The Implementation of Management Information System Under the Impact of COVID-19

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Abstract. In 2019, the outbreak of COVID-19 had a serious negative impact on the development of all levels of society, accelerating the development and frequency of use of management information systems for governments and enterprises. In this paper, the implementation of the management information system (MIS) under the impact of COVID-19 are investigated and discussed. After investigation and research, the MIS can gather, consolidation, store, analysis and maintain information. With the development of the age of big data, the usage of computers instead of manual data processing, management information systems can help staff improve work efficiency. The difference between MIS and traditional information systems is that MIS can not only process data, but also combine data analysis and economic management models to provide users with relevant decision-making information. The emergency capability of the management information system can reduce the work pressure of relevant personnel in data entry and management, it can reduce unnecessary losses. These results shed light on guiding further exploration of MIS in risk management.

Keywords: MIS, COVID-19, emergency management.

1. Introduction

Human beings will face the severe threat of infectious diseases for a long time, the importance of research on the illness of infectious diseases, regular of infection and prevention strategies has become increasingly important, and it has become a major problem that needs to be urgently solved in world. Since December 2019, a multitude of hospitals in Wuhan City, Hubei Province have successively come to light a number of cases with a history of exposure to the Seafood Market, which were confirmed to be acute respiratory infectious diseases caused by the COVID-19 disease infection [1-3]. The Corona Virus Disease2019, or "COVID-19" for short. Symptoms of people infected with the COVID-19 contain respiratory symptoms, fever, exhaustion and difficulty breathing. Severe infections can lead to pneumonia, loss of taste and hearing, and even death in disadvantages group, e.g., the patient, children, and elderly.

The full name of MIS is management information system or information management and information system. There are four stages in the development of MIS in the following [4, 5]. The first stage is from the mid-1950s to the mid-1960s. In 1954, the first commercial data processing computer installed by the General Electric Company of the United States mainly used electronic computers to replace business processing with large amounts of data and simple operation methods, such as payroll accounting and material management; The second stage was developed in the mid-1960s. During this period, computers were widely used in business, enterprise and various fields. The third stage is from the mid-1970s to the late 1970s. During this period, the management information system shifted from transaction-based to management-based control; The fourth stage is from the 1980s to the present. During this period, the management information system has turn from dealing with affairs to focusing on management control.

Since the COVID-19 is an emerging infectious disease in recent years, various prevention and the measure of control methods must to be continuously improved. With the changes in epidemic prevention and control plans and actual needs, the management information system needs to be more efficient to help decision makers, especially for sudden outbreaks. Emergency measures in case of

contagion need to be strengthened. The strengthened emergency management information system during the epidemic period can reduce the work pressure of relevant staff in data entry, management, and achieve good application results. Similar jobs provide convenience and experience, it can reduce government pressure and improve work efficiency. Emergency management information system can minimize unnecessary losses.

In this paper, the implementation of MIS during COVID-19 will be demonstrated with three specific applications. The rest part of the paper is organized as follows. The Sec. 2 will give basic descriptions of MIS. Subsequently, the Sec. 3 to Sec. 5 will clarify three applications, respectively. Afterwards, the limitations and prospects will be presented in Sec. 6. Eventually, a brief summary will be given in Sec. 7.

2. Basic Descriptions of MIS

Management information system integrates information studies, management science and computer science. Supply chain is the unity of logistics, capital flow and information flow, among which information system mainly supports information flow. Most enterprises will choose to import management information system to help enterprises establish a complete system background, reduce enterprise costs and speed up enterprise operation. On basis of the composition of MIS, there are multimedia technology, database technology, artificial intelligence technology and so on. By COLLECTING AND ANALY2ING MIS UTERATURE published in core journals in the period 1968-88 we have been able to paint an overall picture of the MIS field and its evolution as represented in this literature [6]. According to the analysis, the early MIS-related articles gradually decreased. With the development of the field, the research direction has also changed. The content is more focused on theoretical testing and management practice. During the epidemic outbreak, many industries were using management information systems, such as government e-government system, hospital information system, enterprise supply chain system.

