notes that after assessing the significance of these five forces to the industry, this framework can also be used to assess whether information systems can influence the relative power of these forces, including what opportunities exist by the use of IS. A good business or IS strategy should be able to create barriers against potential new entrants, change the balance of power in supplier relationship, increase switching costs for customers, and change the basis of competition among rivals in favor of the organization.

2.6.2 SWOT Analysis

Johnson (1993) suggests that SWOT (Strengths, Weaknesses, Opportunities, and Threats) analysis could be a very useful way to provide a mechanism for systematically thinking through the extent to which the organization can deal with its environment. SWOT analysis requires an understanding of both the environment and the resource capabilities of the organization. The lists of major strengths and weaknesses of an organization as well as potential opportunities and threats, although somewhat crude, have proved in practical application to be a helpful to the

formulation of strategy. They provide an insight to the current situations of the organization. Then the strategy that is relevant to these situations can be developed.

The point of performing SWOT analysis suggested by Robson (1997) is that the businesses should not take on a high-risk strategy or an opportunity, if they have significant weaknesses in the area. A SWOT analysis is a reminder of a need to balance and an attempt to judge the options available. We can also use SWOT to weight up the risks involved in possible responses of IS such as when both opportunities and strengths present, the organization is in the position to attack its competitors by using IS with a good chance to succeed. On the other hand, when both threats and weaknesses present, the organization must take steps to protect itself from its vulnerability to be attacked from its competitors.

2.6.3 Strategic Thrusts

Wiseman (1988) defines strategic information systems as " *uses of information technology to support or shape an organization's competitive strategy, its plan for gaining or maintaining a competitive advantage or reducing a rival's advantage.* " He notes that information systems can be considered strategic only when they support or shape the strategic thrusts. These strategic thrusts an organization can employ to gain position are differentiation, costs, innovation, growth, and alliances, all of which influence relationship with customers, suppliers and competitors. Figure 2-5 shows the strategic thrusts in a competitive arena.
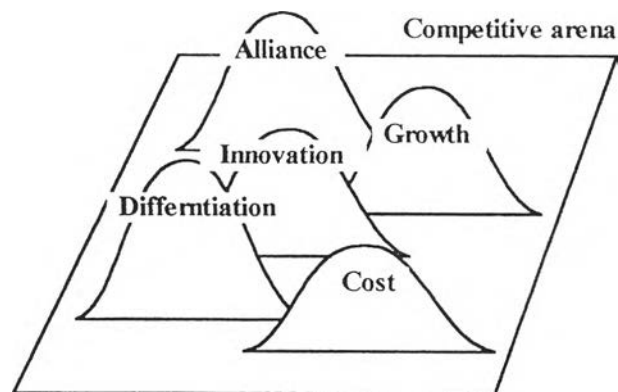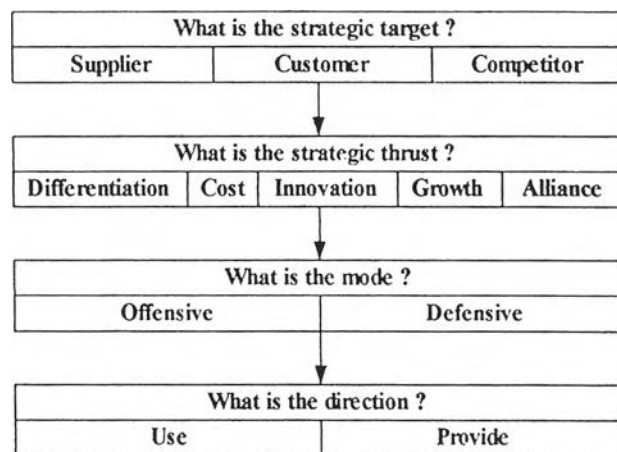
Source: Adapted from Warwick Manufacturing Group (1999)

Figure 2-5 The Strategic Thrusts

2.6.4 Strategic Option Generator

Based on the theory of strategic thrusts, Wiseman (1985) develops a conceptual model called the strategic option generator to identify business opportunities, especially involving the use of information systems. It can also be used to evaluate organizations that have successfully used IS to gain a competitive advantage. The strategic option generator as shown in figure 2-6 begins with the identification of business targets: customer, supplier, and competitor and continues through the strategic thrusts: differentiation, cost, innovation, growth, and alliance, strategic modes: offensive or defensive and then the direction of the use of information systems.

