Demonstration Comparison of the Features for ERP, SCM and CRM

Linhao Deng*

School of Information Management, Wuhan University, Wuhan, China

*Corresponding author: 2020301041210@whu.edu.cn

Abstract. With the further development of the digital economy in the world, MIS play a more and more significant role in the process of economic activities in various enterprises. Contemporarily, a variety of systems are emerging, causing certain troubles for the digital transformation of the enterprise. Comparing the features of different systems is an important guide for the digital transformation of enterprises. This paper will describe and compare the features of ERP, SCM, and CRM using a case study approach based on previous data. This paper firstly introduces the basic knowledge, including definitions and history of MIS. Subsequently, definitions, requirements expected effects, advantages and disadvantages of ERP, SCM and CRM are demonstrated respectively with specific successful cases. Finally, an outlook on the development of MIS is proposed and the limitations are clarified for the state-of-art systems. These results shed light on guiding further exploration of various MIS and the digital transformation for enterprises.

Keywords: ERP; MIS; SCM; CRM.

1. Introduction

MIS originated in the USA in the late 1960s and matured towards full development in the 1980s. In the 1990s, the rapid development of BPR provided an even wider scope for MIS [1]. In this paper, MIS is considered in a broad sense, i.e. all information systems in an enterprise can be understood as management information systems. MIS consists of three components, i.e., people, computer software and computer hardware. It is a human-driven system for collecting, transmitting, processing, storing, updating, expanding and maintaining information using computer hardware, software, network communication equipment and other office equipment. With the development of the economy and the advancement of computer technology, MIS is playing an increasingly important role in our modern society today. It is not only used in traditional manufacturing, but also in all sectors of people's work and life. Whether it is the financial sector, public utilities (e.g., medical schools and libraries, the retail and foreign trade industries), MIS always play an important supporting role, making it possible to improve the efficiency and quality of work in all sectors of society. The mainstream information systems in society include IC, MRP, MRPII, ERP and SCM etc. [2]. This research will mainly focus on ERP, SCM and CRM. Among them, ERP is a further development of MRP II, the scope of management includes production planning, quality management, maintenance management and other aspects of the entire enterprise, the application of ERP has also been extended from the manufacturing industry to the financial industry, communications and other industrie. SCM integrates all departments and personnel up and down the supply chain to improve the efficiency of suppliers, manufacturers and retailers. CRM is customer-centric, using information technology (e.g., data mining to provide better service, expand consumer base and reduce sales costs, thereby increasing customer satisfaction) [3].

In recent years, the demand for information technology in domestic and international companies has increased rapidly, and the academic community has paid more attention to MIS. Gui et al. emphasize the importance of integrating ERP, SCM, CRM and BPR [4]. Guo pointed out that enterprises should respond to the needs of big data development and build management information systems that keep up with the times [5]. Zhou, et al. developed a meat pigeon production management information system with modern IT technology. It can be found that previous researches have mainly focused on the combination of management information systems and emerging technologies, or the design and implementation of management information systems in a particular industry or

organization, while there is a relative lack of horizontal comparison of various systems of management information systems.

In a modern society with increasing demand of Informa ionization, it is important to identify and compare the features of various management information systems for the integration and technical updating of them. Taking China as an example, small and micro enterprises and some local governments and institutions in the process of digital transformation are often unable to understand the essence of different management information systems due to insufficient funds and lack of regional development and talents. In this case, it is difficult to grasp the focus when building management information systems, and achieving limited results in information technology construction. The features of management information systems will deepen the understanding of the society and provide assistances for digital transformation. This research will introduce and compare principles, requirements, expected outcomes, advantages and disadvantages of ERP, SCM and CRM, point out limitations of MIS and look towards future.

