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ENTERPRISE MANAGEMENT INFORMATION SYSTEMS AND THEIR IMPROVEMENT

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INTRODUCTION

The basic functions of the management information system: data collection and input, responsible for data storage, responsible for information transmission in the system, data processing, model establishment, solution, application and modification, output information, provide information to all management levels, support decision-making, and management and maintenance of the management information system itself. The latter is mainly based on the structured system specification, mainly including system analysis, system design and so on.

As we all know, management information system is a science formed on the basis of management science, system science, information science and computer science in order to meet the needs of modern management. It studies the whole process of information processing and decision-making in management system, and discusses the implementation method of computer. It is a system composed of human, computer, communication equipment and other hardware and software, which can collect, process, store, transmit, maintain and use management information. Management information system can promote enterprises to develop in the direction of information, make enterprises in a virtuous circle of sensitive information, scientific management and accurate decision-making, and bring higher economic benefits to enterprises. Therefore, management information system is an important symbol of enterprise modernization and an only way for enterprise development.

Information system is widely used in the management of various affairs, which promotes the improvement of enterprise management. Management information system serves for management. Its development and establishment is an effective way for enterprises to get rid of backward management methods and realize management modernization. The management information system unifies, standardizes and modernizes the management work, greatly improves the efficiency of management, and makes the modern management form a unified and efficient system. In the past, the traditional management method was manual operation with human as the main body. Although managers invested a lot of time

and energy, their personal ability is limited. Therefore, the management work will inevitably have limitations or personal subjectivity and one sidedness. The man-machine system established by the management information system using the system idea, taking the computer as the information processing means, taking the modern communication equipment as the basic transmission tool, and capable of managing decision-makers to provide information services, is undoubtedly a major measure to integrate management with modernization and improve management quality with science and technology. The management information system gives a large number of complex information processing to the computer, so that people and computers can give full play to their respective strengths, organize a harmonious and effective system, and bring convenience to modern management.

In modern management, computer management information system has become an indispensable helper of enterprise management, and its wide application has become an important symbol of management modernization. In the modernization of enterprise management, the modernization of organization, method and control is inseparable from the modernization of management means. With the development of science and technology, especially the development of information technology and communication technology, computers and networks are gradually applied to modern management. Facing more and more information resources and more complex internal and external environment of enterprises, it is necessary for enterprises to establish an efficient and practical management information system to provide guarantee for enterprise management decision-making and control, which is the inevitable trend to realize management modernization.

CHAPTER 1. ENTERPRISE MANAGEMENT INFORMATION SYSTEMS

1.1 Information technologies, concept and essence

Technology when translated from Greek (techne) means art, skill, and this is nothing more than processes.

Under the process should be understood a certain set of actions aimed at achieving the goal. The process should be determined by the strategy chosen by the person and implemented using a combination of various means and methods.

The concept of technology means a complex of knowledge about the methods, methods of labor, sets of material and technical factors, ways of combining them to create a product or service.

With regard to industrial production, the concept of industrial technology is used.

The application of the concept of technology to information processes led to the emergence of the concept of information technology as a body of knowledge about the methods of automated processing of information using computers to automate management activities.

In modern society, the main technical means of information processing technology is a personal computer, which significantly influenced both the concept of building and using technological processes, and the quality of the resulting information. The introduction of a personal computer into the information sphere and the use of telecommunication means of communication determined a new stage in the development of information technology and, as a result, a change in its name by adding one of the synonyms: “new”, “computer” or “modern”.

Information technology (IT), like any other technology, can be divided into two distinct components:

Hardware. This part of information technology includes the physical structure, configuration of computers, systems and other equipment.

Software. It is a set of rules, guidelines and algorithms necessary to ensure

the performance of technical equipment. This also includes programs, agreements, standards and rules of use aimed at coordinating individual tasks and the process as a whole.

A significant role is played by the so-called algorithmic (intelligent) support. It, depending on the intentions, expected results and goals, should justify the feasibility of using and deploying hardware and software, as well as its configuration in each specific case.

Information technology is a set of methods and software and hardware tools combined in a technological chain that provides the collection, processing, storage, distribution and display of information in order to reduce the complexity of the processes of using information resources, as well as increase their reliability and efficiency. Information processing has a long history of development, going back to the invention of the first abacus and printing machine. The modern term information technology arose in the late 1970s and came to mean the processing of information using computer technology. The development of computer technology took place in several stages, each of which was the result of innovative technological solutions and led to the creation of a new generation of computers. Evolutionary processes affected both hardware and software. Achievements in the field of information technology, of course, reflected in their application in the economy. And if at the stages of the formation of computer technology their use was limited to scientific and technical calculations, mainly in the military direction, then as information technologies improved, various areas of the economy, and then the entertainment sector, became areas of use.

First-generation computers based on vacuum tubes had low performance and, as a result, limited application. The invention of transistors and their mass production led to the emergence of second-generation computers. The high performance of such computers, as well as significant advances in the development of software, made it possible to use them in economic activity for processing and storing economic information.

From the mid-1960s for the production of computers, electronic circuits of

medium and high degrees of integration began to be used, which marked the beginning of the third stage in the development of computer technology. New technical solutions based on microprocessors formed the basis for the creation of the first personal computers, which were characterized by small size and low cost. The production of computers acquires an industrial scale during this period, and the development of operating systems and software contributes to an increase in the number of users of computer technology and the expansion of its areas of application. High functionality and affordable price ensured the introduction of computer technology in almost every department of enterprises to solve such local problems as accounting and data processing.

The modern generation of computers originated in the mid-1970s. 20th century and exists to this day. The basis of these computers was large and extra-large integrated circuits (LSI and VLSI) and microprocessors.

In parallel with hardware, software (software) was also formed, both system and applied, which also passed several generations in its evolution. The first generation of software was basic programming languages that only computer scientists knew. The procedurally oriented languages FORTRAN, COBOL, ALGOL of the second generation of programming languages made it possible to join the development of applied programs of scientists and specialists from various fields of science and technology. The third stage in software development is characterized by the use of advanced operating systems (OS), database management systems (DB) and structured programming languages such as Pascal. The fourth generation is marked by the development and application of object-oriented languages, software for distributed computer systems, improved graphical interface and integrated programming environment, and advanced database software tools. The fifth generation is focused on knowledge processing, support for network architectures and technologies.

The widespread use of computer technology, the need to exchange data between remote computers became an impetus for the creation and development of computer networks. At the initial stage, various non-standard devices were

used, capable of providing connections only for those computers for which they were designed, and in the mid-1980s standard technologies for connecting computers to a network were established - Ethernet, Arcnet, Token Ring, which greatly simplified the process of creating network structures.

Models for the organization of calculations and information processing were also improved. Since the 1950s the centralized computing model was used, when non-intelligent terminals were connected to a powerful computer, and users worked in a split-time mode. Subsequently, the centralized model could also include personal computers as intelligent terminals. In the 1980s distributed computing model has become widespread, one of the most popular versions of which is called the "client-server" architecture. All advances in IT have been used in business process management in enterprises and organizations. At the same time, integrated with organizational solutions and aimed at meeting the needs of business, they formed a class of economic information systems for managing economic objects (enterprises, banks, trade organizations, government agencies, etc.).

Economic information systems have also undergone significant changes in their development. If in the 50s computer technology was used mainly for processing significant amounts of information, then the 60s. marked by the beginning of a comprehensive automation of enterprise management and the integration of information support based on databases. The full-scale use of automated control systems dates back to the 70s, when, on the basis of third-generation electronic computers, it became possible to create computer systems with a distributed terminal network. 80s marked by the widespread use of personal computers by managerial workers, the creation of a large set of automated jobs. However, it should be noted that this kind of local (“island”) automation did not contribute to improving the efficiency of management at enterprises and organizations. The development of telecommunication technologies has led to the creation of flexible local and global networks and, as a result, to the development and implementation of integrated systems that have

provided a real opportunity for collective work of both the direct executors of business operations and managers who make management decisions. The structure of information technology includes the following procedures: collection and registration of data; preparation of information arrays; processing, accumulation and storage of data; formation of result information; transfer of data from sources of origin to the place of processing, and the results (calculations) - to consumers of information for making managerial decisions.

As a rule, economic information is subject to all transformation procedures, but in some cases, some procedures may be missing. The sequence of their implementation also varies, while some procedures may be repeated. The composition of the transformation procedures and the features of their implementation largely depend on the economic entity that conducts automated information processing. Consider the features of the implementation of the main procedures for converting information.

Collection and registration of information occur differently in different economic entities. This procedure is most complicated in the automated management processes of industrial enterprises, firms, where primary accounting information is collected and registered, reflecting the production and economic activities of the facility. This procedure is no less complicated in the financial authorities, where the registration of the movement of cash resources takes place.

Particular importance is attached to the reliability, completeness and timeliness of primary information. At the enterprise, the collection and registration of information occurs when performing various business operations (receiving finished products, receiving and dispensing materials, etc.), in banks - when performing financial and credit operations with legal entities and individuals. Credentials may arise at workplaces as a result of counting the number of processed parts that have been assembled assemblies, products, identifying defects, etc. In the process of collecting factual information, measurements, counting, weighing material objects, counting banknotes, obtaining temporal and quantitative characteristics of the work of individual performers are carried out.