What is the strategic target ?		
Supplier	Customer	Competitor

What is the strategic thrust ?				
Differentiation	Cost	Innovation	Growth	Alliance

What is the mode ?	
Offensive	Defensive

What is the direction ?	
Use	Provide

Source: Adapted from Wiseman (1985)

Figure 2-6 The Strategic Option Generator

2.6.5 The Application Portfolio

The application portfolio developed by Ward and Griffiths (1996) is a means of bringing together existing, planed and potential information systems and assessing their contribution to business. An application can be defined as strategic, high potential, key operational, or support, depending on its current business contribution. Strategic applications are critical to the future success of the organization. They shape or support the strategic thrusts of the organization. High potential applications are considered the potential future strategic importance of the organization but still in the early stage of considerations. Key operational applications are very crucial to the day-to-day operation of the organization. If they do not exist, operating business might not be possible. Finally, support applications are those that can improve productivity or efficiency of business tasks but not critical to the business. Applications in portfolio, as shown in figure 2-7, will evolve over time. The direction is usually strategic – key

operational – support with movement from high potential to any other segment possible as well.
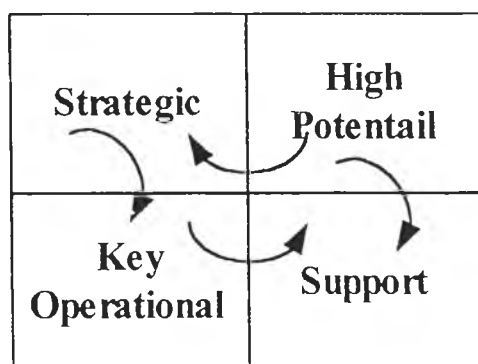
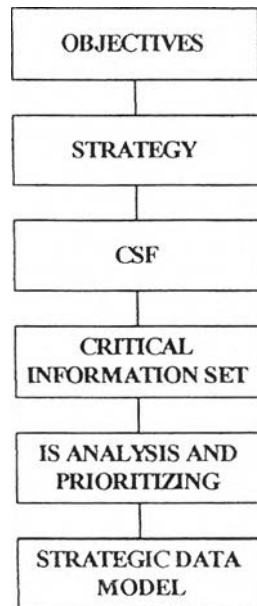Source: Adapted from Ward and Griffiths (1996)

Figure 2-7 The evolution of an application portfolio over time

2.6.6 Critical Success Factor (CSF) Analysis

Another important technique in SISP is the critical success factor analysis (CSF). A research conducted at the Massachusetts Institute of Technology (MIT) by John Rockart and others has shown that the CSF technique in IS planning is an effective way to identify the information requirements of a firm's executive and the enterprise as a whole. The CSF then has become the cornerstone of several SISP methodologies.

Rockart (1979) defines CSFs as being " for any business, the limited number of areas in which results, if they are satisfactory, will ensure successful competitive performance for the organization". He notes that CSFs provide a focal point for directing an information systems development effort, and CSFs method should result in an information system useful to top management as it highlights key areas that require a manager's attention.

Ward and Griffiths (1996) suggests that the determination of CSFs should be started only when the objectives have already been identified. The first stage is to identify CSFs against each objective. Many CSFs will occur but a reasonable number should be 5-8 per objective. Only then should the importance of information or systems in achieving those CSFs be considered. CSFs also enable management to use their judgement in two ways: to assess the relative importance of systems opportunities and to identify the information required managing the business. To be effective, it is necessary to be clear about objectives before starting to create a CFS analysis. Figure 2-8 illustrates the steps for developing CSFs.

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┌─────────────────────┐
│     OBJECTIVES      │
└─────────────────────┘
          │
┌─────────────────────┐
│      STRATEGY       │
└─────────────────────┘
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│     CRITICAL        │
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│   IS ANALYSIS AND   │
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│  STRATEGIC DATA     │
│       MODEL         │
└─────────────────────┘
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Source: Adapted from Remenyi (1991)

Figure 2-8 The Steps for CSF

2.7 Evaluation of Design Output

2.7.1 Design Control (Input, Output and Validation)

To ensure that the design out put meets the user requirements, a systematic validation is needed. According to ISO 9001 (1994), design input requirements relating to the product shall be clearly identified, documented, and reviewed by the supplier for adequacy and design output shall:

> ➢ meet the design input requirements;
> ➢ contain or make reference to acceptance criteria;
> ➢ identify those characteristics of the design that are crucial to the safe and proper functioning of the product (e.g. operating, storage, handling, maintenance, and disposal requirements).

At appropriate stage of design, design verification is needed to ensure that the design stage output meets the design stage input requirements. Design verification may include activities such as performing alternative calculations, comparing the new design with a similar proven design, undertaking tests and demonstrations and reviewing the design stage document before release. After successful design verification, design validation should be performed to ensure that product conforms to defined user needs and/or requirements. Validation is normally performed on the final product under defined operating conditions. Multiple validations may be needed if there are different intended uses.

2.8 Other Related Issues

2.8.1 Success Factors in Strategic Information Systems

According to Ward and Griffiths (1996), the research based on the analyses of over 150 examples indicates the key factors that occur frequently. Few strategic information systems show all of these factors but many show a number. The followings are those factors:

➤ External not internal focus.
➤ Adding value not cost reduction.
➤ Sharing the benefits.
➤ Understanding customers.
➤ Business-driven innovation, not technology driven.
➤ Incremental development.
➤ Using the information gained.