2. Descriptions of MIS

MIS is a category of information system. Information systems are human-machine systems that use computers to process information, and they have developed rapidly over the last half century. In the 1950s, TPS (transaction processing systems) emerged, using computers to process daily transaction data such as payroll and billing. In the 1970s, MIS (management information systems) matured. Compared with TPS, whose operational activities are accessing and processing data within a department, MIS provide information for management, extending the speed and quality of information processing to all parts of the organization and enhancing the efficiency and capability of management. Later, systems such as DSS (decision support systems) and OA (Office Automation) also emerged, which will not be described in detail in this paper. MIS is the foundation of ERP, SCM and CRM, which will be introduced in detail later. The history can be introduced as shown in Fig. 1. From a narrow perspective, MIS are systems that provide their users and managers with useful information that they need to take decisions and solve problems. Information from both internal and external sources is entered into the MIS and processed by the system and output in the form of reports and documents to the management level of the company as illustrated in Fig. 2 [6].

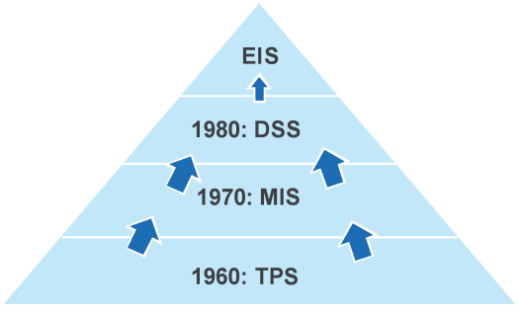

Figure 1. The history of information system

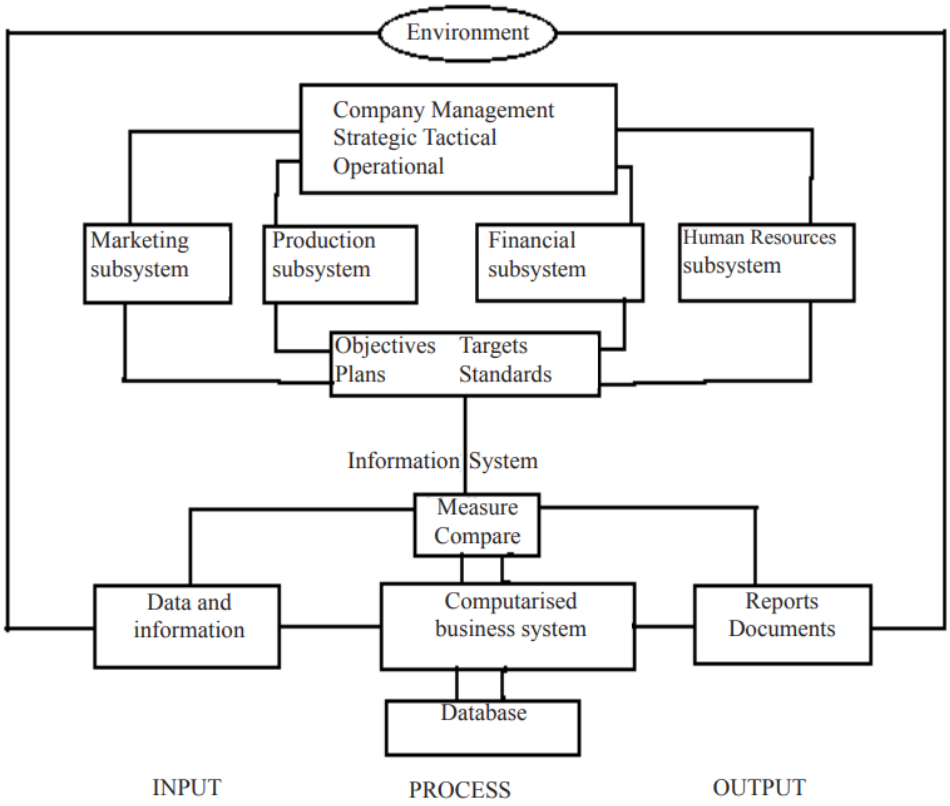

Figure 2. The structure of MIS

However, from the perspective of system theory and management cybernetics, MIS contains information collection, processing, storage, transmission, retrieval and output systems that exist in any organization and serve for management decisions [7]. No matter which definition, MIS is faced with defined needs of information and focuses on the effective management of information to ensure the flow of high-quality information, thereby improving the quality of the overall decision and management making. To achieve this, MIS should be able to identify information needs, collect information, process it, integrate it and deliver it. This series of information management processes need the support of a unified database. Nowadays, with advances in computer technology and communication technology, it can be expected that application models and databases will play a more and more important role in MIS.