The collection of information, as a rule, is accompanied by its registration, i.e. fixing information on a material carrier (document, machine carrier), entering it into a PC. Recording in primary documents is mainly carried out manually, so the collection and registration procedures are still the most labor-intensive, and the process of document flow automation is still relevant. In the conditions of automation of enterprise management, special attention is paid to the use of technical means for collecting and recording information that combines the operations of quantitative measurement, registration, accumulation and transmission of information via communication channels, input directly into a computer to form the necessary documents or accumulate the received data in the system.

The transfer of information is carried out in various ways: using a courier, sending by mail, delivery by vehicles, remote transmission through communication channels using other means of communication. Remote transmission via communication channels reduces the time of data transmission, however, its implementation requires special technical means, which increases the cost of the transmission process. It is preferable to use technical means of collection and registration, which, automatically collecting information from sensors installed at workplaces, transfer it to a computer for further processing, which increases its reliability and reduces labor intensity. Both primary information can be transmitted remotely from the places of its occurrence, as well as resultant information in the opposite direction. In this case, the result information is recorded by various devices: displays, scoreboards, printing devices. The flow of information through communication channels to the processing center is mainly carried out in two ways: on a computer carrier or directly by entering into a computer using special software and hardware.

Remote transmission of information using modern communication tools is constantly evolving and improving. This method of information transfer is of particular importance in multilevel intersectional systems, where the use of remote transmission significantly speeds up the passage of information from one

level of control to another and reduces the total time of data processing.

Machine coding is a procedure for machine representation (recording) of information on machine media in codes adopted in a PC. Such encoding of information is carried out by transferring data from primary documents to magnetic disks, information from which is then entered into a PC for processing.

Recording information on machine media is carried out on a PC as an independent procedure or as a result of processing.

The storage and accumulation of economic information is caused by its repeated use, the use of conditionally permanent, reference and other types of information, the need to complete the primary data before processing them. Storage and accumulation of information is carried out in information bases, on machine carriers in the form of information arrays, where data are located according to the order established in the design process.

Data retrieval is directly related to storage and accumulation; selection of the necessary data from the stored information, including the search for information to be corrected or replaced. The information search procedure is carried out automatically on the basis of a request for the necessary information compiled by the user or the PC.

The processing of economic information is carried out on a PC, as a rule, in a decentralized manner, in the places where primary information arises, where automated workplaces are organized for specialists of one or another management service (logistics and sales department, chief technologist department, design department, accounting department, planning department and etc.). Processing, however, can be carried out not only autonomously, but also in computer networks, using a set of PC software and information arrays for solving functional problems.

In the course of solving problems on a computer, in accordance with the computer program, result reports are formed, which are printed by the machine on paper or displayed on the screen.

The printing of summaries can be accompanied by a replication procedure if

the document with the result information needs to be provided to several users.

Decision-making in an automated system of organizational management, as a rule, is carried out by a specialist with or without the use of technical means, but in the latter case, based on a thorough analysis of the resulting information received on a PC. The decision-making task is complicated by the fact that the specialist has to look for the most acceptable solution from the set of feasible solutions, minimizing the loss of resources (temporary, labor, material, etc.). Thanks to the use of personal computers and terminal devices, the analyticity of the processed information is increased, and a gradual transition to automation of the development of optimal solutions in the process of the user's dialogue with the computer system is ensured. This is facilitated by the use of new technologies of expert decision support systems.

Information can be distinguished by characteristics such as its source (e.g. internal and external) or its form (e.g. numerical or non-numerical). Non-numerical form information can be structured or unstructured. Management information can be structured or unstructured. Each enterprise as an information unit in the information society has its own particular information environment and information needs. Like energy, capital and human resources, information is a fundamental resource for an information unit such as an enterprise because without it an enterprise cannot function. Although information is an intangible resource, it links the whole enterprise together. Because of the intangible nature of information, enterprises often do not have sufficient capacity and means to integrate information into their resource plans when allocating and operating various types of resources. The use of information resources involves information and information technology. As mentioned earlier information is a resource, while information technology refers to the means of collecting, storing, transmitting and using information. Current science and technology is changing the way information is acquired, processed, stored, transmitted and used, which requires companies to use advanced science and technology to manage information resources properly and use them effectively.

Enterprise information management can be defined as the ability of an enterprise to collect, store, retrieve, transfer and utilize information, in particular, to provide useful information in an effective form for decision-making purposes. In terms of evaluation criteria, information management requires that information is useful and effective, and that information systems, as information management tools, reflect economic value and improve business operations at a substantive level. From the technical point of view, the basic task of enterprise information management is to adopt modern scientific and technological means to manage enterprise information.

The second half of the 20th century was a period of rapid development in systems science. Since the 1940s, many systems terms have emerged, including systems science, systems engineering, systems theory, cybernetics, systems analysis, systems methods, and systems thinking. All these terms have since been unified under systems science. Systems science thinking has reached into many natural and social science disciplines, including, naturally, the discipline of information systems. Systems science is considered to be the theoretical foundation of information systems, and its concepts are widely used in information systems research. The basic concepts of information systems are based on General Systems Theory (GST) and Systems Sciences (SSS). These include two main general systems theory models, namely the input-process-output model and the system-subsystem-system environment model. Let us start with the input-process-output model. A general system is made up of a number of interconnected functions whose purpose is to receive inputs and produce outputs in an organized form. A general system is usually a dynamic system in which the three basic interacting functions are inputs, processes and outputs. Inputs refer to elements such as raw materials or energy that enter the system and participate in the process. Process refers to the process of transforming the input into an output such as a manufacturing process or a mathematical calculation. Outputs refer to the elements that result from the transformation process such as finished products or management information. An example might be a manufacturing system that

receives raw materials as input and, after the input is involved in the process, produces a finished product as output. This manufacturing process is accompanied by a flow of information, and as an information system it is the system that tracks and describes this flow of information. Of course the information system itself is also a general system, i.e. it accepts data as input and outputs it as information after it has been involved in the process. The model is made more useful when two other functions are introduced into the ordinary system model described above. These are feedback and control. A system with feedback and control capabilities is known as a Cybernetic System, i.e. a system with self-monitoring and self-regulating capabilities. Feedback refers primarily to the ability of a system to feed data about the system's output back to its inputs to provide information for necessary adjustments. Control refers to the analysis of the system's feedback data to determine whether the system is achieving its objectives. If the objectives are not achieved, the system has to make appropriate adjustments to its inputs or process components to obtain the desired output. The addition of feedback and control functions to the basic model of an information system makes the model more applicable to management information systems.

Another common system model is called the System-Subsystem-System Environment Model. When designing an enterprise information system, the enterprise is often viewed as a system, with the enterprise departments as subsystems and the external enterprise as the system environment. By analyzing the system-subsystem-system environment at multiple levels of refinement, it is possible to design a better system from the perspective of system analysis and system design, no matter how complex the system is. In simple terms, the input-process-output model makes it possible to simulate logistics and information flows, while the system-subsystem-system environment model makes it possible to understand, analyze and design highly complex enterprise information systems at a conceptual and logical level. The system-subsystem-system environment model makes it possible to understand, analyze and design highly complex enterprise information systems at a conceptual and logical level.

1.2 Classification of enterprise information systems

The first classification is to divide information systems mainly into systems for business operations and systems for decision-making. There are three main sub-systems in the system for enterprise operations, the transaction processing system, the enterprise process control system and the enterprise internal work coordination system. Systems for decision making are divided into management decision systems (MIS) and decision support systems (or on-line analytical processing systems). Business operations systems can provide information for internal and external use, but they are often not specifically designed to provide information that can be used directly by management. Information that is directly available to management often needs to be processed by a management information system to be available. The purpose of business operations systems is to efficiently process business transactions, control business processes and facilitate the exchange of information within the business. A typical example of a transaction processing system is a sales outlet system and an example of a process control system is a refinery with electronic sensors that continuously monitor the chemical process and make adjustments to control the refinery process at any time. An example of an internal work coordination system is an office automation system. When the application of information systems is primarily for decision-making purposes, they are called decision systems. Management information systems provide reports for middle management. For example, sales managers can obtain product sales reports and daily sales analysis reports from the system. A decision support system or on-line analysis system, on the other hand, provides information directly to the top level of decision making.

The second category includes Expert Systems, Knowledge Management Systems and Strategic Information Systems, in addition to the systems listed above. An expert system is a calculator system that translates expert knowledge into a calculator code that is used to solve many practical problems. Expert systems can be used in both transaction and decision-making systems. Knowledge Management Systems are a new generation of knowledge-based information

systems that collect, organize and communicate information in the form of knowledge from within and outside the organization. Such systems can be used for both transaction and decision support. It is a relatively new system that is expected to become a major product of the information industry in this century. The purpose of a strategic information system is to use information systems to improve a company's products, services and processes so that it can gain a strategic advantage in the face of competition.

The third classification is the classification of information systems based on how they support business sector functions. Under this classification, information systems are mainly classified as Functional Business Systems (FBS), such as accounting systems, sales systems, manufacturing systems, etc.