These factors provide the implications to us that what actually produces the success - information technology, information systems, or information. Some companies might use high technology to create advantage but normally it lasts only short time because competitors will be able to purchase the same technology at one point. Any advantages could soon be reduced. If a company needs to sustain its competitive advantage, it must use the information systems gathered from its systems to improve its product or service to meet the requirements of the business.

2.8.2 The needs for Information Systems

According to Phrommapan (2000), the needs for information systems are as follows:

1. **More Complexity in operations:** Organizations are growing rapidly as well as employees, departments, and resources. Therefore, an organization with fast operations has a crucial advantage. Companies, domestic and international, have heavily invested in technology resulting in more pressure for other companies to keep pace with.

2. **Reduction of operation time:** Advance technology expedites operation and increases productivity. Compared to manpower, using machines in production can manufacture products according to the planed schedule more accurately.

3. **High needs of consumers:** Customer demand is increasing every day. Underdeveloped countries are pushing themselves towards development. Developing countries also keep improving their capabilities to match those of developed countries. When economic is good, consumers then have more buying power.

4. **More competitors:** Running a business has to deal with more and more competitors these days. One reason is the open of free trade that makes competition more intense. Information systems have been used for success in business. The purposes of using information systems as a competitive weapon are:

♦ Obstruct the opposites to use systems, data, or information when needed.
♦ Reduce opposite's information system capabilities.
♦ Produce and transfer misleading information to the opposites.
♦ Obtain information from the opposites to use for our benefits.

5. **The introduction of computer to support decision-making:** Knowledge management is a new era of managing an organization. Many big companies have competed with each other by introducing many products to provide useful information to top management to help in decision-making. Among these products are Office 2000, SQL Server, Exchange server, or Domino R. 5.

2.8.3 Decision Support Systems (DSS)

Power (2000) explains that Decision Support Systems (DSS) are interactive computer-based systems intended to help supporting and informing decision makers to identify, solve problems, and make decisions. DSS is also intended to improve and speed-up the processes by which people make and communicate decisions. Generally, there are five major DSS categories: communications-driven, data-driven, document-driven, knowledge-driven, and model-driven. Figure 2-9 shows the target users, purpose, and technology deployment in each of these five categories.

Dominant DSS Component	Target Users: Internal → External	Purpose: General → Specific	Deployment Technology
Communications Communications -Driven DSS	Internal teams, now expanding to partners	Conduct a meeting or Help users collaborate	Web or Client/Server
Database Data-Driven DSS	Managers, staff, now suppliers	Query a Data Warehouse	Main Frame, Client/Server, Web
Document base Document-Driven DSS	the user group is expanding	Search Web pages or Find documents	Web or Client/Server
Knowledge base Knowledge-Driven DSS	Internal users, now customers	Management Advice or Choose products	Client/Server, Web, Stand-alone PC
Models Model-Driven DSS	Managers and staff, now customers	Crew Scheduling or Decision Analysis	Stand-alone PC or Client/Server or Web

Source: Adapted from http://dssresources.com/papers/supportingdm

Figure 2-9 Decision Support Systems Categories

Communications-driven DSS supports more than one user. It includes decision model like rating or brainstorming to support communication, collaboration, and coordination among users. Data-driven DSS emphasizes on access to and manipulation of large database of the company. Target users are managers or staff, now extending to suppliers as well.

Document-driven DSS refers to systems that help managing, retrieving, and manipulating unstructured information. It integrates a variety of storage and processing technologies to provide assists in knowledge management, categorization, inquiry, deployment, and discovery for users. Knowledge-driven DSS specializes in problem solving. It can suggest and recommend actions for managers from its database that store knowledge from expertise as facts, rules, and procedures or in similar structure. Finally, model-driven DSS focuses on access to and manipulation of model such as financial models, representational models, conceptual models and optimization models. It uses data and parameter provided by decision-makers to aid them in analyzing a situation.

2.8.4 Web-based Decision Support Systems

Power (1998) identifies that Web-based Decision Support Systems refer to a computerized system that provides decision support information or decision support tools for managers or business analyst using Web browser like Netscape Navigator or Internet Explorer. The computer server is hosting DSS application that is linked to the users' computers by a network. Web-based DSS have reduced technological barriers to make decisions based on information available to managers and staff users in different geographic areas, thus making it easier and less costly.

Source: Adapted from http://dssresources.com/papers/webdss/index.html
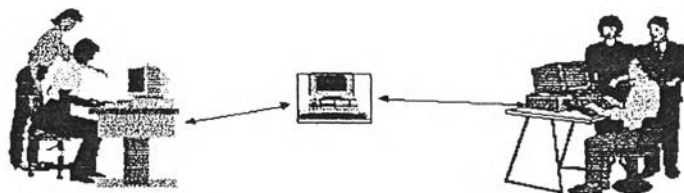
Figure 2-10 Web-based Decision Support System

Potential problems relating to Web-based DSS involve user expectations, especially in terms of how much information they want to access. Technological issue involving Web browser between Netscape and Microsoft is also a potential problem.