Although the successful application of MIS requires the hard environment (e.g., technology and capital), MIS also has high requirements for soft environment (e.g., the cultural heritage of the enterprise organization, the standardization of various operations and procedures, good strategic planning of the enterprise). These soft conditions are also important conditions for MIS to function better. The same goes for ERP, SCM and CRM.

3. ERP

ERP is a modern business management theory. It is a business management idea developed on the basis of MRP II, which establishes a closed-loop system through management of material flow, capital flow and information flow with the support of computer technology, allowing this system to achieve full process management from production to sale. ERP further extends the management scope to cover quality control, maintenance and service etc. and realizes the integrated management of various information resources of the enterprise, becoming a comprehensive, integrated platform for production, management and decision-making [8]. With the rapid development of Internet technology, ERP provide users with the ability to share information and data exchange, and plays an important role in cross-enterprise or cross-regional departmental cooperation. As shown in the Fig. 3, ERP has

six modules including financial management, production management, material management, human resource management, project management and engineering service. It can integrate the enterprise's financial, human, inventory and other internal and external information, and promote the integration of business processes to reduce costs, improve product quality, improve the enterprise's ability to respond to the market. Therefore, ERP is useful not only in production, decision-making, and management in enterprises, but also in other types of organizations, such as those in the public service category. ERP meets the needs of modern enterprise management operation and has a positive impact on the enterprise.

There are many enterprises that use ERP and achieve success, taking Maotai as an example, Maotai is the largest listed company in China and one of the highest market capitalization brewing companies in the world. High-end liquor is its main business, while the middle and low-end amounts of other liquors account for a relatively low percentage. As a company in a traditional industry, Maotai has been more successful with the support of ERP. In terms of information flow, it has launched the small program, iMaotai, which smooths the flow of information between the company and consumers and reduces the behavior of middlemen earning price differences. Meanwhile, Maotai uses RFID technology to guarantee that consumers can buy authentic liquor. Therefore, it ensures the reliability of information delivery. In the capital flow, its high-end liquor has a very high profit margin. Therefore, Maotai develops supply chain finance business to help small and medium-sized enterprises upstream and downstream of the supply chain. Sufficient capital can flow smoothly to those companies, thus making contributions to the stability of Maotai's supply chain [9]. In terms of material flow, Maotai adopts automation and information technology, and the quality control of its products has advanced significantly through automatic blending equipment. Maotai ERP construction has integrated information flow, capital flow and material flow together, achieving greater success and making it one of the most successful brewing companies in the world.

However, ERP has some disadvantages as well. First, as ERP pays attention to the integration of the whole organization including information flow, capital flow and material flow, the cost will be much more expensive, and the cost may be unaffordable when the integration requires BPR. Second, ERP lacks the extensibility. As ERP requires to integrate the whole process of the operation of the company, it's not simple to extend the function of ERP, and the function of one module is possible to be relatively weak. Last but not least, ERP is quite complex as it integrates so many functions. So, for traditional industries, employees need a long time of training to make full use of ERP, and the cost may be too high for some small and medium-sized enterprise.