As can be seen from the different classifications above, although systems can be classified in a variety of ways, the day-to-day operation of an enterprise often requires not just a single system, but the integration of a number of systems. In other words, information systems are often required to appear as integrated systems in the practical application of an enterprise, in the sense that the above classifications only illustrate the different roles played by different systems within the enterprise. In practice, information systems appear as cross-departmental and cross-functional integrated systems. For example, when designing an enterprise information system, it is often expected that the system will be accessible to all management levels and to all operational departments, which determines the integrated nature or integration of the enterprise information system. In a sense, the scope of information systems should be Enterprise Informatics/Cross Enterprise Informatics, which is characterized by the effective collection, transfer and use of information within and outside the enterprise. This need is particularly acute in the context of e-commerce and supply chains. In view of this objective need, the development of enterprise information systems in the last decade has been accelerating towards integration, and enterprises are increasingly inclined to develop a truly highly integrated enterprise information system.

An Enterprise Information System (EIS) is any kind of information

system which improves the functions of enterprise business processes by integration. This means typically offering high quality of service, dealing with large volumes of data and capable of supporting some large and possibly complex organization or enterprise. An EIS must be able to be used by all parts and all levels of an enterprise.

The word enterprise can have various connotations. Frequently the term is used only to refer to very large organizations such as multi-national companies or public-sector organizations. However, the term may be used to mean virtually anything, by virtue of it having become a corporate-speak buzzword

Enterprise information systems provide a technology platform that enables organizations to integrate and coordinate their business processes on a robust foundation. An EIS is currently used in conjunction with customer relationship management and supply chain management to automate business processes. An enterprise information system provides a single system that is central to the organization that ensures information can be shared across all functional levels and management hierarchies.

An EIS can be used to increase business productivity and reduce service cycles, product development cycles and marketing life cycles. It may be used to amalgamate existing applications. Other outcomes include higher operational efficiency and cost savings.

Financial value is not usually a direct outcome from the implementation of an enterprise information system.

An Enterprise Management System (EMS), also known as Enterprise Systems, is an application software package that helps organizations to manage various software tasks and achieve their software needs in real-time. The software is customized based on an organization’s needs. If you operate a large business, investing in EMS can help you manage your business smoothly and achieve your goals.

Customer Relationship Management

This software helps an organization with managing interactions with

customers. Its ultimate goal is to connect brands to existing and potential customers, process data, gather customer details, streamline processes, decrease the time used by employees on various tasks and grow businesses.

Enterprise Resource Planning

An organization implements Enterprise Resource Planning (ERP) for easy facilitation of processes. It helps smooth marketing projects, accounting, human resource management, finance, and procurement. The modules in this system are interconnected and play a crucial role in the effective distribution of information.

Supply Chain Management

Managing the supply chain is a challenging task that requires the right tools and resources. Using a supply chain management system helps an organization manage data, finances, and the flow of product or service delivery to the end-user. It helps an organization monitor the entire process, from purchasing raw materials to product delivery.

The Advantages of Investing In an Enterprise Management System

Supports Complex Infrastructure

An Enterprise Management System supports complex IT infrastructures without needing many hands from IT professionals. The system is easy to use because it comes in one package. It is an ideal tool that helps organizations streamline operations, leading to enhanced collaboration and efficiency.

Boosts Decision Making

Handling big data can be challenging and time-consuming. Investing in EMS helps you get real-time data and make informed decisions. You will use the most accurate and up-to-date data to devise creative ways to offer better services to your customers. Your team can easily access data because this system integrates various elements of the business into one platform.

Increased Organization Performance

EMS reduces paperwork, leading to increased performance and productivity.

Since this system connects the inventory, supply, human resources, and sales, it gives quick access to data, thus, enhancing operations and improving efficiency. Using this system also minimizes human errors and reduces disruptions during production.

Enhanced Business Planning

With enterprise management systems, you can quickly create business plans that help you track your organization's operations. The plan enables you to determine whether you are working towards achieving your goals or not. You can monitor overall service and customer satisfaction, expenses, and how production is coming along. You will also get notified of potential inventory problems that enable you to make the necessary changes in time.

Improved Data Accuracy

Many organizations experience challenges managing operations due to duplicate records of data. This is why it is imperative to invest in a tool that can give you accurate data for effective operations. Using EMS creates a centralized information collection with enhanced data processing and storage. This makes it possible for the staff members to easily access and share data, thus, improving performance and collaboration.

Better Flexibility and Productivity

Every organization longs to remain productive all year round. While this may seem straightforward, it can be challenging if you lack the right tools. EMS is an effective tool that automates specific processes, thus, increasing employee productivity. Your team will not waste time on various tasks because the software can handle the tasks automatically. The team will focus on other duties that contribute to the growth of your organization.

Reduces Running Costs

When using enterprise systems, you do not need much paperwork. You will also experience reduced optimization of daily activities. Which means you will no

longer need many hands to do various tasks. This saves you money on operating costs in the long run. You do not have to worry about hiring IT staff because the software can handle multiple tasks. This enables you to save money that you can use to expand your business in the long run.

Increased Data Security

With advanced technology today, hackers continue to look for new strategies to hack systems and manipulate data. This leads to a data breach, hefty fines, and penalties for the affected organizations. If your business faces a data breach, you will lose money, experience business disruptions, and compromise the integrity of your organization. An EMS has an integrated security feature protecting customers and business data from data loss and theft. You will run operations with peace of mind, knowing that your data is safe.

Different states have stringent regulatory measures that organizations must apply and comply with. If not, an organization risks harsh penalties and fines. Using an EMS enables you to keep quality records that you may use in the future whenever a regulatory body wants to prove the performance of your business. This could be information about your company's assets, inventory management, and properties. EMS collects data automatically, thus, enabling you to meet regulatory requirements for inventory and asset management.

Improved Coordination

Teams need to remain coordinated to have a seamless experience when managing tasks. Since EMS contains data, teams can quickly access the data and share it within different departments in real-time. This minimizes communication delays or breakdowns, thus, promoting coordination whether the teams work remotely or not.

Enhanced Customer Support

The modern EMS boosts relationships between customers and businesses. Since the team can quickly access data from a centralized point, they can communicate with customers effectively and on time. This minimizes delays in

serving customers, thus making them satisfied and motivating them to keep coming back for more. It gives you an edge over your competitors and helps you gain a higher market share in the long run.

CHAPTER 2. MODERN APPROACH TO THE COMPUTERIZATION OF MANAGEMENT AT THE ENTERPRISE

2.1 Systems science and mathematical methods

According to systems science, systems are made up of subsystems, which in turn influence the existence of the system. The occurrence of events is influenced both within the system and its environment. A model that considers the whole must therefore include both the system and the environment. Systems thinking also consider the properties of the system as a whole to be different from the properties of the system when it is broken down into subsystems. The Holistic Approach emphasizes the study of the interrelationships between the components of a system and, on this basis, the study of the system as a whole. Systems thinking are widely used not only in the analysis and design of information systems, but also in many specialized systems.

Two fundamental theories in systems science are the dissipative structure theory and the synergetic theory proposed by Nobel Laureate Prigogine and German scientist Haken respectively. Both theories have profound implications for self-organization in many fields, and they also have applications in information systems. One of the technical guidelines for information systems is how to order information/knowledge, and thus order preservation is extremely important in information systems. An analysis of the fire quotient in information systems reveals the implications of dissipative structure theory for management information systems, including maintaining systems in disequilibrium, exposing systems, promoting dynamic synergistic behavior, and selectively expanding volatility.

Many information systems employ systems thinking to varying degrees, and there are two models in the field of municipal planning that explicitly embrace systems thinking. One model is the Rubenstein-Montano and Zandi model. This is a model of solid waste disposal that provides a holistic systems-based simulation of municipal solid waste systems and their environment. Although the model does

not include all system parameters in the system implementation, the modeling idea fully embodies the systems approach. Another municipal information system uses the Soft Systems Methodology. This system recognizes that organizational characteristics affect the effectiveness of planning and links systems thinking directly to knowledge management. It takes into account the organizational aspects of information system design in the system design.

In the area of Information Systems Development (ISD), there has been an increase in the number of studies applying a systems perspective in recent years. A recent study applied a systems perspective to the development of information systems from the 1950s to the 1990s, proposing a trilogy of information systems development, in which information systems are viewed, in particular, as social systems, emphasizing their dual nature and revealing the different roles they play at different stages. For example, information systems are typically characterized by both inward and outward orientation when they are in the social phase, and it is important to make the most of both inward and outward orientation in this phase.

Dimensional is a fundamental concept in physics and has recently been introduced into information systems feasibility studies, information retrieval, information systems planning, software development and systems development. War field, the internationally renowned founder of systems science, defined dimensional in the following way: "If we assume that a system consists of distinguishable subsystems, it is reasonable to assume that there are sets of dimensions, that some dimensions may be useful for particular subsystems, and that some dimensions are useful or meaningful only for the system as a whole ". In the process of system development, different dimensions interact with each other. Software quality, for example, is a multidimensional system. In many current information systems development processes, some non-technical dimensions are often not given the attention they deserve. This is a direct result of the fact that some information systems are technically successful but are not as good as they could be in practice. Typical missing dimensions in the development of systems include the cognitive dimension, the evolutionary dimension and the

temporal dimension. One of the more important deficiencies is the omission of subsystem-dimension integration. The long-established methods of system structure analysis and design lack the ability to represent the sum of parts as a whole, and in particular the ability to integrate subsystems and dimensions, so that the structure of large systems is often not revealed.