Examples of Web-based DSS are such as Booz-Allen's Purchasing analysis tool that includes structured and flexible tools that allow users to analyze historical purchasing data, graphs, and reports for performing analysis within or across business units, dbProbe 4.0 that provides tools for sales analysis, financial analysis, inventory analysis or any data warehouse application. DSS Web 5.0 from Microstrategy also provides a WWW interface to the product called DSS server, which runs a Relational OLAP engine. Pilot Software includes Internet capabilities within the Pilot Decision Support Suite. It delivers decision support solutions using World Wide Web to users at the company or remote location through Web browser Interface.

2.8.5 Case Studies in SIS

According to McBride (1999), Fruit of the Loom (FOTL) is a major manufacturer of clothing. It has a wide range of small retail chains and independent retailers to sell its clothes. FOTL maintains a significant share of a competitive market. However, recent movement from large retailers trying to reduce their costs has caused the reduction of profit and market share to FOTL. Moreover, there are complaints from customer that they have difficulty finding out whether items were available in the warehouse of FOTL and when they could be shipped. Some customers then turned to other suppliers. FOTL it self also has difficulty responding to the pace of fashion changes required by retailers.

Therefore, In order to reduce the loss of customers, FOTL has developed a web-based system to enable customers to search the distributors' warehouses for items, to check the status of their orders and to identify alternatives for out-of-stock items. An automated catalogue and a web-based ordering facility are included in the systems to allow customers reviewing or changing their orders at any time. This pilot project has been very successful and then extended to 30 distributors. The new system has provided competitive advantage over its competitors and improved relationships among FOTL, distributors and customers. Using this web-based system also reduced transaction costs and provided an opportunity for competitive enhancements. The system has resulted in both increases in market share and in numbers of transactions completed through the web site.

Another case is from Causton Cartons. It manufactures flat-pack cartons for the pharmaceutical industry. The Managing Director's vision for the future of the company is 'one-stop purchasing'. Instead of pharmaceutical companies purchasing cartons from one sources, inserts from another, plastic containers and glass from another, the entire packaging for a pharmaceutical could be bought from Causton. There would be a single point of contact for customers buying pharmaceutical

packaging. Causton Cartons then employed strategists to advise new IS strategy for them

Therefore, three projects were identified: Customer Interface Project, Supplies Co-ordination Project, Production Control Project. There is also a need for integration of information systems and a firm IT infrastructure. These projects would provide an excellent base from which several management support systems could be developed in the future. The three projects suggested five initiatives: commence definition of IT platform, pilot Electronic Data Interchange (EDI) projects, commence definition of supply co-ordination system, commence definition of customer interface system, and acquire a new production control system which will interface with supply co-ordination. However, evaluation of these suggestions would be necessary to prioritize their business contribution to the company.

2.9 The Personal Computer Industry in Thailand Introduction

The personal computer (PC) industry has become one of the most favorable industries for investment in Thailand due to 3 factors: increasing demand, growing market, and relatively low first-investment. The demand for computers is significantly growing following the increasing needs to use Internet by academic institutes, government sectors, companies, and especially for home users. The increase in demand is also come from customers who have waited to monitor Y2K problems and held their decision to buy computers at that time.

The Number of Internet Users in Thailand
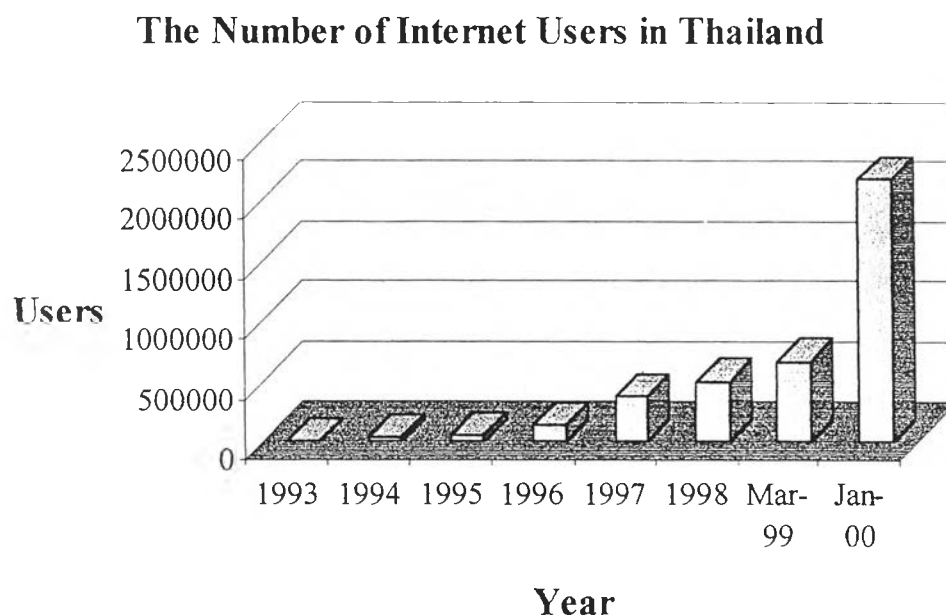
Source: Adapted from Pantawee (2000)

