

ICEST 2021

II International Conference on Economic and Social Trends for Sustainability of Modern Society

**COMMON INFORMATION SPACE FOR INDUSTRIAL
COMPANIES UNDER THE BACKGROUND OF INDUSTRY 4.0**

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Abstract

Common information space is a dynamic space for all members of society to produce, acquire, transmit, and absorb information. It's a kind of space that makes information produce circulate and exchange and interacts with other spatial elements of the social system. At present, the common information space plays an important role in the development of the high-tech sector of the economy. This article discusses the dynamic, open, and blend characteristics which information space has. It is shown in the paper that common information space consists of three layers of government information, social organization information, and private information. Complex functions of common information space such as energy supply, integration, control, and service are provided in the paper. It is shown in the paper that the development of high-tech industries is inseparable from the common information space, which provides support for the development of high-tech. The high-tech industry can share information through the common information space and achieve more reasonable resource allocation and save corporate costs to create more wealth. The establishment of a common information space allows implementing of an ecosystem approach to the development of the high-tech industry.

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Keywords: Common information space, industry 4.0, high-tech industry, industrial companies



1. Introduction

Information is everywhere, and the development of society is inseparable from information. After the world industrial revolution, society has entered an information age, that is, an information society. The so-called information society is a new type of society based on electronic information technology, information resources as the basic development resources, information service industries as the basic social industries, and digitization and networking as the basic social interaction methods. In the information society information is spread by information space. In modern conditions, the development of industrial companies largely depends on the characteristics and quality of the information space. In turn, in the context of the fourth industrial revolution, the development of the high-tech sector of industry determines the competitiveness of the economy as a whole. So, what are “information space” and “common information space” under the background of Industry 4.0, and the role of information space in development of industrial companies need to be discussed.

2. Problem Statement

The dissemination of information is inseparable from the carrier of information space, and there is little research on information space under the context of Industry 4.0. Based on a large number of scientific articles, this paper provides a further understanding of the common information space, and the relationship between common information space and high-tech industries development under conditions of the Fourth industrial revolution.

3. Research Questions

The content and structure of common information space and connections between the common information space and high-tech industry development under the background of Industry 4.0 represent the main research questions of this paper.

4. Purpose of the Study

The purpose of the study is to explore the point of convergence between the common information space and high-tech industries development under the background of Industry 4.0; to find out, how does the common information space serve the high-tech industry progress.

5. Research Methods

Comparative analysis of existing scientific papers and empirical data was conducted to find the essence of common information space. In-depth analysis of the content and essence of the public information space was conducted to get results. This research also uses induction to summarize the characteristics, structure, and functions of common information space from the characteristics of information, common information, and information space.

6. Findings

6.1. The content of common information space under the background of Industry 4.0

The most prominent feature of Industry 4.0 is informatization. With its omnipresent and omnipotent power, information changes society and shapes industrial companies' activity. With the continuous changes of human social system and technological development, the type of information shared by the society and its existence space are undergoing profound changes, which have an increasingly important impact on the operation of the entire social system. In this research separately elaborates common information, information space and common information space.

For the concept of "common information", academia has many understandings. The Tennessee Public Information Act of the United States points out that public information is information collected, organized, and kept under laws or statutes and in connection with official affairs (Xia, 2005). All information generated, collected, sorted, transmitted, released, used, stored, and cleaned up in the administrative process is called public information (Mo & Wang, 2004). The above definitions point out that the main body of public information production is the government.

However, with the continuous improvement of the degree of informatization and the continuous innovation of information production and dissemination methods, it is not an objective fact to use the government as the sole source of public information. Therefore, if the "public" meaning of public information refers to the level of common use, then, except for the government, other types of organizations, and even individuals provide shared information that belongs to the category of public information. Based on this, the content of public information includes not only information generated by government departments, but also other organizations and individuals in a public manner. The internal information released by the organization also includes certain private information released publicly (Wang & Yang, 2008).

The theoretical clarification of information space has been a common interest of sociologists, economists and information scientists in recent years. British economist Max H. Boisau put forward the concept of "information space" within the basic viewpoint of the political economy of information. Information space can be used to study the coding, abstraction and dissemination of knowledge. That is, the production and exchange in a social system, the research object is the flow and evolution of knowledge and information... the information space is a conceptual tool used to analyze the production and exchange of knowledge and information within a social system (as cited in Boisau, 2000).

In China, scholars believe that the information space is different from the traditional physical space. It is a huge information carrier that undertakes the derivation, storage and transmission of information. As a new spatial form under the background of informatization, networking and globalization, this space takes information elements as the main components, and the information flow realizes the vertical penetration of regional information, forming a horizontally interconnected virtual space (Wang, 2016). As a virtual fluid space, the fluidity of information elements surpasses the limitations of geographic regions, and the spatial form is reconstructed, which is manifested as the flow of information elements and the aggregation of information resources. The specific characteristics are non-physical, shared, fluid interactive and efficient (Wang, 2016). The essence of information space is the regional recombination of information resources

and information elements, giving the space new information characteristics from the perspective of time and space (Xu & Chen, 2013).

