

The Role of Archivists in the Industrial Revolution 4.0 and Society 5.0

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ABSTRACT

This research aims to find out the role of archivists in the industrial revolution 4.0 and society 5.0 in skill and professionals, multicultural interaction competence, new literacy (big data, technology or coding, humanities, cybersecurity), and lifelong learning for 4C (critical thinking, communication, collaboration, creativity). This study used library research as its research methods. The data was derived from the primary source (original data sources), and secondary data (indirect research, participation on research object, analyzing and comparing related previous studies). The data collection was conducted by collecting materials related to the research object. Therefore, the data content was analyzed from variant materials related to the research object. This study reveals that archivists in the fourth industrial revolution and society 5.0 have essential roles, specifically in research, technology, and higher education. They should have excellent skill and professional; multicultural interaction, information, communication, and technology competencies; 4C skills. Moreover, they must be aware of their operational and strategic level roles; encouragement to develop a relevant concept of systems with the dynamic of the industrial revolution and society; and capacities for analyzing archives contents for decision and policy making, actively documenting and managing the flow of knowledge in their institutions.

Keywords: Archivist, literacy, technology, industrial revolution 4.0, society 5.0

1. INTRODUCTION

The purpose of this research is to determine the role of archivists in the Industrial Revolution (4.0) and Industrial Revolution (5.0) in terms of skill and professionals, multicultural interaction competence, new literacy (big data, technology or coding, humanities, cybersecurity), and lifelong learning for 4C (critical thinking, communication, collaboration, creativity). In this day and age, industrial revolution 4.0 and society 5.0 require people to be smarter and use technology in carrying out various activities in their daily lives (Onday, 2019). Technology becomes a means to support their work life. Erboz, (2017) define Industry 4.0 as a collective term for technologies of value chain organizations, and the components of industry are categorized as the Internet of the Things, Cyber-Physical Systems, Internet of Services and Smart Factory. Segura et al., (2020) shows a comprehensive overview of new technologies and describes that visual computing could be seen as a vital component of Industry 4.0.

The development of fast-paced technology by providing much information needs to be filtered and validated (Deguchi et al., 2020). Archives are information in both digital and conventional forms (Mahmoud, Amer, & Ismail, 2021). However, in terms of technology, the digital archive has an essential role in providing the information needed by society (Y. Zhao & Zhang, 2017). Following the

provisions of Law Number 43 of 2009, an archive is defined as documentation of activities or events in a variety of formats and media in accordance with the development of information and communication technology, which is created and accepted by state and regional government agencies as educational and business institutions as well as political and non-governmental organizations (NGOs) and individuals in the implementation of community, national, and state life.

According to this definition, an archive is a collection of events that documents the development of information and communication technologies. As a result of the Fourth Industrial Revolution (4.0) and the Fifth Social Revolution (5.0), rapid and accurate information technology is being developed. With respect to industrial revolution 4.0 and society 4.0 in Indonesia, the Ministry of Research, Technology, and Higher Education (MoRTHE), which is responsible for the three primary areas of law, technology, and higher education, has a significant effect on the development of these two phenomena. Human resource development and preparation for this circumstance are being carried out in partnership with multiple parties by the Ministry of Research, technology, and Higher Education.

The emerging Industry 4.0 concept is an umbrella term for a new industrial paradigm that embraces a set of future industrial developments, including Cyber-Physical Systems (CPS), the Internet of Things (IoT), the Internet of Services (IoS), Robotics, Big Data, Cloud Manufacturing and Augmented Reality (Nagy, Oláh, Erdei, Máté, & Popp, 2018; Ramdani, Agustiyara, & Purnomo, 2021). Industry 4.0 mitigates the burden of current challenges for manufacturers to make the companies more flexible and responsive to business trends (Fukuyama, 2018). Among these challenges are the ones of increasing market volatility, shorter product lifecycles, higher product complexity, and global supply chains (Morrar, Arman, & Mousa, 2017). For example, intelligent items will bring more robust integration of the top floor and shop floor and thus more intelligence and flexibility to production. It is expected that the use of modern technologies such as digital chains, intelligent systems, and the industrial Internet will speed up innovations as new business models can be implemented much faster. It highlights the role of the consumer as a co-producer and puts them in the center of all activities (Lee et al.,

2018).

The customization of products is the most critical activity in the product value chain, and digitization will facilitate crowdsourcing, leading to a faster design process (Morrar et al., 2017). Workers will be allocated to areas where assistance is required; as a result, there will be more need in the workforce for abilities in managing complicated projects, but more flexible employment will also become accessible as a result of the increased demand. The use of innovative solutions can help companies reduce their energy consumption while maintaining their operations with existing and new business models. The ability to produce globally (even in high-cost locales) near to markets while employing the capabilities of the home workers is another advantage that modern technologies provide (Dachs, Kinkel, & Jäger, 2019).

Acatech (2014) described Industry 4.0 as the IoT: data and services that will change future production, logistics, and work processes (Kamble, Gunasekaran, & Gawankar, 2018). This change means that the evolution of the IoT has gone beyond Internet-connected applications in recent years with the integration of different technologies such as machine learning, embedded systems, and wireless connection (Reddy, Mamatha, & Reddy, 2018).