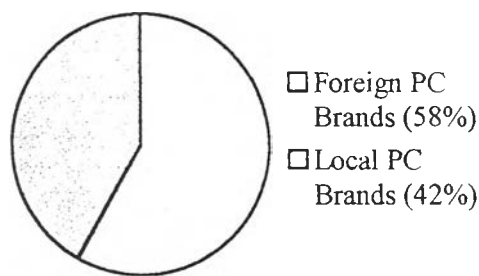Figure 2-11 The Increasing Numbers of Internet Users in Thailand.

Figure 2-11 clearly shows the significant increase in the number of Internet users in Thailand during the last 8 years. This trend indicates that the need for more computers is more likely to increase in order to support these users and new services in the forms of Internet café, Internet service provider and many more to come.

The other reason why PC industry is becoming more popular is that it requires none of machinery, and thus there is no need for a large factory or machinery purchase. Only trained technician and some equipment such as knots and screwdrivers are enough to assemble the PC. The average required size of PC shop is about 50 square meters, where products will be displayed at the front and the space at the back will be used for PC assembly.
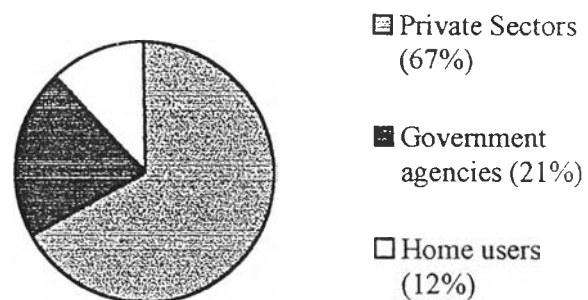
2.9.1 Market Structure

Generally, the PC domestic market structure can be divided into two sectors: foreign brands and local brands (produced by Thai operators). Among foreign brands, IBM has the largest market share followed by Acer, Compaq, Hewlett Packard, and Lacer respectively while Belta and Atec have dominated the local brands. Recently, there are many efforts initiated by the National Electronics and Computer Technology (NECTEC) to foster the usage of computers produced in Thailand. For example, the quality certification given to qualified local assemblers from NECTEC helps to increase confidence for home users and makes these assemblers more competitive in the government auction since they have rarely been selected due to no guarantee of product quality and standard. Therefore, the usage of local PC brands is more likely to increase in the future.

PC Market Structure **Market Segment**


□ Foreign PC Brands (58%)
□ Local PC Brands (42%)

▦ Private Sectors (67%)

▨ Government agencies (21%)

□ Home users (12%)

Source: Department of Industrial Promotion (1999)