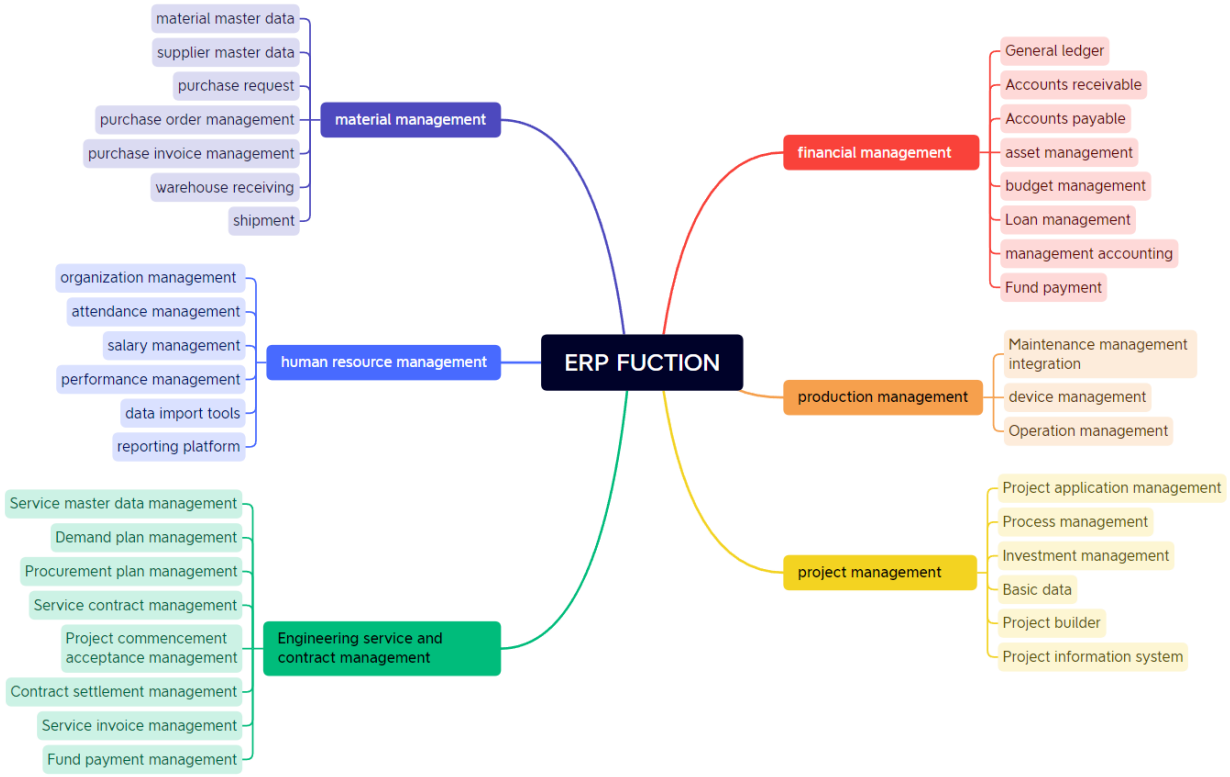

Figure 3. The function of ERP

4. CRM

There are many different definitions of CRM given by many different scholars from different perspectives. This research defines CRM as a customer-centric business strategy that uses IT technology to analyze customer needs, improve business models, and enhance customer satisfaction, thus achieving a win-win situation for both corporate profitability and user satisfaction [10]. As ERP focuses on the integration of the whole process of the company's business, it will pay less attention to the customers. With the economic development, IT technology advances and diversification of customer needs, the information systems of enterprises should pay more attention to the customers. ERP does not pay sufficient attention to the customer and that has become one of its shortcomings, therefore, CRM has been developed rapidly and helped numerous enterprises solve problems. As a management information system, CRM could not only integrate and analyze resources of customers, but also arrange the work of the employees, similar to the design in Fig. 4. CRM satisfies the demand of modern enterprises which especially need the resource of customers. With the support of CRM, an enterprise could understand the segmented demands of its consumers and develop personalized marketing strategies, thus enhancing the satisfaction of various customers, ensuring the customer resources of the company and increase its competitiveness. Besides, CRM could contribute to the integration of an enterprise. Customer-centric CRM also requires efficient organization of resources, which enables the sharing of information between departments and the pooling of customer information to deepen the company's overall understanding of all customers, thereby enhancing the company's competitiveness. Last but not least, CRM pays attention to the business intelligence. The success application of CRM requires high-level IT technology. Modern IT technologies such as data mining and artificial intelligence could help CMR dig deeper into the needs, assets and consuming habits of users and fully depict the user portrait. They also close the distance between the users and the enterprise, i.e., companies can communicate with users easily and further enhance the satisfaction.