In Russia, there are three common concepts related to information space, namely "information space", "common (unified) information space" and "cyberspace". Among them, "information space" and "unified information space" are in the same line, but they are in line with "network Space" is completely different (Bannon & Bodker, 1997). The definition of "information space" in Russian official documents is: the activity domain related to the formation, creation, conversion, transmission, use, and storage of information (You, 2017). Activities carried out in this domain can affect individual and social cognition, information infrastructure and information. The impact of activities themselves is a broader concept than cyberspace. Cyberspace refers more to various communication networks and information infrastructures, and information space also includes a series of activities related to it, and it predates cyberspace and is more widely used by officials and people. The information space is a brand-new existence space that interweaves technology platforms, information flows, and human behaviours. The core element is information. In this space, all behaviours, technologies, and cultures will be displayed using information as a medium to delivery and realization.

The basic connotation of information space can be summarized by combining the research on the issue of "information space" by different countries, multiple scholars and multiple disciplines (Lu, 2016). Information space is not a tangible physical space, but an information inquiry and utilization environment with the characteristics of non-centrality, uncertainty, and virtuality; it has the fluidity and shareability of information. Common information spaces have many forms. In some cases, they are formed for people who co-exist in time and space. In other cases, they are distributed on the boundary of time and space and used for the mechanism for supporting "shared" information has also changed accordingly.

The common information space has been established from the beginning of social interaction and information transmission by humans. One of the biggest characteristics of the early public information space was its dependence on fixed physical space (Lu, 2013a). With the emergence of the fourth industrial revolution (Industry 4.0), the form of public information space dependent on physical space expanded and some public information spaces that are not dependent on specific physical spaces have emerged, virtual spaces on the Internet continue to emerge. In various websites, forums, Weibo, WeChat and other tools, it can be observed that public information is spreading, configured, used, and feed backed, and all parties involved in the public information space are among them, and its geographic scope is no longer fixed in a specific physical space or even a certain fixed medium. This is a truly revolutionary change in the public information space, breaking through the limitations of the three-dimensional space of communication, making the public information space ubiquitous and everywhere.

The common information space is locked in the specific information type of "common information". The analysis object is the occurrence space of various information behaviours derived from public information, contains the spatial laws of the production, output, reception, selection, learning, feedback and other behaviours of public information, the spatial law of progress is the information intersection space between people, between people and organizations, the shared space between individuals and external information spaces, and the information intersection space between individuals and organizations. It is a type of information space for the purpose of sharing experience. For the private information space and the

information space of a specific organization, the information flow is relatively closed for the users by individuals and members of the organization. The information in the public information space does not restrict the members of information participation. The concept of public information space is not proposed as a loose abstraction, but as a potentially useful structure that can help clarify important aspects of cooperative work activities. It has the characteristics of dynamic, openness and fusion, but some scholars believe that whether the public information space is open or closed is of dialectical nature (Bannon & Bodker, 1997).

6.2. Structure and function of common information space

According to the division of information supply subjects, the structure of common information space includes government information layer, general organization information layer and private information layer (Lu, 2013b; Tang, 2015). These three levels have their own closed parts, and the more the closed parts, the smaller the flow of the three types of information. The three types of information interact and transfer in the information space, forming a dynamic common information space information flow.

The government information layer is the core part of the entire public information space. The information it provides is the main part of the public information space from quantity to quality. However, this ratio is not static.

General social organization is an important part of society in addition to the government, and is the basic cell for the operation of the entire society. With the emergence of industrial society, the functions and types of organizations are becoming more and more abundant, and the number is increasing. On the one hand, general social organizations need public information provided by the government to ensure their efficient operation. On the other hand, they also have much more strong ability to create public information which is used for communication and interaction with the government and other organizations and individuals. However, compared with the government, the goals of general social organizations are limited to smaller groups, and the resources to support their operations do not come from public authorization. For this reason, general social organizations have the ability and obligation to create and provide common information, but most of the information it produces is only used by internal members of the organization and plays a role in achieving organizational goals.

For most of the time in history, private information has belonged to the individual information producer and his organization. However, with the continuous innovation of information dissemination methods, there have been drastic changes in the way people interact with people and society. In the information society stage, the private information components that were rare in the past social stages have appeared in the common information space, which has enriched the structural composition of the common information space and also changed the simple structure of the common information space in the past.

Structural functionalism believes that the existence of any social structure has its effect. In this sense, as a component of the social system, common information space has the following functions:

Energy supply. Common information space is a shared space of all components of a social system, and its function is core and basic. The basic operation of other social subsystems depends on the energy supply of information space. The common information space is a fluid space, filled with the inside of social subsystems and between various systems. The operation of each sub-system does not need to obtain energy from the public information space, organize other original production factors of their respective systems for production, so as to

carry out the production activities of their respective systems. The results produced by each social subsystem are simultaneously increasing the energy of the common information space.