Figure 2-12 The PC Domestic Market Structure and Segment in 1999

2.9.2 Market Statistics

◆ **Domestic Markets**

The recovering economic in Thailand in 2000, the needs for computers from government sectors, academic institutes, consumers, and private companies that are still increasing, the advance technology that makes computer life cycles shorter, and the needs for information jointly make the domestic markets growing continually. Consumer's behavior is also changing from brand name products to local brand products, thus forcing price reduction from many recognized brands. Therefore, there are not many differences between brand names and local brands in terms of prices.
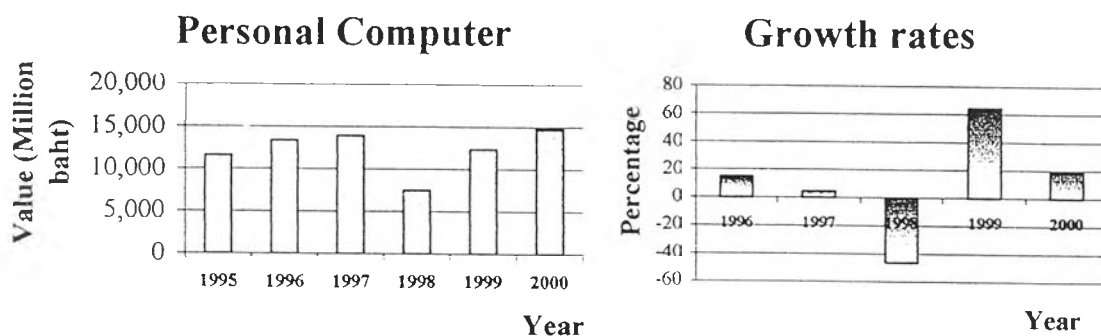
Types	1995		1996		1997		1998		1999		2000	
	Volume (set)	Value (million)	Volume (set)	Value (million)	Volume (set)	Value (million)	Volume (set)	Value (million)	Volume (set)	Value (million)	Volume (set)	Value (million)
Mainframe		2,315		2,544		2,094		1,490		2,016		1,547
-hardware	17	1,050	20	1,100	14	739	5	300	8	464	7	350
-software		406		494		420		200		358		321
-service		859		950		934		960		1,194		876
Medium		2,069		2,299		2,620		2,007		2,439		2,178
-hardware	200	800	230	759	240	760	100	380	135	445	140	420
-maintenance		390		490		651		467		613		652
-service		879		1,050		1,209		1,160		1,381		1,105
Small		2,037		2,600		6,698		5,125		5,263		6,096
-hardware	600	720	750	825	1,900	2,257	1,100	1,645	1,100	1,483	1,300	1,563
-maintenance		554		770		1,893		1,400		1,382		1,674
-service		763		1,005		2,448		2,170		2,448		2,860
Workstation		2,754		2,795		2,019		1,151		1,179		1,149
-hardware	1,500	600	1,800	630	1,000	336	400	161	350	124	400	131
-maintenance		1,479		1,180		967		550		465		545
-service		675		985		717		440		590		473
Personal Computer	271,300	11,598	312,540	13,361	289,000	13,988	174,000	7,522	300,600	12,373	363,950	14,718
-printer	174,700	2,977	225,000	3,520	304,500	4,680	129,000	1,630	189,600	1,767	225,520	1,966
-display	93,800	730	119,000	840	101,000	708	70,000	415	160,000	919	192,000	1,084
-software		1,678		2,700		2,921		2,480		3,470		4,551
-service		1,634		2,521		2,762		2,300		2,902		3,821

Source: Thai Farmer Research Center (2000)

Figure 2-13 Thailand IT Trends, Growth Rates and Market Values

◆ International Markets

Even though Thailand is capable of producing computers to adequately supply domestic needs, there is still necessity to import some types of new computers and components that can not be produced. Import markets trends are therefore continually to increase. For export market, devaluation of Baht is a major factor that has significant effects to demand from international markets. The product's prices from Thailand are relatively much cheaper than other countries. Therefore, the devaluation of Baht, especially in 1997-1998, is considered favorable to the export market.

Year	Import (million)	Growth rate (percentage)	Export (million)	Growth rate (percentage)
1991	29,522.3	12.1	46,340.3	19.8
1992	36,870.5	24.8	55,384.2	19.5
1993	38,968.2	5.7	62,744.8	13.3
1994	52,983.7	36.0	92,059.2	46.7
1995	65,587.8	23.8	128,432.3	39.5
1996	71,899.2	9.6	165,240.9	28.7
1997	95,293.4	32.5	217,635.5	31.7
1998	83,986.6	-11.9	316,288.6	45.3
1999	92,257.8	9.8	299,922.9	-5.2

Source: Thai Farmer Research Center, Bangkok (2000)

Figure 2-14 Import and Export Values Statistics

2.9.3 Raw Materials

Raw materials in assembling PC include:

◆ Hard Disk Drive
◆ Floppy Disk Drive
◆ Monitor
◆ Keyboard
◆ Power Supply
◆ Mainboard CPU
◆ Mouse

Even though Thailand is one of the leading computer part manufacturers in the World, in PC industry the entrepreneurs import most of raw materials from other countries due to their superior quality and cheaper price. Imported raw materials

contribute to about 65-90 % of overall materials. The costs of overall materials represent over 90 % of total costs. Controlling material costs is therefore very important since the cost of each material varies rapidly depending on many factors such as exchange rates, product life cycles, or popularity.

Import Countries	1995 (million)	1996 (million)	1997 (million)	1998 (million)	1999 (million)
USA	16,544.1	17,283.0	22,953.9	14,877.8	18,853.5
China	1,603.5	3,338.2	9.866.5	13,435.7	16,709.2
Philippine	7,840.9	6,607.6	7,951.1	13,598.7	14,823.7
Japan	9,156.9	10.046.8	12,160.5	10.699.6	9,625.6
Singapore	9,176.0	6,828.2	7,385.3	6,151.0	9,222.3
Germany	2,080.6	1,929.0	1,971.4	1,566.9	5,507.2
Malaysia	11,004.6	14,457.6	19,135.1	12,513.8	4,182.3
Mexico	230.4	1,122.9	3,476.5	3,054.0	2,921.6
Taiwan	3,360.5	3,082.4	3,144.6	1,432.7	1,751.2
South Korea	510.4	1,228.3	2,509.6	1,702.6	1,514.5
Others	4,082.9	5,975.2	4,738.9	4,953.8	7,146.3
Total	65,587.8 23.8%	71,899.2 9.6%	95,293.4 32.5%	83,986.6 -11.9%	92,257.8 9.8%