According to the International Research and Development Center (IERC), "are expected to become active participants in business, information, and social processes where they are enabled to interact and communicate among themselves and with the environment by exchanging data and information "sensed" about the environment, while reacting autonomously to 'real/physical world' events and influencing them by running processes that trigger actions and create services with or without direct human intervention." (Jeyanthi, 2018). As stated by (Ahanger & Aljumah, 2018) the primary goal of the Internet of Objects is to "enable things to be connected with anything and anybody at any time, from any place," and "allow things to be linked with anything and anyone, ideally through any path/network and any service."

As one of the higher education sectors, archivists have an important role in taking part in facing the industrial revolution 4.0 and society 5.0 (Fukuda, 2020). Archivists must be able to support all elements starting from researchers, students, lecturers, and all

related to these fields in providing and presenting information accurately, quickly. Furthermore, archivists should be able to help performance accountability and policymaking. In addition, looking at the current practical problems, archivist competence is currently unable to meet the demands of the industrial revolution era 4.0 and society 5.0 (Yahaya, Sopian, Razak, & Ishar, 2021). This study is conducted to investigate the archivist's role in supporting the human resource development of industrial revolution era 4.0 and society 5.0, particularly the Ministry of Research, Technology, and Higher education.

2. METHOD

The method used in this research was library research (Chun Tie, Birks, & Francis, 2019). Data sources of research are based on primary and secondary data sources, one of the primary data sources is original data sources, while secondary data is available previous research related to this research. Secondary data used to confirm or to compare with previous theories (Johnston, 2017). The collection of data by literacy is collecting materials in libraries that are aligned with the object of research. The data collected from many kinds of literature are processed with three steps; editing, organizing, and finding of results of the research (Atmowardoyo, 2018). Data analysis is conducted to analyze the contents (content analysis) from various kinds of literature that are relevant to the discussion of the research objects

3. RESULTS AND DISCUSSION

3.1 Result

There is a limit to what individuals are capable of doing; thus, the chore of gathering the required information from a sea of information and evaluating it was a hardship, and the labor and breadth of action were limited due to the age of the participants and the varying degrees of their competence (Deguchi et al., 2020).

Social reform (innovation) in Society 5.0 will result in a forward-looking society that breaks down the existing sense of stagnation (Aquilani, Piccarozzi, Abbate, & Codini, 2020), a society whose members

have a mutual respect that transcends generations, and a society in which every person can lead an active and enjoyable life, according to the vision of the organization.

In Society 5.0, a large quantity of information gathered from sensors in physical space is stored in cyberspace and used to make decisions (Narvaez Rojas, Alomia Peñafiel, Loaiza Buitrago, & Tavera Romero, 2021). This large amount of data is evaluated by artificial intelligence (AI) in cyberspace, and the analysis findings are given back to people in physical space in a variety of formats (Purnomo & Ramdani, 2021).

People, objects, and systems, on the other hand, are all linked in cyberspace in Society 5.0, and the ideal outcomes achieved by artificial intelligence (AI) that exceeds the capabilities of humans are sent back into physical space (Nagahara, 2019).

3.1.1 Society 5.0 Balances Economic Development and Solves Social Issues

It can be said that the environment surrounding Japan and the world is in an era of drastic change (Fukuyama, 2018; Onday, 2019). As the economy grows, life is becoming prosperous and convenient, the demand for energy and foodstuffs is increasing, lifespan is becoming longer, and the aging society is advancing. In addition, the globalization of the economy is progressing, international competition is becoming increasingly severe, and problems such as the concentration of wealth and regional inequality are growing (Broz, Frieden, & Weymouth, 2021).

Social problems that must be solved in opposition (as a trade-off) to such economic development have become increasingly complex (Kassouri & Altıntaş, 2020). Here, a variety of measures have become necessary such as the reduction of greenhouse gas (GHG) emissions, increased production and reduced loss of foodstuffs, mitigation of costs associated with the aging society, support of sustainable industrialization, redistribution of wealth, and correction of regional inequality. while achieving both economic growth and social problem solutions at the same time has proven to be difficult in the present

social system (Melnyk, Dehtyarova, Dehtiarova, Kubatko, & Kharchenko, 2019).

In the face of such significant changes in the world, new technologies such as IoT, robotics, AI, and big data, all of which can affect the course of a society, are continuing to progress. Japan seeks to make Society 5.0 a reality as a new society that incorporates these new technologies in all industries and social activities and achieves both economic development and solutions to social problems in parallel (Narvaez Rojas et al., 2021; Onday, 2019).