3. Applications in Indonesia's Manufacturing Industry

According to a questionnaire on Indonesia's manufacturing industry, it can be seen that the disruption due to the emergence of the epidemic outbreak has caused an imbalance between supply and demand in Indonesia's company. The demand for goods for preventing infectious diseases and products for detecting infectious diseases is rapidly increasing. There is a shortage of products. Demand for most goods fell, and sales of daily necessities fell, leading to a sudden reduction in manufacturing industry capacity. Indonesia's manufacturing company need to act in concert with other companies quickly to reduce unnecessary losses [7].

The establishment of a supply chain management information system accelerates the interaction and creation between the inside and outside of the company, the integration of supply chain management information system can quickly inform the inside and outside of the company, and the quality of information sharing and certification improves the function and efficiency within and between organizations [8]. The information provided can be used to make the right decisions to improve operations and increase the company's flexibility and supply efficiency.

There are two shortcomings in the use of supply chain information systems. On the one hand, when supply chain information is shared, companies that lack the awareness of information sharing will not take the initiative to participate in information sharing. In this case, other suppliers on the supply chain information system cannot obtain effective information in a timely manner. On the other hand, when supply chain information is transmitted on the system, different information processing methods and formats of different companies will lead to information distortion. The suggestion of the shortcomings of supply chain information is to establish some risk rules mechanism to constrain various supplier partners, and establish a reward mechanism to promote information sharing, promote

information communication between enterprises, and quickly respond to market demand and use supply chain information systems efficiently.

4. Applications in Hospital Information System

HIS is hospital information system. This system can use the software of computer, hardware technology, management knowledge and other modern means, afterwards it can integrate the hospital's personnel information, inventory information and financial management information on HIS. Then, its various departments analysis, processes and summarizes the data generated at various stages of medical activities to form relevant decision-making information and reports. This result can show the results of data processing and suggest solutions.

Therefore, the hospital information system can provide comprehensive automated management and information systems for various services in all operation respects. A hospital information system is a subcomponent of MIS that handles the inpatient medical data, including inpatient laboratory, X-ray, electrocardiography reports, etc. [9]. For example, the hospital management information system mainly handles part of the business functions, including admission procedures, available beds inquiries, order management of hospital patients seeing a doctor, HIS system integrates management functions and business processing functions. The integration of medical health and the Internet provides convenience for hospitals to take measures related to the spread of COVID-19, classify and treat diseases, avoid treatment for patients with infectious diseases and ordinary patients. The hospital information system can effectively guarantee the operation efficiency of the hospital.

However, for some functions of the hospital information system, it can be said that the functions of the HIS system in dealing with emergencies still need to be strengthened. The aspects that need to be strengthened include: the management of medical materials, the upgrading of emergency system technology, the functions of purchasing and allocating materials etc.

As for the management of medical materialsm, if there is a sudden outbreak of COVID-19 infection in a certain area, medical supplies need to be allocated reasonably, such as protective clothing, isolation suits, nucleic acid testing medical equipment, alcohol, thermometer. The medical information system allocates materials reasonably according to the data about the infection situation entered by the staff.

With regard to the upgrading of emergency system technology, when the epidemic outbreak, the HIS system should quickly provide solutions. After a positive COVID-19 patient appears, the hospital system should quickly notify the relevant departments, and it display the relevant information of the positive patient, the time of the latest nucleic acid test and analysis the date that the nucleic acid test needs to be repeated. The number of the empty isolation room in the hospital, and the relevant personnel who did the nucleic acid test at the same time as the positive patient.

For purchasing function and allocating medical material function, it is recommended to set a lead time for the procurement of medical materials on the hospital information system to avoid the shortage of medical materials, make rational use of medical materials, and improve the efficiency of the manager. It is recommended to set the proportion of distributed materials on the hospital information system. In the case of positive patients, medical materials and related equipment should be quickly distributed to reduce unnecessary waste of equipment and materials. At the same time, improve the utilization rate of hospital medical materials and improve the hospital materials Management system to promote the economic benefits brought by materials.