Source: Thai Farmer Research Center, Bangkok

Figure 2-15 Import Markets for IT products

2.9.4 Production

Production process in assembling PC includes:

♦ Preparing raw materials (electronic components and other peripherals)
♦ Assembling
♦ Full function test line
♦ Burn-in test
♦ Packaging

2.9.5 Costs Structure of Personal Computer (PC) Industry

Cost structure of PC industry can be categorized by percentage as follows:

- Raw materials 95 %
- Labor 3 %
- Overheads 2 %

2.9.6 Distribution Channels

- **Domestic**

  ➢ **Direct sales to customers**

  For home user sales, location is very critical. Most of the computer shops are located at the big department stores such as Pantip Plaza, Seri Center, and IT Mall where customers can easily come and purchase a variety of products in one place. On the other hand, if the main target customers are government sectors or private companies, shop location is not much important. However, it is likely that auction to be the supplier for these customers might need extra money and connections to accomplish. Most of the computer entrepreneurs focus on both groups of customers to reduce the risks of depending too much on a particular group.

  ➢ **Through Intermediates**

  Selling through intermediates helps the entrepreneurs to expand the markets and services to more customers without the costs of establishing their own shops.

- **International**

  When domestic markets decline, some entrepreneurs may seek for new markets by exporting their products to other countries. Most of export sales are made through dealers. Direct sales to customers are very few.

Export Countries	1995 (million)	1996 (million)	1997 (million)	1998 (million)	1999 (million)
USA	25556.7	29276.3	46,289.2	87,053.8	77,245.0
Singapore	55,906.8	64,553.9	64,194.9	63,017.8	66,131.9
Netherlands	14,525.4	12,719.9	15,628.7	31,184.0	28,513.5
Japan	9,973.3	15,387.2	19,574.3	24,807.1	21,840.7
Taiwan	1,226.7	2,049.2	5,392.8	13,155.2	18,599.4
England	4,843.9	8,130.5	10,608.0	13,869.4	15,492.1
China	610.5	3,373.2	7,144.1	21,674.8	12,790.1
Malaysia	2,462.4	7,742.4	15,634.4	15,085.1	13,141.7
Others	38.833.3	51,284.6	79,458.3	133,195.2	123,413.5
Total	**128,432.3**	**165,240.9**	**217,635.5**	**316,288.6**	**299,922.9**
	39.5%	**28.7%**	**31.7%**	**45.3%**	**-5.2%**

Source: Thai Farmer Research Center (2000)

Figure 2-16 Export Markets for IT products

2.9.7 Rules and Regulations

> **Tariff**

Basically, PC assemblers have to pay about 5 % tax for imported components. However, there is an agreement established in 1996 at Singapore called Information Technology Agreement (ITA), which agrees that country members have to reduce imported IT good tax to 0 % in the year 2000, extended to 2005 in some countries. Thailand have joined and become member of this agreement in 1997. Therefore, Ministry of Finance, Thailand, has announced 0 % tax of 153 IT goods in the year 2000 and will gradually reduce tax for 37 sensitive price IT goods to 0 % within the year 2005.

> **Certificate**

Legally, there is no need to apply for certificate from the National Electronics and Computer Technology Center (NECTEC) to guarantee the efficiency and the standard of the products. However, this certificate will enable the company to gain more confidence of product standard from customers. It acts like a label for quality-proved computer. It also helps pave the way to the market of state agencies and expand the market as a sale person. To apply for application for Standard Quality System, the computer must be approved the quality, production-involved documents and plant supervision under the ISO standard.

2.10 The Case Company Description

2.10.1 Brief Introduction

The Case Study Company was recently established in 2000 and scheduled to operate within the next year. It intends to sell hardware and personal computers to customers in domestic markets and the owners also have a plan to expand the business into other computer-related areas such as solution software, software education, computer service training, and Internet café. Currently, the company is in the registration process with the revenue department, employee recruitment, and location selection. It plans to have about 6 or 7 employees and one manager operating this business. The cash flow in the company is expected about 0.5-1 million baht per month.
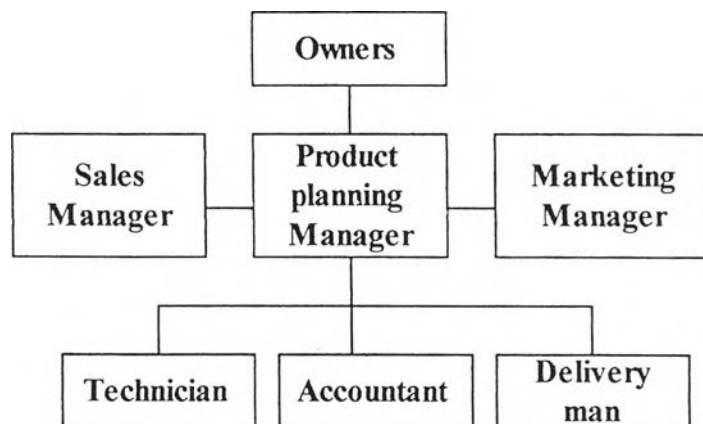
2.10.2 The Organization Chart