Warfield introduced the famous Law of Requisite Variety for dimensionality. This law requires that the dimensions involved in the design of a system must be consistent with the dimensions implicit in the information system. Assume that Ks denotes the dimensions implicit in the information system and Km denotes the dimensions defined by the system designer. In many current system designs, the dimensions of the system are often not fully understood due to the lack of conceptualization of the system, i.e. Km The development of a unified and complete theory of information systems is an urgent and serious task in current information systems research. This work requires concepts and methods with a solid theoretical foundation that can simulate different systems, subsystems and dimensions. In this regard, systems science and mathematics can provide the appropriate concepts and methods to highly integrate the required knowledge. In terms of the relationship between systems science and mathematics, research has shown that systems theory can contribute to most mathematical models. For example, systems science concepts are used in system dynamics, simulation, graph theory and combinatorial optimization. Methods in systems theory help modelers to organize their thinking and to perform accurate analysis and synthesis. In terms of the composition of mathematical theory, traditional mathematical systems theory includes finite state machine theory, discrete automata theory, and almost all classical models used in physics and engineering based on differential equations and statistical mechanics. It is noted that other branches of mathematics with generalizing power such as algebraic geometry, combinatory, graph theory, logic, set theory and topology will also be added to the list of available mathematical tools.

There is a growing body of research in the field of systems science that is

helping us to develop a unified and complete theory of information systems. Giant systems theory is a theory for the study of complex open giant systems. The theory explores subsystems with complex structures and their interactions. The theory, developed by our renowned scientist Professor Qian Xuesen, aims to synthesize the diverse knowledge of many disciplines and form them into a whole for the study of complex systems. In addition, the theory of logical images is being investigated in relation to systems theory and the design of information systems. Cybernetics, calculator science and systems research are being synthesized into a calculator-based systems theory. All these developments will provide the basis for a complete theory of information systems.

Qualitative research is also emerging as a research tool in management information systems research, primarily through the use of Structural Equation Modeling (SEM) to quantify management variables in information systems that are not easily quantifiable, in order to determine the components of the model and their causal relationships, and to build a management theory of the information system on this basis. Hypothesis testing and statistical analysis are used in the analysis. A sample size of 200 is generally an acceptable sample size. An example is given here. The importance of management information systems to industrial companies is self-evident. However, in order to confirm this in terms of management theory, qualitative research is a major research tool. A recent study deals with the impact of MIS on advanced manufacturing technology. The study first A theoretical framework was first proposed to describe the impact of MIS on manufacturing technology. Data samples were collected in the form of questionnaires, modeling and hypothesis testing, and finally conclusions were drawn. The findings suggest that MIS has a significant impact on high manufacturing technology. The study also makes specific recommendations for the management of manufacturing companies. For example, as companies move from low to high complexity manufacturing technologies, they tend to place more specific demands on information systems.

2.2 Evolution of the definition of information systems

There are many definitions of management information systems. However, the narrow definition of MIS began to evolve into a broader definition of information systems as it was subdivided into transaction processing systems for the production and operational levels, management information systems for middle management, and on-line analytical processing systems (including decision support systems and top-level management information systems) for high-level decision-making. As early as 1991, Argyris defined MIS as "an MIS system that provides managers at all levels of the enterprise with useful information, based on data sources both inside and outside the enterprise, in a standardized way, so that they can make timely and effective decisions about enterprise planning and management". This definition effectively broadens the definition of MIS to include information systems that are appropriate for all levels of the enterprise. There are now two distinct schools of thought on the definition of information systems, disciplines and research areas. One of these schools is the classical school, which focuses on the management content involved in MIS. Since traditional MIS are systems used by middle management, this school of thought tends to lack comprehensive coverage in terms of who the systems are used for. This school still uses the name MIS. Another school of thought has renamed the traditional MIS as Information System (IS) or Information Technology (IT).

It can be said that the MIS school focuses on management information systems, whereas IS and IT have a broader scope but also include management information systems, so there is an overlap in teaching and research in the area of management information systems. For example, the development, use and maintenance of enterprise information systems from a systems perspective, the consideration of many management factors in the development of enterprise information systems, and the usefulness and relevance of the information provided by management information systems to enterprise users. However, for undergraduate MIS or IT students, calculator and management knowledge are

equally important, as the development of enterprise information systems requires both business operations knowledge and programming skills. At this stage, the teaching and research of the PhD program is more oriented towards MIS, with the training of MIS teachers in management schools. However, with the transition from MIS to IS and IT, there will be more IS and IT content in PhD teaching and research in the future. The Master's program is similar to the undergraduate program in that it focuses on the middle ground between IT and management content, training middle and senior level systems managers with both management and systems knowledge.

As Information Systems is a multi-disciplinary, interdisciplinary and integrated discipline, the content and subject matter of research can vary considerably and therefore there are often many different academic journals offering publication opportunities. To date there have been a number of review studies of these journals, although the data from these studies may be incomplete. As MIS transitions to IS and IT, there will be a corresponding impact on the evaluation of scholarly journals that publish research.

When analyzing the organizational structure of an enterprise from a systems perspective, the enterprise is a living open system and the information system is a subsystem of the enterprise. With the development of calculator technology, information systems are increasingly used for decision making at all levels of management and are therefore considered to be one of the most valuable subsystems within the enterprise. There are many advantages to using an enterprise information system, including direct improvements in operational efficiency, reduced costs and shorter production lead times.

Generally speaking, information systems receive data/information as input and through process transformation, output results in the form of information. This information is often used to serve a particular information need. The functions involved in this information conversion process include: (1) data generation: the generation or acquisition of data within the enterprise; (2) data recording; (3) data processing; (4) information generation, storage, retrieval and

transmission; and (5) information use for its needs.

The definition of an information system has been a subject of much research, and in the early 1980s it was defined as "a system of people, processes, data, hardware and software and an organizational structure for collecting, processing, storing and communicating data/information. Such data/information is used at two levels: firstly for transaction processing at the production level and secondly for management decisions". Although this definition seemed comprehensive for its time, it clearly only included two of the uses of an information system, namely production and middle management, and not its third use, namely top management. However, from this definition a number of basic characteristics of an information system can be derived: (1) An information system is not simply a calculator system. It is a relatively complex system consisting of people, transaction processes, data, hardware and software, and organizational structure; (2) management information systems are primarily used for basic business operations and management decisions; and (3) there is a difference between systems of a transaction nature used at the production level and systems used for middle management decisions.

In the late 1980s, as the demand for information systems expanded to the higher levels of management, enterprise information systems began to address and serve all levels of the enterprise, and the names of the systems began to differentiate. Specifically, enterprise information systems began to be defined and described by three subsystems. Subsystem 1 is the system that serves the basic level of the enterprise, i.e. the production and operation level, and is called the Data Processing System. From a system perspective, these systems are mainly transaction systems. Subsystem 2 is a system for the middle level of the enterprise, the middle management, called Management Information System (MIS), which adds a part of the system for middle management decision making to the transaction processing system. Subsystem 3 is a system for the top management of an enterprise, called the Decision Support System (DSS), which is also known as the Executive Information System (EIS). From a system perspective, these

systems provide a part of the data processing system and management information system that can be used for top-level management decisions.

Because an information system is not simply a calculator system, but a relatively complex system of people, processes, data, hardware and software, and organizational structure, many management issues have arisen since the early days of enterprise information systems in the early 1970s. As a result, in the late 1970s the American management community began to pay attention to business information systems and at the same time management information systems, or MIS, emerged as an interdisciplinary discipline.

There are many definitions of MIS, ranging from those that focus more on aspects to those that focus more on a comprehensive overview. One of the definitions is: "Management information systems provide useful information to managers at all levels of the enterprise by standardized means, based on data sources inside and outside the enterprise, so that they can make timely and effective decisions about enterprise planning and management". In short, the primary function of an MIS is to process data into information and to communicate this information to management for decision making. It is then a question of what management functions are enabled by MIS and at which level of decision-making they are involved.

Examining the main characteristics of MIS, it is easy to see that (1) the nature of MIS data/information is both structured and unstructured, which determines that MIS supports both management at the operational level (where data is mainly structured) and to some extent management decisions above the operational level (where both structured and unstructured data are available); (2) MIS is primarily a tool for middle management to make decisions. (2) MIS is primarily a system for middle-level decision-making, as the data structure for high-level management decisions is primarily unstructured; (3) although MIS is primarily a system for middle-level decision-making, it seeks to serve the enterprise as a whole.

The value of management information lies in the way in which it is used by a

particular management to make a particular decision and the effect of that decision. It is therefore important to understand the decision-making characteristics of different levels of management in order to develop a system that is relevant. There are three main levels of management. The basic level is the operational/processing level (managerial positions such as transport supervisor), the middle level is the tactical level (managerial positions such as accounting or sales manager) and the top level is the strategic level (managerial positions such as general manager and chairman). For the basic level, the data is relatively structured. For the tactical level, data is both structured and unstructured. For the strategic level, data is more unstructured. Nobel Laureate Simon distinguished between programmable and non-programmable decisions.