5. Applications in E-governmentAZ

The COVID-19 pandemic, by placing medical technology, organization of health care and medical control in society at the center of public attention, has stimulated change and acceleration not only in technological innovation, but also in social, administrative and even political relations. All this represents in many respects a single complex of transformations that can be productively studied in a

system [10]. Fig. 1 shows the impact of the pandemic on e-government. E-government is a comprehensive information management and information system for inside and between government agencies, enterprises and society. E-Government During the outbreak, government websites were used to actively reach out to the society, update and provide COVID-19 information.

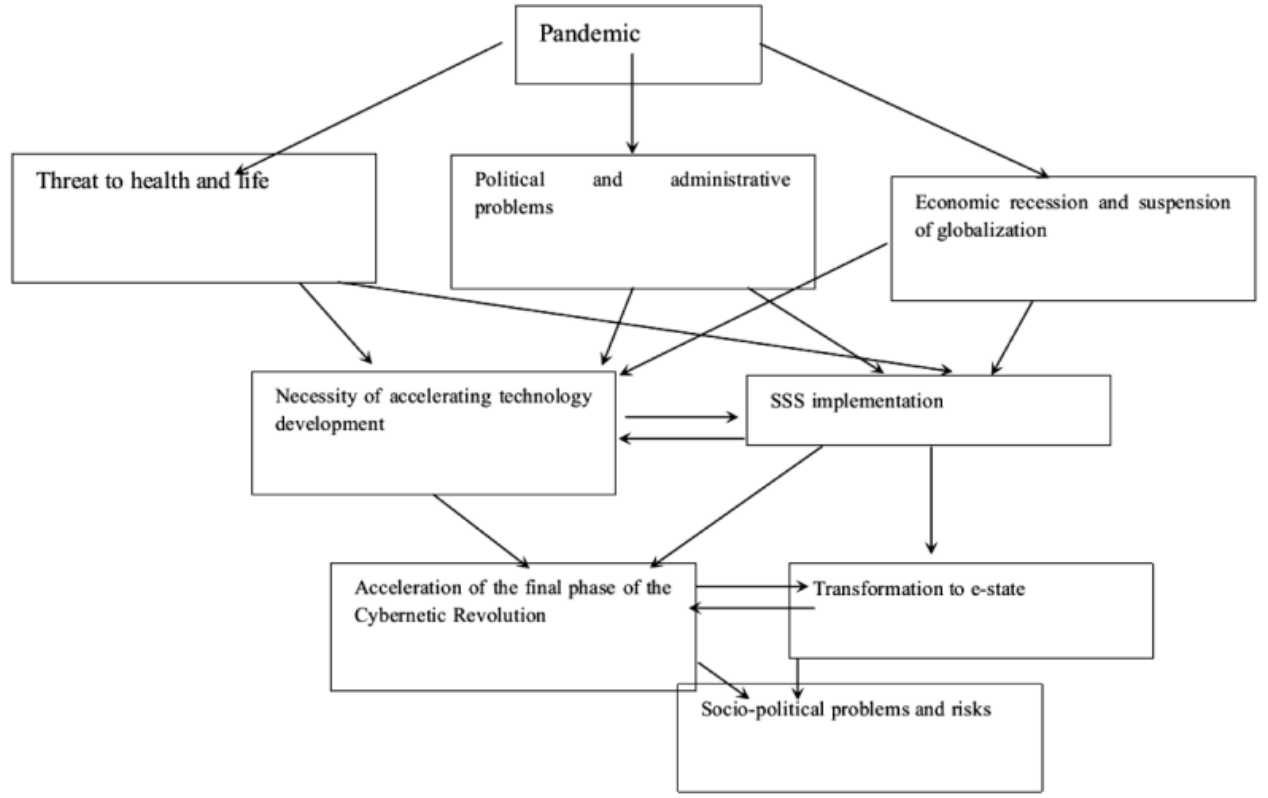

Figure 1. A sketch of the impact of COVID-19 on E-government

Table 1 compares constructs to determine the discriminate validity. For data validity and measurement, the value of the AVE should be greater than 0.5, CR > 0.7, and rho > 0.7, table 1provides the reliability and validity of measurement scales [11]. The aspects that need to be strengthened include: the security of e-government, professionals of e-government, staff's concept and understanding of e-government and emergency system in case of epidemic outbreak.

Table 1. Reliability and validity of measurement scales.