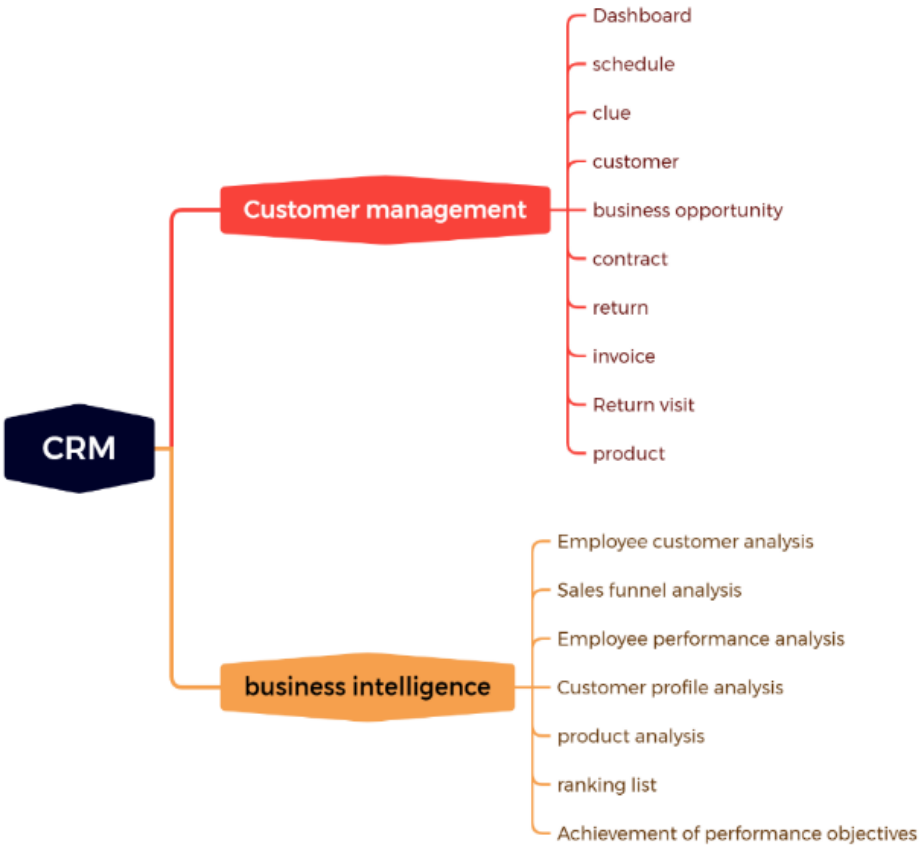

Figure 4. Function of CRM

There are many successful applications of CRM. Taking Apple as an example, it is one of the world's most successful companies. It has built an ecosystem that exemplifies the successful use of CRM. In order to retain customers, Apple connects data between cell phones, computers and tablets so that users can enjoy all products with just one account, and the synchronization of data from multiple devices in the account also allows Apple to collect more information about users' consumption habits and other information. As a result, Apple was able to personalize its pushing service based on the accumulated user data, and Apple's marketing costs were greatly reduced. At the same time, Apple's hardware devices (e.g., mobile phones), have industry-leading performance with the support of its powerful supply chain [11]. It makes their users to replace their devices less frequently and Apple can accumulate user data more easily to provide personalized services, thereby increasing user satisfaction. The use of CRM has helped Apple build a closed but efficient ecosystem, making Apple one of the most competitive technology companies in the world.

There are some disadvantages of CRM as well. Accumulating a large amount of data about users is not an easy task, especially in industries with strong network effect. It is often difficult for late entrants to expand their customer groups to become more competitive. Another problem is data security. As CRM requires the data of users, how to collect and save these data legally and safely is a serious question. Some data are data that users don’t like to share; hacker attacks also pose a significant challenge to data security. Besides, to fully dig the information of customers, high-level technology such as data mining is required and the cost will be unacceptable for some small companies if they want to achieve their targets perfectly.