The term "programmable" refers to the rule-based or repetitive decisions. Procedural decisions are rule-based or iterative decisions where the decision criteria are predetermined. Non-programmable decisions are newer, unstructured decisions where the problem and the decision criteria are not predetermined. In terms of decision levels, decisions at the basic level are procedural, decisions at the tactical level are both procedural and non-procedural, and decisions at the strategic level are non-procedural. As mentioned above, MIS is primarily a system for mid-level decision making, but the limitations of MIS are evident in the fact that it seeks to serve the whole enterprise. This has led, in part, to the requirement for specialized information systems for the top echelons of the business, leading directly to the emergence of decision support systems, top management information systems and on-line analytical processing systems. In other words, due to the different system characteristics of the three sub-systems in the enterprise information system, the service targets are not identical, which eventually leads to the subdivision of the management information system, i.e. data processing system, management information system and online analytical processing system (including decision support system).

Obviously for different levels of decision making, the decision making process is different, resulting in different information requirements and therefore

different requirements for the system. This imposes different design requirements on information systems designed for different levels, for example, attention must be paid to factors such as the type of decision, the decision process, the role of the decision maker in the business, the type of business, the business environment, etc. The recognition and understanding of these factors by both management and IT is a prerequisite for the development of effective information systems.

In addition to the above-mentioned subdivision of MIS into three different systems, what is happening is a generalization of the definition of MIS. As information systems are not only used in enterprises, in other words in a wide range of industries, the traditional name 'management information systems' is changing to 'information systems' or 'information management systems'. "This has led directly to the current definition of the discipline of information systems. This has led directly to the evolution of the current definition of the discipline of information systems from the traditional, narrowly defined Management Information Systems (MIS), which began in the 1970s, to the broader term Information Systems (IS) and further from the broader term Information Systems to encompass the broader term Information Technology (IT). This trend has shaped the definition of the discipline, the subject matter of the discipline, the composition of the discipline's knowledge, and its socio-economic impact, and has also influenced changes in the discipline's structure. For example, management information systems (MIS) and information systems for business use fall within management studies, while information systems for non-business use, such as medical informatics, do not necessarily fall within management studies. In this sense, there is a growing trend to develop and develop broader information systems based on traditional management information systems, and to develop broader information technologies from broader information systems. Information systems or information technology, as a direct application of computer science and technology in the national economy, includes information systems and related technologies used in different industries, making it a comprehensive discipline with a multidisciplinary nature and a broad development prospect.

The importance of information systems to business management cannot be overstated. Even in a small business, management rarely relies entirely on actual observation of operations in the field. The use of information systems to solve practical problems for the business is now an important responsibility of business managers. It is the responsibility of the business manager to propose systems on behalf of the business and to be responsible for their continuous improvement. It is also their responsibility to manage the IT department and personnel of the company in a way that takes into account the needs of the users within the company. It is important to note that the adoption of information technology brings with it both opportunities and challenges.

The planning of enterprise information systems is important. The timely operation of information systems that reflect the state of the art in technology directly supports the strategic vision of the company and its implementation. For example, the integration of enterprise systems is currently a major trend. However, many manufacturing companies have management information systems that consist of disconnected subsystems, each of which uses its own database. Often each subsystem is used to solve one or two problems and the multiple data conversions between databases are non-automated. This has a significant impact on the efficiency of the system. If a server is used, it serves the purpose of centralized database management, but does not allow for automated data conversion. However, the importance of data integration and system integration cannot be overlooked. Here are two examples of the negative business results of neglecting system integration in system planning. One example is Thomson Home Appliances. The retailer was unable to stock key items quickly because it was still using an old inventory system. With the introduction of a demand coordination system directly linked to internal production and logistics systems, the out-of-stock rate was reduced to 1% and demand forecasting accuracy improved to 95%. Another example is Boeing. In 1997, Boeing was late in integrating its information systems, resulting in delays in assembly and a direct economic loss of $1.6 billion due to the lack of smooth transfer of approximately six million parts

needed to build the aircraft. Having learned from this experience, Boeing quickly introduced the supply chain concept into its internal production system and the results have been very promising. Within four years, production capacity had increased by 100% and aircraft production lead times had been reduced by 60%.

Many companies use a systems development approach to their information systems design process. This approach is also known as the systems development cycle approach. This approach promotes the design of an enterprise information system based on a joint systems analysis of the enterprise's information processing needs by business users and IT personnel. Typical tasks include proposing the economic and technical feasibility of the proposed system, building a prototype, system operation, system maintenance to accommodate changes in the business operating environment and maintaining the real value of the information system. Despite the use of advanced design methods, many problems arise in practice. Problems include a lack of management involvement in the design phase, a lack of focus on the system, an over focus on data processing, a lack of understanding by the technology department of the real information needs of management and the business, and a lack of senior management attention. It is clear that in order to successfully design and operate an information system, attention must be paid not only to technical factors but also to behavioral factors in the organizational structure of the business. Management must be fully involved in the system design phase and the IT department must have a good understanding of the corporate structure, corporate management and its operations. Only with full cooperation between management and the corporate information department can an efficient information system be developed and operated. The difficulty is that management often cannot clearly articulate their information requirements and IT often does not have a thorough understanding of business management operations. In short, management and IT In short, communication between management and IT and a shared in-depth understanding of information systems by both management and IT are essential to the development of a suitable system.

In short, although a major part of an information system is information

technology, there are many practical issues to be studied and resolved in the design and operation of the system, as it is a complex system involving the business environment and people. There is a risk that mismanagement or misuse of information technology and information systems will not only create technical problems but also cause operational problems. In addition, it is important to have a forward-looking enterprise information systems plan. Companies should make their information systems and IT support business strategy, business process improvement, business infrastructure development and business culture improvement. It is particularly important that enterprise information systems and technology effectively support enterprise strategy and implementation.

CHAPTER 3. ENTERPRISE MANAGEMENT INFORMATION SYSTEMS IN CHINA AND THEIR IMPROVEMENT IN FUTURE

3.1 Chinese enterprise management information systems

Enterprise informatization is a development process, the development process of enterprise informatization is closely related to the prevailing level of social and economic development and changes in the competitive environment in which enterprises are located. From the development history of China's enterprise information technology, China's enterprise information system construction has largely experienced the following characteristic development process.

China's enterprise information technology began in the mid-1970s China's enterprises began to build a simple, independent management information system (MIS), as well as computer-aided design (CAD) and computer-aided manufacturing (CAM). These systems have a single function, and the degree of informatization of enterprises is not high, and the contribution of independent applications by functional sub-departments to the overall output of enterprises is small. However, good social and economic benefits were still achieved at that time in terms of reducing labor intensity and improving the accuracy of operations.

From the mid-1980s, Chinese enterprises began to use local area networks to connect various functional departments of enterprises and develop more powerful enterprise MIS and office automation systems; manufacturing industries adopted enterprise process-oriented software technologies while networking and implementing manufacturing resource systems (MRP/MRPII). These systems use the network to connect all departments of the enterprise, use the client/server (C/S) structure to manage public software and information, use distributed databases to seek more information data sharing, and use enterprise process-oriented software technology to achieve automation and informatization of the enterprise design, production, and service processes. These systems make comprehensive use of various information technologies, the most representative of which is the MRP II system, which uses production planning as the main line to plan, organize, lead,

and master the manufacturing resources of the enterprise, so that the logistics, information flow, and capital flow of the enterprise become a dynamic feedback system that is unobstructed and clear to the bottom, thus supplying services that satisfy customers and gaining the competitiveness of the enterprise. In addition, the MRPII system also integrates advanced management ideas and methods such as just-in-time production (JIT), total quality management (TQC), electronic data interchange (EDI), etc. It supports the cross-temporal regional management of multiple service outlets and multi-level warehouses of enterprises, and grasps the integration of production, supply, marketing, human, financial and material management resources in multinational operations of enterprises.

In the middle and late 1990s, with the integration of global economy and rapid popularization of Internet application, new information technology and management models were applied to the informatization construction of enterprises in China, and the informatization process entered a period of rapid development, with the emergence of various open integrated systems such as Enterprise Resource Planning (ERP) and Computer Integrated Manufacturing System (CIMS).

The open and integrated wide-area network informatization system forms a tightly connected supply chain with the activities of the enterprise itself, distribution network, customers and suppliers, and promotes the synergy and balance of all links in the supply chain through the wide-area information network. Therefore, the system can better realize the overall optimized operation of the enterprise in logistics, capital flow, human resource flow and business flow, and improve the competitiveness of the enterprise.

The ERP system introduces new information technologies such as OLAP, e-commerce and workflow on the basis of traditional MRPII, and draws advanced management ideas such as Supply Chain (SC), Just-In-Time (JID) and Total Quality Management (TQC). The core management idea of ERP is to realize the effective management of the whole supply chain, which is mainly reflected in the following three aspects.

Reflect the idea of managing the resources of the entire supply chain. ERP system to the business process of all parties concerned such as suppliers, manufacturing plants, distribution networks, customers, etc. into a tight supply chain, so that companies gain an advantage in the competitive market, to achieve the management of the entire enterprise supply chain.