Construct	Item	Outer Loading	Mean	SD	α	CR	AVE
Role of E-Government	E-Government 1	0.921	5.045	1.376	0.8	0.883	0.717
	E-Government 2	0.935	5.104	1.155			
	E-Government 3	0.932	5.125	1.144			
2019-nCOV-WOM	CONV-1	0.749	5.557	0.853	9.210	0.95	0.864
	CONV-2	0.895	5.509	0.994			
	CONV-3	0.89	5.402	0.947			
Epidemic protection	E-P 1	0.901	5.255	1.026	0.847	0.908	0.767
	E-P 2	0.913	5.321	1.077			
	E-P 3	0.809	5.227	0.807			
Attitude toward epidemic out brek	ATOB1	0.844	5.427	0.924	0.806	0.886	0.721
	ATOB2	0.846	5.364	0.856			
	ATOB3	0.857	5.469	1.058			
Online social presence in Outbreak	S-P1	0.877	5.254	0.902	0.817	0.891	0.732
	S-P2	0.855	5.38	0.98			
	S-P3	0.835	5.305	0.818			

As for the security of e-government, in terms of physics, there will be security problems such as incorrect use of personnel and malicious attacks on routers and system equipment from outsiders. According to the aspect of applications, there will be security issues such as misappropriation of operator permissions and virus intrusion. These security issues will limit the growth rate of e-government. It is recommended to enhance the security. For example, enhancing the professional ability of operators, establishing a strong network security environment and so on.

Regarding to career, in the process of e-government construction, there are some problems in communication between government staff and information technology personnel, which will reduce the efficiency of e-government processing. It is recommended that the government hire personnel who are understand the government management and have professional information technology.

Some government staff are not familiar with the e-government system. They are accustomed to the traditional office model and regard the e-government system as a computerized system. They invest a lot of money in hardware equipment, but ignore the development of software. Government staff need to realize the importance of e-government system and combine computer and management to use e-government system more efficiently.

When emergency management is set up in e-government system, the risks that affect the normal operation of e-government system include natural risks and human risks. Natural risks include earthquakes, debris flows, infectious diseases and so on. Human risks include designer error or Trojan virus. During the outbreak of the epidemic, the e-government system needs to collect, transmit, and process information. The system should improve emergency response capabilities, connect governments at all levels of the country, and upgrade the construction level of the e-government system.

6. Limitations & Prospects

With the outbreak of the epidemic, after the government and related enterprises applied relevant information management and information systems, they gradually found that information management and information systems still had some limitations. There are two main limitations of MIS in the impact of COVID-19. On the one hand, information management and information system designers mainly design from the original manual management of data, rather than from the perspective of managers' decision-making. Therefore, the information provided by information management and information systems requires managers to make decisions after focusing on the situation of COVID-19 infection information. On the other hand, information management and information systems have technical shortcomings. When the COVID-19 epidemic outbreak, it is impossible to quickly analyze the new information needs, and technical personnel are required to continuously improve and upgrade the system.

As society advances, information management and information systems have become indispensable helpers for governments and enterprises during the outbreak of the epidemic, and the extensive application of information management, the information systems has become an important symbol of management modernization. Intelligent technology has become an indispensable assistant in daily life, enterprises follow the law of social development at the same time, it will also understand the importance of intelligent technology, there will be more and more enterprises to invest in choose and research management information system in the future. Facing more and more information resources, practical and effective information management and information system can guarantee the management and decision-making of enterprises, promote the development of enterprise structure and improve efficiency.

7. Conclusion

In summary, as the outbreak of COVID-19 has an impact on society, there has been drops generally in corporate profits, socioeconomic recession, and global market instability. However, the COVID-

19 accelerates the development and frequency of use of government and enterprise management information systems. With the progress of the times and the development of technology, the government and enterprises have emergency management needs for information management and information systems in this special period. The implementation of relevant information systems can alleviate the pressure caused by emergencies. The realization of information management and information system-related modularization can also improve the efficiency of government and enterprises and reduce related risks. In the aspect of system design, it is still necessary to focus on the needs of managers and to strengthen system emergency management capabilities. Overall, these results offer a guideline for MIS implementation for tackling with emergency issues.

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