Integration. By participating in information activities in the common information space, the public learns and obtains shared behavioural norms and shared beliefs through the process of absorbing, learning, choosing, and feeding back information. The existence of common information space is important for shaping and transmitting the concept of a shared society.

Control. One of the important functions of the common information space is controlling. As the main provider and manager of common information, the government will guide and restrict the information content, information flow, information distribution, etc. This is because if the individual behaviour of the public is fundamentally based on the analysis and refining of the received information and finally reflected by the behaviour, then the overall behaviour of the public as a collective will directly depend on the common information which was disseminated in the common space.

Service. Among the many functions, the common information space should also have a service function, and the main bearer and the participant of service function is the government in the common information space. As the main body of construction and management of the common information space, the government is responsible for providing the main common information resources and maintaining the healthy operation of the common information space. The new public service theory believes that the various resources that the government holds come from the public, and the basic functions of the government should be reflected in public service and safeguard public interests. In the modern information society, the public information space is an open, dynamic and open space to all citizens during the information acquisition, dissemination, absorption, and feedback. Whether it is the government or general social organizations and individuals, all of them seek and clarify their own roles, functions and location. The common information space and various information production entities are constructing each other in a brand-new way, mutually achieving brand-new ways of existence and expression.

6.3. The relationship between high-tech industry and common information space

The fourth industrial revolution made the high-tech industry pervasive and dominant and will change society. The scope of its influence and the speed of change makes this revolution different from any industrial revolution in human history. The common information space under the Industry 4.0 context is to enable information and information products to be communicated and used by the industrial companies at different levels and between various departments. For high-tech industries, it is to share information, a resource that has become more and more important in the Internet era, with other industries, other departments, or individuals through the common information space, to achieve more reasonable resource allocation and save corporate costs to create more wealth.

From the perspective of the structure of public information, the various information structure layers of the common information space can be used as information sources for the development of high-tech industries; from the perspective of the functions of the public information space, its various functions can serve the development of high-tech industries as well. The development of high-tech industries is inseparable from the common information space, which provides support for the development of high-tech.

At present, developed countries have a large amount of common information space a high degree of information sharing, while the amount is small of China's common information space so that the lack of information resources has a great hindrance to various companies and industries.

7. Conclusion

After analysis, the characteristics of common information space can be summarized as the following.

Virtuality and physicality are unified, that is, the virtual public information space needs to rely on physical equipment, content, and platform;

Authenticity and falsity are unified, and users of information need to remove the fake information from the surface and keep the truth;

Comprehensiveness and specificity are unified. For information producers, information disseminators and information consumers, in terms of content composition, secret, confidential, and top-secret information cannot be disseminated or used by the government, any organization or individual;

The dynamics and stability are unified. From a horizontal perspective, after the formation and development of the common information space, its external operation is stable. But the internal information flow changes every moment, information producers, disseminators, and consumers interlace in time and space to produce disseminate and consume information. Through the common information space, high-tech industry can share information easily and achieve more reasonable resource allocation and save corporate costs to create more wealth. A common information space can play an even more important role in implementing an open model for creating innovations, enhancing knowledge exchange, improving the competence level of industrial companies and increasing their dynamic capabilities. Only with the formation of a rich information space is it possible to implement an ecosystem approach to the development of high-tech industry, adequate to the conditions of Industry 4.0.

References

- Bannon, L., & Bodker, S. (1997). Constructing Common Information Spaces. *Proceedings Of the Fifth European Conference on Computer Supported Cooperative Work*, 81-96.
- Boisau, M. H. (2000). *Information space--a framework for understanding organization, system and culture*. Translated by Wang Yin. Shanghai Translation Publishing House.
- Lu, Y. (2013a). A New Vision of Information Sociology: Public Domain and Public Information Space. *Information and Documentation Work*, 05, 15-19.
- Lu, Y. (2013b). On the Research of Common Information Space. *Library and Information Work*, 57(12), 41-45.
- Lu, Y. (2016). On the Structure and Function Transformation of Public Information Space. *Library and Information Work*, 60(24), 51-57.
- Mo, L. K., & Wang, P. M. (2004). The way to transform public information into national strategic assets. *Science Research*, 3, 262-266.
- Tang, Y. Z. (2015). On the Significance of the Changes of Archives Function to the Construction of Public Information Space. *LanTai World*, 17, 54-55.
- Wang, M., & Yang, Y. L. (2008). On the subject and object of public information resource management. *National Library Journal*, 1, 40-45.
- Wang, N. N. (2016). Internet Information Spatial Network Analysis Based on Information Flow. *Geographical Research*, 01, 137-147.

- Xia, Y. K. (2005). Diversified perspectives of public information resource management. *Library and Information Knowledge*, 2, 20-24.
- Xu, J., & Chen, W. X. (2013). Analysis of Modern City System and Its Information Space - Taking Beijing as an Example. *Research and Develop*, 167, 19-21.
- You, X. J. (2017). Thoughts and Practices of Russia's Information Space Construction. Russia. *Eastern Europe and Central Asia Studies*, 5, 51-63.