The ERP system supports the management of hybrid production methods, and its management ideas are expressed in two aspects: one is the idea of "lean production", that is, the enterprise to customers, sales agents, suppliers, collaborative units into the production system, with them to establish a benefit-sharing The first is the idea of "lean production", which means that the company integrates customers, sales agents, suppliers and collaborators into the production system, and establishes a partnership with them to share benefits, thus forming a supply chain. The second is the idea of "smart manufacturing," which means that when new opportunities arise in the market and the company's basic partners cannot meet the requirements of new product development and production, the company organizes a short-term or one-time supply chain consisting of specific suppliers and sales channels, forming a "virtual factory When new opportunities arise and the company's basic partners cannot meet the requirements for new product development and production, the company organizes a short-term or one-time supply chain consisting of specific suppliers and sales channels, forming a "virtual factory", treating the supply and collaboration units as an integral part of the company, and using "simultaneous engineering (SE)" to organize production and bring new products to the market in the shortest possible time, maintaining high quality, diversity and agility at all times.

The planning system in ERP system mainly includes: master production plan, logistics demand plan, capacity plan, purchase plan, sales execution plan, profit plan, financial budget and human resource plan, etc., and these planning functions and value mastering functions have been fully integrated into the whole supply chain system. On the other hand, by defining accounting accounts and accounting methods related to transaction processing, the ERP system

automatically generates accounting entries at the same time when transaction processing occurs, ensuring the synchronization of financial and logistic records and data integrity. Thus, according to the current situation of financial funds, it is possible to trace the origin of the funds and further trace the related business activities, so that it is easy to grasp the matter and make decisions in real time.

In the face of increasingly competitive market and changing business environment, enterprises need to adjust and transform dynamically at any time according to their own changes in the market competition. It not only includes the reorganization of products and production processes, but also involves the related enterprise organizational structure and business management processes. Existing ERP systems are generally supplied to users in a pre-fixed model, and this structure and functionality constrains the dynamic reengineering process.

a. Dynamic Enterprise Modeling (DEM) technology. It is proposed in order to meet the growing needs of the dynamic reengineering process, to achieve the management of business and software systems separately (as if open software systems can be separated from a specific hardware environment). 1996 Baan released a new generation of ERP application suite called BAANIV that embodies this idea. BAANIV implementation of dynamic enterprise modeling, so that Business managers, business analysts and also system implementers can focus on a range of top management functions, best business practices and processes, rather than complex application debugging or endless configuration of product details.

b. Intelligent Resource Planning (IRP). It is an intelligent and optimization of management ideas and models, which breaks all those previous "transaction-oriented" management model. It allows managers to find an optimal solution based on set goals and execute it quickly. This allows them to keep track of, and even stay ahead of, changes in market demand, make the right decisions quickly, then transform their original plans, and implement those changes as quickly as possible. In addition, IRP will also solve the previously unsolvable problems of "collaborative manufacturing" and "constrained resources". Therefore, IRP has become another important direction for the development of ERP systems.

c. Enterprise Information Portal (EIP). It enables enterprises to release all kinds of information stored inside and outside the enterprise, so that employees, customers and partners can access the personalized information they need from a single channel. These users use the information available from this channel to make sound business decisions and execute them.

d. CRM integration with ERP systems. Forward-thinking companies have become familiar with the fact that only by establishing themselves as companies that can respond quickly to their customers can they reap the many rewards of increased revenue, new customers, customer satisfaction, repeat business and company effectiveness, resulting in a significant increase in competitiveness. Therefore the integration of customer relationship management (CRM) with ERP systems has become another direction of development. CRM not only automates the sales process, but also helps companies leverage key customer and corporate data to optimize the business decision making process.CRM empowers customers to communicate with companies through a communication vehicle that is the most convenient for the customer and the most cost-effective for the company. In addition, CRM allows companies to evolve from traditional marketing, sales and service models to an Internet-centric model to accomplish the task of expanding market segments, improving customer service, and increasing personalization of products and services. tight integration of CRM with ERP will not only bring immediate sales growth for companies, but also an opportunity to improve overall corporate management and methods The opportunity to change the status quo of the internal management of enterprises, thus enhancing the core competitiveness of enterprises and bring maximum profit.

e. Electronic customer relationship management (eCRM). With the application of CRM in large service volume systems, a new bottleneck in the manual service channel has emerged, which stems from the limitations of traditional communication methods. Meanwhile, Internet-based communication channels have taken shape, and this new communication channel and the applications based on it have the potential to alleviate personal service bottlenecks

and supply customers and partners with ways to extend the benefits of CRM. This electronic extension of CRM systems is electronic customer relationship management (eCRM).

3.2 Future development of information systems

The future of information systems is immeasurable. Two of the major developments are discussed here, namely knowledge management systems and integrated enterprise information systems.

With the development of enterprise information management in recent years, knowledge management has emerged as a new discipline. Knowledge management refers to the ability of an enterprise to collect knowledge, or to generate knowledge from information, to use it and to carry out enterprise activities effectively on this basis. Enterprise information management has been developed over many years and many enterprises have relatively comprehensive information systems. However, the collection, collation and utilization of knowledge in the form of knowledge systems for internal and external operations and decision-making has only just begun, and new methods and tools are being developed in relation to this. At present, how to develop and utilize enterprise knowledge has become a mark of competitiveness for enterprises, and work in this area requires collaborative research in information technology and other disciplines. This requires collaboration between information technology and other disciplines. A current trend is to build on existing information systems to transform them into knowledge systems. The main difference in the design of these systems is the focus on designing them within the framework of knowledge management.

Knowledge is information that is organized and transformed for problem solving or decision making. Knowledge can be divided into two categories. One is called Explicit Knowledge. Explicit knowledge can be encoded in a formal language. This knowledge is easy to represent, store and use. The other type of knowledge is called Tacit Knowledge. Tacit knowledge is generally difficult to

represent and communicate. In knowledge management, tacit knowledge can be acquired through the analysis of cases, experiences and knowledge generation in the context of solving real problems. The generation of corporate knowledge can take many forms, such as the acquisition of new knowledge, knowledge fusion, knowledge renewal and knowledge networking. Knowledge management involves many methodological issues. It is not only about technical issues, but also about the context of the system and how to represent explicit and implicit knowledge.

One of the objectives of KM is to create value from the intangible assets of an organization. When implemented, knowledge management has a specific objective and target audience. For example, knowledge management is used in business planning. Knowledge management generates innovative ideas, enables the implementation of corporate strategies, improves corporate processes and enhances the dissemination of knowledge across the enterprise. The design of information systems is currently evolving towards how they can facilitate the integration and sharing of knowledge.

Integrated information systems are one of the main directions in which enterprise information systems are currently evolving. In today's highly competitive international marketplace, e-commerce is becoming a new means of doing business. ERP systems are the information infrastructure platform required for e-commerce. ERP systems are currently being developed to assist enterprises in their transition towards integration and to support e-commerce operations at a substantive level. It can be argued that ERP has been created to meet the needs of modern enterprises for integration. Under the concept of enterprise integration, ERP systems link data, operational models and system functions related to enterprise activities into a ERP systems support a wide range of functions including Customer Relationship Management (CRM), Supply Chain Management (SCM) and e-commerce.

The predecessors of ERP systems are Material Requirements Planning (MRP), Manufacturing Resource Planning (MRPII) and Computer Integrated Manufacturing (CIM). Currently, ERP systems are developed to integrate various

functions within an enterprise such as manufacturing, engineering, transportation, finance, accounting and warehouse management in a supply chain environment to achieve more effective business operations. From a system perspective, ERP has moved from being a traditional on-line transaction system to a highly integrated enterprise information system. It is worth noting that in the past decade or so, many companies in the US are replacing their management information systems with ERP systems in order to meet the need for enterprise integration in the age of e-commerce. Statistics show that ERP systems, which represent integrated enterprise information systems, were one of the largest single investments in the information industry in the 1990s. This trend means that the demand for traditional information systems, including production operations systems, management information systems and decision support systems, is decreasing and the demand for integrated enterprise information systems such as ERP is increasing. ERP systems are now being developed to incorporate the functionality of the former production, management and decision support systems and to make the previously separate single systems more integrated and coherent. As ERP systems are replacing existing enterprise information systems, ERP is becoming an important research topic in the information systems community.

A complete ERP system should provide all the functionality for an enterprise, seamlessly integrating all functions of the enterprise to provide decision support at all levels of the enterprise. However, as the integration of the enterprise and the system itself is a complex process, developing and running an ERP system can be a challenge for both ERP manufacturers and users. Two of the main research topics in ERP systems are exploring the experience of running ERP systems from management theory and developing the business operations modeling tools needed to develop efficient ERP systems.

The first topic focuses on modeling and theoretical analysis of the key factors that influence the implementation of ERP in a supply chain environment to enable enterprise integration decisions. The answers sought will include an analysis of the reasons for successful and unsuccessful implementations of ERP systems, how

companies should restructure their business processes when running ERP systems, and how companies can bridge the gap between their existing business models and the business models embedded in ERP systems. The second topic focuses on the development of tools that can better describe enterprise processes and thus facilitate the matching of enterprise processes with ERP systems. In this area of research, Enterprise Modeling provides a good framework for better modelling of enterprise operations and matching ERP systems with enterprise processes. Enterprise Modeling has its roots in production operations management and is used to describe enterprise processes and functions. Existing approaches within this framework include ARIS, CIMOSA, GERAM, GRAI, NIAM, PERA, SADT and TOVE. The current direction of research is to develop a realistic enterprise model using a multidisciplinary approach in order to lay the foundations for the development and successful operation of an ERP system. The research is primarily concerned with developing a new methodological framework that includes existing enterprise modeling approaches, technical-non-technical factors approaches, interpretive approaches and other complex systems approaches. In addition to the two main research topics on ERP mentioned above, other research topics include general management theory of ERP, knowledge management of ERP, information technology of ERP, the relationship between ERP and supply chain management, and the role of ERP in e-commerce.