5. SCM

SCM refers to the use of modern computer information technology to grasp the information of the supply chain from suppliers to users, including the flow of money, the operating conditions of each enterprise etc. According to the overall situation of the supply chain, an enterprise can optimize

enterprise resources and adjust the production and operation of enterprises, internal rules, strategic systems to ensure the stability of economic activities of enterprises and supply chain to enhance the competitiveness of enterprises [12]. The conception of SCM has already originated in the 1980s, but this conception gets its new connotation until the widely application of ERP. As the paper mentioned in Sec. 3, ERP pays attention to the integration of information in the whole company. Hence, it will have relatively little consideration for the external environment of the company. Therefore, SCM shows the integration and optimization of the whole supply chain, and enhance the business efficiency of the customer, manufacturer and retailer. Supply chain connects supply side and demand side, as sketched in Fig. 5, so SCM can make contributions to the development of economy [13, 14]. The key of SCM is to share the information of materials, funds and so on with other enterprises in the supply chain. SCM plays an effective information system for enterprises to enhance its competitiveness. SCM can synchronize information upstream and downstream in the supply chain, which is of great help to enterprises across countries and regions, thus reducing the risks for both buyers and sellers, lowering costs and promoting profit growth for both sides.

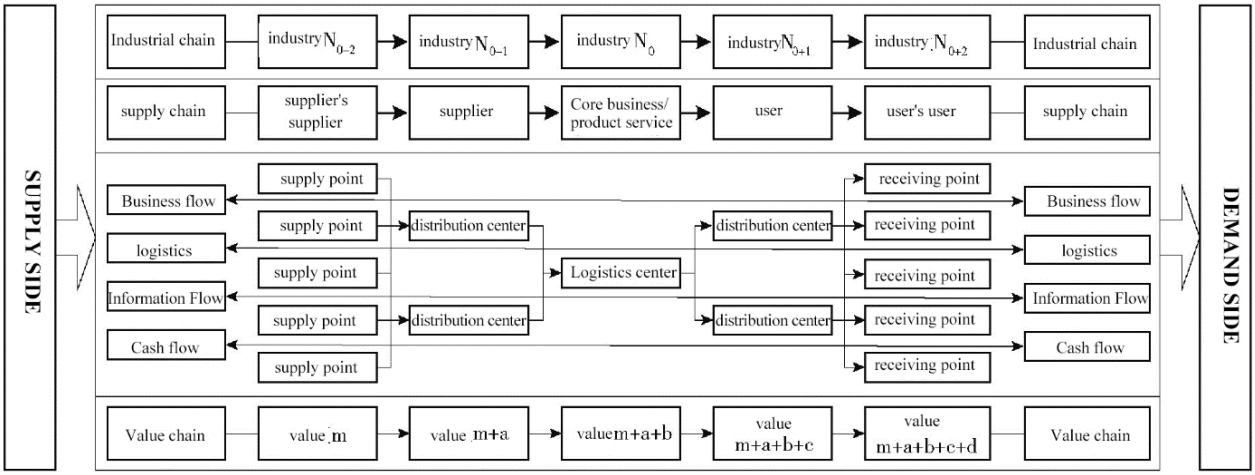

Figure 5. the connection between supply side, supply chain and demand side

Fengshen Group is a case of successfully using SCM to enhance its competitiveness. In Fengshen's supply chain, the core company headquarters is set in Shenzhen, while the production bases are in Xiangyang and Huadu respectively. Firstly, through strategic cooperation with suppliers and factories in Xiangyang and Huadu, Fengshen achieves information sharing among partners, promotes smooth logistics, and creates competitive space and time advantages. Second, in the supply chain, there are both competitive and cooperative relationships between entities. To be specific, factories in Xiangyang and Huadu compete in terms of quality output, etc., but coordinate with each other when risks arise to improve the quality and stability of the supply chain. Finally, Fengshen's supply chain has the ability to adjust to changes in the market and the company's strategy, which enhances its adaptability to the market by adjusting the relationships and strategies of upstream and downstream companies in a timely manner. Thus, Fengshen's SCM is more successful, and its efficient management of the supply chain enhances the competitiveness of the company.

The biggest disadvantage is that SCM requires that every company in the industry is digitized. The whole supply chain will be adversely affected with an enterprise having low-level digitization. It may also require enormous investment, data and talent as other systems. SCM is exactly a methodology, or a theory, so the success of the application of SCM mainly depends on people rather than the method.