Figure 2-17 The Company Organization Chart

The company consists of 3 main sections: marketing, sales, and production planning. Marketing section involves analyzing and finding markets for the company while sales section handles ordering, purchasing, invoicing, and accounting. Production section jobs involve planning production and delivery schedule.

2.10.3 The Background of the management

The Owner

♦ Exporters in international level for 3-5 years.

Sales Manager

♦ Sales representative at computer company for 2 years.

Production Planning Manager

♦ Production and maintenance engineer in appliances industry for 2 years.

Marketing Manager

♦ Marketing manager in plastic injection industry for 5 years.
♦ Currently marketing manager in cement business.

Currently, this management are working at their current companies and contacting each other through telephone and electronic mail, periodically. The software that can be used simultaneously or separately is therefore needed to develop SIS as described in user's requirements (see more in chapter 3).

2.10.4 The Company Intention

According to the owners' decision, this company is planned to be operated by using as least number of employees as possible, meaning that business activities need to be automated as much as possible. Typically, the small-scale PC assembly business needs a minimum of 8 persons to operate, which includes:

♦ Three computer or electronics knowledgeable assemblers.
♦ Two sales representatives.
♦ One accountant.
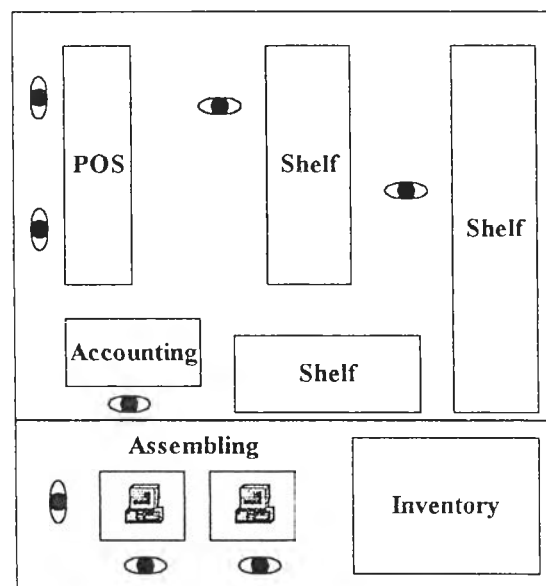♦ Two customer supports.

Figure 2-18 The Layout of the shop

Generally, business activities include ordering, selling, assembling, purchasing, invoicing, accounting, and delivery. For small business, most of these activities are done manually and often resulted in delay, redundancy, and lots of paper works. Unfortunately, in this competitive market, inefficient business is not likely to survive. Computer-integrated systems and information systems therefore come to play a vital role in this case in order to increase efficiency, effectiveness, and productivity of the business.

2.10.5 Future Outlook

If the PC assembly business is successful, future development of the company will focus on diversifying into business related to computers, including Internet café, computer training, wholesaler, and software applications.

◆ Internet Café

Currently, this is one of the most popular businesses throughout the country due to the popularity of Internet. Customers are mostly students and kids who can not afford to buy computers yet. Basic services include Internet surfing and computer games. Location is the key factor for the success of this business.

◆ Computer Training

Computer training involves teaching computer software, computer repairs, or computer assembly. This business is also growing following the increase in computer usage in both government and private sectors.

◆ Authorized Wholesaler

In stead of competing with many small PC assembly shops, it may be better supplying them with products and compete with few competitors in wholesaler markets.

◆ Software Applications

This business involves providing a software application or a software package to companies or businesses. Such applications may include strategy development, business solution, or just a program for specific purposes.

2.11 Summary

This Chapter has reviewed the important issues relating to strategic information systems planning. It begins with the meaning of information system (IS) and how the use of IS has been evolved over time. Next, the approaches of IS planning have been discussed, especially strategic information systems planning (SISP). This chapter also shows the linkage between business strategy and IS/IT

strategy in order to demonstrate the importance of relating business needs to the IS strategy and the problems resulted from the lack of a coherent IS strategy. Finally, several strategic information systems (SIS) frameworks and tools have been presented, including other related issues in this study.

The second part of this chapter investigates the personal computer industry in Thailand in many aspects. Both domestic and international markets have been discussed in terms of the nature of the industry, the market structure, market trends, rules and regulations relating to the business. This chapter also discusses about the case company organization, intention, and the backgrounds of each management.