In addition to the two main research topics mentioned above, there are a number of topics currently being investigated in the information systems discipline. These include: defining the enterprise in terms of the relationship between information needs and enterprise processes, strategic planning of information systems, how to make effective use of data resources as an intangible asset of the enterprise, training of human resources for information systems, using information systems to discover new markets, how to match enterprise information systems with the enterprise structure, quality issues in software development, open systems, data security issues, how to measure the efficiency and effectiveness of information systems, distributed systems, calculator-aided

systems, and the role of e-commerce. The quality of software development, open systems, data security, measuring the efficiency and effectiveness of information systems, distributed systems, calculator-aided software engineering, IT infrastructure, etc.

In today's era, China's large and medium-sized enterprises are striving to improve their own development capabilities, and the demand for management information systems is increasing, increasing the financial investment in management information systems while promoting their rapid development. At the same time, the financial investment in management information system is increasing, and its rapid development is being promoted. Management information system was first born in the late 1970s and early 1980s, and the system is composed of the system is composed of three parts: people, computer software and hardware, which is also known as the human-computer system. The system has the functions of storing data, system maintenance, and analysis and processing, the It controls the operation status of the enterprise at any time, helps the enterprise to enhance market competitiveness, accomplish business goals and help the enterprise to make various decisions.

Second, the development status of management information system

Although the management information system has many advantages, but according to the analysis of the existing economic situation in China, there are still many disadvantages for small and medium-sized enterprises to adopt management information system. There are many drawbacks. The complexity of management of small and medium-sized enterprises in China, the personnel and costs are limited to a certain extent, resulting in the development of management information system is hindered, and its value cannot be fully realized. The value of MIS cannot be fully realized. Most enterprises adopt management information systems while blindly developing the system, resulting in the system's functions and design not being able to meet the development of the enterprise. can meet the development of the enterprise, so that the normal working procedures of the enterprise are interfered with and prevent the enterprise from making correct

decisions, so the relevance of the system should be improved and the management information system should be continuously Optimize the management information system.

(i) The system is facing the attack of hackers

Based on the premise of scientific research and development to carry out big data, enterprises can develop plans that meet various requirements according to their own development. However, hackers are usually familiar with the the organizational framework of management information systems and then use big data technology to steal relevant information from others.

(ii) The general increase of cyber crime rate

Along with the continuous development of science and technology, the advantages of management information technology are becoming more and more prominent. In advancing social progress to provide people with convenient and fast life At the same time, the surfacing of some highly intelligent lawless elements using management information systems this high-tech means of crime, lawless elements through the network this channel using WeChat The number of fraudulent crimes committed through the network is also increasing. In general, these criminals hide their real identity and information on the network The police will immediately cancel their false information after the incident is exposed, and they will disappear without a trace on the network, which increases the difficulty of police investigation. This increases the difficulty of police investigation. At the same time, the mindset of most police officers in China's public security management information system lags behind the needs of the times, and their cognitive level of big data is not yet clear. They do not have a clear understanding of big data, and the means and methods of handling cases are in accordance with traditional thinking, which is obviously reflected in the collection of information. In the investigation and evidence collection, there is no a clear grasp of the development of the law of the case, and will not be in accordance with the relevant cases in the past to carry out a scientific and reasonable analysis of the case, mostly in accordance with the previous way of handling the case. Most of

them are carried out in accordance with the previous way of handling cases.

Third, the future development trend of management information system

(A) Network development

In today's era of rapid development of network technology and big data information technology, no technology can develop alone without the network environment, so the management information system will also develop in the direction of networking under the network environment. In the current management practice, as the number of various types of information is growing rapidly, it is necessary to pay more attention to the development of network technology to ensure that the management level is significantly enhanced, while relying on network technology to achieve the accurate and efficient processing of various types of information. At the same time, relying on network technology can also effectively ensure the security and stability of the management information system, to ensure the security of various data dissemination process, so that the management information system can maximize its own value. Thus, network technology will be more and more widely used in the management information system, and the management information system will develop in the direction of networking.

(2) Integrated development

All kinds of subsystems under the management information system are effectively combined, so as to form a unified management of all systems can be achieved, which is the integrated development. The internal structure of the management information system is complex, and it contains a variety of science and technology, and the processing of big data requires the system to rely on a variety of different science and technology to achieve the operation, and promote the development of the management information system in the direction of integration needs to rely on a wide variety of complex technology to carry out.

(iii) Intelligent development

While the management information system itself is developing continuously, the application of its system in life is also becoming more and more in-depth, and

the market competition among large and medium-sized enterprises is also increasing. Only by continuously improving their own management system can enterprises obtain the space for survival and development in the fierce competition. Intelligent technology has been closely related to our lives. Our life is closely related to intelligent technology, enterprises follow the law of their own development at the same time, will certainly pay extra attention to intelligent, the next thing to do is to invest a lot of money to The next thing to do is to invest a lot of money to develop intelligent management information system.

Measures to improve the construction of enterprise management information system

(a) Improve the awareness of information construction. Informatization is a major trend in the current development of the times, and is also an irreversible trend. Therefore, enterprises must be clearly aware of this, especially the enterprise managers to innovate the ideology, change the idea of seeking success in a hurry, and develop a long-term plan for enterprise development. At the same time, we can promote the overall coordination of internal resources, such as personnel and technology, to ensure the effective implementation of management information system construction, establish scientific and feasible goals, and provide reliable institutional and financial guarantees. Only by attaching importance to it at the ideological level and effectively implementing it at the operational level can the management information system not become a mere formality, and further give full play to its role of providing enterprise service quality, improving enterprise management effectiveness and perfecting enterprise management structure.

(2) Carry out a good selection of system tools. In terms of the current development reality, enterprises in the process of building management information systems should carry out a good selection of system tools in terms of input costs, operational difficulties and professional functions. First of all, the system tool selection is based on the premise of input cost. At present, cost control is an important factor to be considered in the process of construction of

enterprise management information system. Therefore, when carrying out the construction of management information system, technical personnel should not pursue the top version or high technical standard of the system body and software system, but should focus on the effective fit between the system function and the actual business management needs of the enterprise, and further achieve the effective control of the software cost and material cost of the construction of management information system on the basis of guaranteeing the value of the management information system. Second, the choice of system tools is based on the premise of operational difficulty. To some extent, at this stage, some enterprises have adopted the ERP system even if they have reaped a certain application effect, but each functional module whether its actual operation or its actual operation and maintenance are quite difficult to call, so in the process of enterprise management information system construction, should work with technical personnel, the management system operation process to effectively simplify, and carry out a good key logo design of each functional module. For example, the design of parallel operation links should be reduced as much as possible, and linear and trapezoidal operation flow design should be introduced to ensure that enterprise personnel are less likely to face the problem of choosing the same level of key operation when operating the system in practice, so as to further improve the effective utilization of the management information system. Finally, the choice of system tools is based on professional functions. With the development of market economy, enterprises are always faced with the management and processing of huge amount of resources and information data in the fierce market competition. Therefore, in the process of enterprise management information system construction, it is important to pay attention to the comprehensive and professional consideration of management information system functions to ensure that the system can simultaneously meet the data management needs of different fields such as production, sales, logistics, finance, and customers. At the same time, on the basis of ensuring the diversity of management information system functions, we should also ensure the effective coordination

between different functions, so as to promote the integration and systematic development of enterprise management and lay a solid foundation for the modern development of enterprises.

Increase the training and introduction of relevant talents. The construction of enterprise management information system is not only inseparable from the support of hardware facilities such as computers, but also inseparable from the strong cooperation of talents and systems to compete for production factors. Among them, talents, as an important manifestation of enterprise's soft strength, are the first element in the construction of management information system. The planning and design of enterprise management information system cannot be separated from people, the learning and use of management information system cannot be separated from people, and the value of management information system still cannot be played without people. Therefore, in the process of enterprise management information system, we should uphold the concept of "people-oriented", increase the training and introduction of relevant talents, and strengthen the education and training of new technology and new technology for enterprise employees. At the same time, more stringent requirements should be put forward for enterprise managers, who should be able to clarify the development needs of the enterprise, grasp the specific differences between the information collection and information needs of the enterprise at this stage, and grasp the functional direction of the management information system at the macro level. For some enterprises, an independent MIS team can be formed within the enterprise, and employees who are proficient in different functional modules of the MIS and can be responsible for organizing, executing and coordinating the orderly operation of the MIS can be selected to join the team, so as to unite the talents of the enterprise and work together to effectively promote the smooth development of the enterprise MIS construction.

To sum up, to carry out the construction of enterprise management information system and promote the organic integration of management information system and the actual management of enterprises is the trend of

enterprises to comply with the development of the information age. Therefore, it is necessary for the relevant personnel of enterprises to innovate their ideology, improve their understanding of the value of enterprise management information system, strengthen the in-depth analysis of the main problems faced in the construction of enterprise management information system, improve the awareness of information construction, carry out the selection of system tools, increase the training and introduction of relevant talents, etc., so as to actively promote the smooth development of the construction of enterprise management information system of enterprises.