6. Suggestions & Prospects

Contemporarily, the global digital economy is developing at a rapid speed, and MIS will play an important role in both the digital transformation of traditional industries and the further development

of Internet enterprises. The ability to build successful information systems will be important for the development of enterprises. For enterprises that requires high-level information system, the first thing is to be able to sort out the purpose and functional requirements of their own information system. Whether it is ERP, CRM, or ERP, they all have their own appliable scenarios, have their own unique advantages, and are constantly developing and updating. Only specific analysis of specific issues can the enterprises understand their information needs and be able to choose the right information system. Secondly, adequate financial support and talent security is an important factor for the construction of information system. Informationization construction requires a large number of talents, funds, and technical support to run smoothly. In addition, employees and management of traditional industries should actively change their mindset and their philosophy. The construction of management information systems is not just the deployment of computer hardware and software, it also includes the transformation of the overall mindset and philosophy of the enterprise. Whether it is decision making, management, or resource sharing, the mindset and philosophy of the participants in all processes will have a significant impact on how the information system plays its full role.

In the future, various MIS will be more and more widely used in various industries, playing an important role in the digitalization of enterprises and society as a whole. The paper holds the view that MIS will have a positive market and will have a fast development in the future. Nevertheless, the technology, funds and talent are essential in this process as the basis of the digital transformation of the society. Without efforts of these three factors the successful use of MIS or even the digital transformation of society will be incredibly difficult.

7. Conclusion

In summary, this paper discusses features of different information systems from the perspective of advantages, expects and son. Specifically, features of ERP, CRM and SCM. According to the analysis, ERP is a system that focuses on the integration of all resources within the enterprise for decision making and management. Moreover, CRM is customer-centric and focuses on the accumulation of data and the cross-department data sharing to provide high-quality service to customers. Nevertheless, SCM, as a complement of ERP, focuses on the integration of data flow, fund flow and material flow upstream and downstream the supply chain. In the future, MIS will have a fast and bright development with the support of talent, technology and fund. Overall, these results offer a guideline for the features of MIS and have a positive impact on the digital transformation of the society.

References

[1] Wang W. Development of Management Information Systems. Journal of Modern Information, 2007 (06): 224 - 225.

[2] Gan J. et al. Management Information System. Beijing: China Machine Press, 2001.

[3] Wang W. and Kuang K. Information System Analysis and Design 4th edition. Beijing: Tsinghua University Press, 2013.

[4] Gui M. et al. Integration Research on BPR, ERP, SCM and CRM. Statistics & Decision, 2004 (11): 132 - 133.

[5] Guo X. Research and Application of Large Data in Management Information System. International Conference on Education, Management, Computer and Society. Atlantis Press, 2016: 1035 - 1038.

[6] Ma Kunlong. Short term distributed load forecasting method based on big data. Changsha: Hunan University, 2014.

[7] Li K. The Difference and Connection between MIS, EIS and ERP. Sci-Tech Information Development & Economy, 2007 (29): 122 - 125.

[8] Lu L. Overview of ERP. China Collective Economy, 2018, (26): 64 - 65.

[9] Yang Y. Research on Maotai Group's Supply Chain Finance Business Model. Guizhou University of Finance and Economics, 2021.

[10] Wang Jia. CRM Review & Outlook. Journal of Zhengzhou University of Aeronautics, 2016, 34 (05): 56 - 61.

[11] Du D. Apple's market cap tops $3 trillion, epidemic boost or strength delivered. National Business Daily, 2022 - 01 - 05 (001).

[12] Zhu M. Analysis of the role of supply chain management in enterprise management and improvement measures. Industrial Innovation, 2022 (02): 92 - 94.

[13] He M. The rise of supply chain management: new dynamics, new features and new discipline. Journal of Beijing Technology and Business University (Social Sciences), 2020, 35 (03): 1 - 12.

[14] Shi Biao, et al. Short-term load forecasting based on modified particle swarm optimizer and fuzzy neural network model. Systems Engineering-Theory and Practice, 2010, 30 (1): 158 - 160.