1. How is information systems transforming business? Why is it so important to the operation and management of today's businesses?

Email, web conferencing, mobile phones and tablets have become essential tools for conducting business. Information systems are the foundation of fast-paced supply chains. The Internet allows many companies to purchase, sell, advertise and mobile customer feedback online. Through the digitization of core business processes and the gradual evolution into digital companies, organizations are striving to become more competitive and efficient. The Internet has allowed us to significantly reduce production and purchasing costs and to sell products globally, thus stimulating globalization. New trends in the development of information systems include the emerging mobile digital platforms, big data and cloud computing.

Information systems are now the basis for conducting business activities. Without the widespread application of information technology, companies in many industries would struggle to survive and gain the ability to achieve their strategic business objectives. Companies are currently using information systems to achieve six key objectives: operational excellence, new products, services and business models, strong relationships with customers and suppliers, improved decision-making, competitive advantage and sustainability.

2. What exactly is an information system? How does it work? What are its management, organizational and technical elements? Why are complementary

assets essential in ensuring that information systems provide real value to the organization?

From a technical perspective, an information system phones, stores and distributes information from within and outside the organization to support organizational functions and decision-making, communication, coordination, control, analysis and visualization. Information systems transform raw data into useful information through three basic activities - input, processing and output.

From a business perspective, an information system is a solution to a problem or challenge faced by a company and contains elements of three dimensions: management, technology and organization. The management element of an information system designs topics such as leadership, strategy and management behavior; the technical element of an information system includes computer hardware, software, data management technology and network/communication technology (including humans); and the organizational element of an information system designs topics such as organizational hierarchy, division of functions, business processes, culture and political interest groups.

In order to derive meaningful value from information systems, organizations must invest in appropriate organizational and managerial complementary assets alongside technology. These complementary assets include new business models and business processes, organizational culture and management behaviors, appropriate technology standards, rules and laws, etc. Businesses are unlikely to achieve high returns when investing in new information technology unless appropriate management and organizational changes are made to support the change in technology.

3. What disciplines are used to study information systems? How does each discipline contribute to the understanding of information systems?

Information systems research involves topics and perspectives from both technical and behavioral disciplines. Technical approaches focus on models and system functions and include computer science, management science and operations research. Behavioral approaches focus on the design, implementation,

management and business impact of information systems, and include psychology, sociology and economics. The socio-technical perspective considers both the technical and social characteristics of information systems and solutions, and that their systems and solutions represent the best balance between the two.

CONCLUSION

Even with the numerous benefits, there are a number of challenges that companies are likely to face when applying Management Information Systems in their businesses.

The first challenge is in the cost of equipment. For a big company to successfully incorporate a Management Information system, there is a need to purchase devices that the employees and management executives will be using to interact with the system. These devices include servers, tablets, laptops and desktop computers. In addition, the company needs to invest in a good network that will connect these devices in order for the system to work effectively.

Training of the workforce can also become a problem when applying Management Information Systems in a company. Without a proper understanding of how the system works, it can be hard to reap the full benefits of using it. This therefore makes it necessary for the company to ensure that employees and their managers are well trained on how to use the system. This can be an expensive and time consuming exercise.

The systems are expensive to purchase. Owing to the unique needs of each organization, Management Information Systems have to be customized for each company. This means that there has to be brainstorming sessions where the vendors sit with management officials seeking to understand the needs before they can develop the system. As a result, the cost of the system goes up, thus taking it out of reach for small and medium companies.

Many companies end up purchasing systems that lack the features they need most. As mentioned earlier, each company has its own unique needs when it comes to Management Information Systems. When you purchase a system that is not meant for your company, you will have better access to data that doesn’t help improve your operations. As a result, you will not be able to get the best return on investment.

There is also a need for trained personnel to keep the system in good working order at all times. Like any other system, management information

systems need proper maintenance in order for them to produce the best results. This means that you will need to add specialized personnel for system maintenance in your company. Without these people, using the system will be a challenge since errors will go unresolved and this will result in inefficiencies in the operations.

Management Information Systems are heavily affected by large changes in the company. This means that before you make any change in the way you run the company, there will be a need to consider the impact of the changes on the information system. Sometimes, it becomes impossible to make some changes without changing the Management Information Systems hence having the system in place ends up being a limitation. However, most small changes should easily be incorporated in a good MIS.

Management Information Systems will result in the loss of employment for a number of employees in a company. People like office messengers and traditional registry clerks will need to be reduced or eliminated after the system has been incorporated since some of these tasks will be automatically done on the system. These employees will not be happy about the changes and this can easily result in lawsuits or other problems with trade unions when large numbers of employees are retrenched.

In the context of the 21st century information era, information technology has been promoted and penetrated in all aspects of life, work and study of the public with its series of advantages. In the current context, management information system has become a symbol of enterprise modernization, which helps to provide enterprise service quality, improve enterprise management effect, perfect enterprise management structure, and lay a strong foundation for enterprises to participate in the market competition. At the same time, although the management information system has been promoted in many enterprises, the problem of low utilization of management information system is very common under the influence of a series of factors such as construction funds, concepts and personnel, and it presents different problems in different enterprises.

The value of enterprise management information system

(1) It can promote the improvement of enterprise service quality. Through the construction of enterprise management information system, we can promote the information exchange and interaction between enterprises and customers, and thus improve the satisfaction level of customers to enterprise services. In addition, in industries such as finance, logistics and transportation, enterprises can rely on the implementation of management information systems to transfer real-time information data on a wide range of products and personalized services into the corresponding computer clients or mobile applications. In this way, customers can understand the information related to the products and services of enterprises regardless of time and space, thus ensuring the real-time sharing of data between enterprises and customers.

(2) It can promote the improvement of business management efficiency. For a long time, efficiency has been an important indicator to assess the market competitiveness of an enterprise. The construction of a good management information system can promote the sharing of information among different parts and personnel in enterprise management and further prevent the conflicts caused by asymmetrical information and lagging information sharing in traditional management, so that enterprise management can be carried out in an orderly manner. In addition, in such industries as architectural design and commodity manufacturing, the construction of enterprise management information system can also promote product design by three-dimensional, modeling instead of the traditional flat, further reducing the high dependence of the design work on the professional quality and work experience of the relevant personnel, and improving the quality and efficiency of the enterprise product design.

(3) It can promote the improvement of enterprise management structure. According to relevant research, a large proportion of SMEs in China are facing a negative business situation, and the main reason for this situation is the lack of capital turnover capacity, which is closely related to the enterprise's own management structure. If the management structure of an enterprise has problems,

the flow of funds and income corresponding to its production, procurement, sales and other business processes will gradually become chaotic, further causing the "capital chain" to break, which will have a negative impact on the enterprise (iv). In view of this situation, it is necessary to promote the construction of enterprise management information system. With the support of management information system, it can help enterprises to carry out more scientific and detailed data analysis activities, and further carry out comprehensive and systematic analysis of a series of income and expenditure links involving the magnitude and return cycle, and finally provide a strong basis for scientific and reasonable budgeting activities and management decisions, so that the enterprise management structure can be effectively improved.

The main problems faced in the construction of enterprise management information system

In recent years, the construction of management information system of large enterprises in China is in good condition, but some small and medium-sized enterprises face various problems in the construction of management information system, which are mainly manifested as follows:

(a) Insufficient funds for the construction of enterprise management information system. Small and medium-sized enterprises are difficult to compare with large enterprises in terms of scale and economic income, so the funds that can be invested in the construction of enterprise management information system are relatively limited. The construction of enterprise management information system involves not only software systems that can provide direct services, but also various hardware network equipment, operating systems, servers, etc. These software and hardware systems require a large amount of investment. In addition, a series of management operation and maintenance work has to be carried out in addition to the construction of a comprehensive management information system, which also requires a large amount of investment. Due to the limited funds, the construction of enterprise management information system is restricted to a certain extent.

(2) Management information system business is not standardized. Due to the lack of funds for the construction of management information system, it will further make the specific implementation algorithm of management information system construction appear incorrect and out of place, which will eventually cause the business process of management information system to be irregular, which will definitely have a negative impact on the management of enterprises. At the same time, also because of the limited funds for MIS construction, the MIS construction process is not fully realized according to the professional realization system construction process, which leads to many loopholes in the constructed MIS, poor performance quality, and even difficulties in comprehensive and accurate business data analysis, which eventually provides deviations in the analysis data and adversely affects the business management of enterprises.

(3) The vision of management information system construction is not broad enough. Some enterprises do not have a broad vision in the construction of management information system, and do not make short-term and long-term plans at the same time, but only focus on immediate interests. Because the investment in the construction of management information system is linked to the long-term management of the enterprise, it is often not possible to reap significant benefits in the short term, so the enterprise managers are required to consider not only the short-term benefits but also the long-term development needs of the enterprise when promoting the construction of management information system, so that the current construction of management information system can be effectively expanded and maintained in the future as far as possible to further lay a solid foundation for the construction of enterprise management information system. This will further lay a solid foundation for the construction of management information system.

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