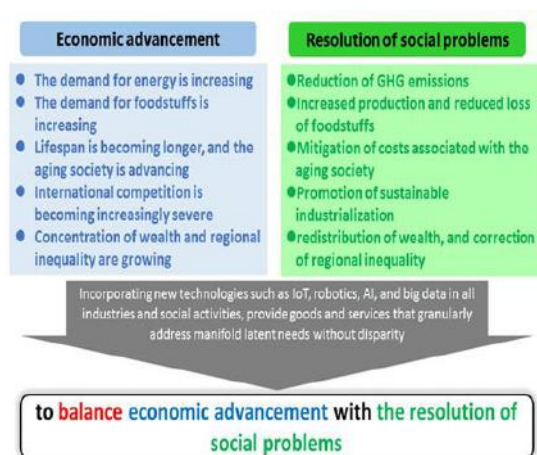


Figure 1 Society 5.0 Balances Economic Development and Solves Social Issues

3.1.2 Economic Development and Solutions to Social Problems in Society 5.0

In Society 5.0, the new value created through innovation will eliminate regional, age, gender, and language gaps and enable the provision of products and services finely tailored to diverse individual needs and latent needs (Fukuyama, 2018). In this way, it will be possible to achieve a society that can both promote economic development and find solutions to social problems.

Achieving such a society, however, will not be without its difficulties, and Japan intends to face them head-on to be the first in the world as a country facing challenging issues to present a model society (Narvaez Rojas et al., 2021).

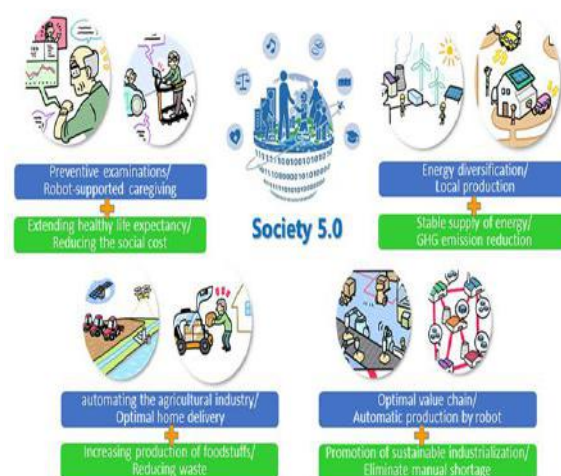


Figure 2 Economic Development and Solutions to Social Problems in Society 5.0

3.1.3 Society 5.0 Will Bring About a Human-centered Society

Society 5.0, on the other hand, achieves advanced convergence between cyberspace and physical space, allowing artificial intelligence (AI) based on big data and robotics to do or assist as an agent the labor and adjustments that people have done up until now (Fukuda, 2020). The creation of new value frees humans from the drudgery of everyday tasks and tasks that they are not particularly good at, and the provision of only those products and services that are required to the people who require them at the time they require them results in the optimization of the entire social and organizational system.

A human-centered society (Society 5.0), in which anybody may live a life of high quality and energy, is the goal of Japan, which wants to be the first nation in the world to attain this goal (Narvaez Rojas et al., 2021). This is the vision of Society 5.0: to build an economically prosperous and socially responsible society in which people may live full, active, and pleasant lives while also experiencing rapid economic progress (Alvarez-Cedillo, Aguilar-Fernandez, Sandoval-Gomez Jr, & Alvarez-Sanchez, 2019). Society 5.0 is Japan's growth plan however, it is not confined to Japan since its aims are the same as those of the Sustainable Development Goals (SDGs) (Fukuyama, 2018; Zengin, Naktiyok, Kaygın, Kavak, & Topçuoğlu, 2021).

3.1.4 Definition of Archive

In accordance with the development of information technology and communication, an archive is a recording of activity or event in various forms and media that has been made and accepted by state institutions and local governments as well as educational institutions and businesses, political organizations, social organizations, and individuals in the implementation of social life, national existence, and state existence (Chen & Cheung, 2017) (the legislation No.43/Year 2009/Article 1 Paragraph 2). A more rigorous and standardized management structure is required in the Information Age, in order to ensure that the informatization process has a positive impact on all parties involved (W. Zhao, 2021). First and foremost, the working team should be fine-tuned, resulting in a firm foundation built on the abilities of those who are involved in the informatization of book and archive management (Shein, Robinson, & Gutierrez, 2018).

The archivist's knowledge of computer network technology provides increased efficiency of information administration and stability and security of book and archive management, among other benefits (Endrissat & Leclercq-Vandelannoitte, 2021). In order to increase the informatization of book and archive management, the library must have sufficient hardware and software capabilities for the use of computer network technologies and a computer network infrastructure. To summarize, it will not be easy to develop the informatization of book and archive management shortly without first developing a scientific and well-developed management system, followed by a consistent and uniform management pattern (Shein et al., 2018).

3.2 Discussion

Archivists have an important role in the industrial revolution 4.0, and society 5.0 should have the capacity and professional (Fukuda, 2020; Skilton & Hovsepian, 2018), Archivists should be able to:

a. Paperless

Indeed, in initially it will be difficult to accept changes, but if the change is fun, it will be received slowly. For example, the paperless program is associated with a smartphone / mobile system or application, then people will be more pleased because

the smartphone can be more optimal, including receiving email / paperless (Msiza, Malatji, & Mphahlele, 2020; Reddy et al., 2018).

b. Media Transferred

Media transmitted serves as a backup and a means of accelerating the diffusion of information in the Information Society 4.0 (Mahmoud et al., 2021). If it is genuine, then the facts and information included inside it are accurate. After that, there is an authentication step that takes place throughout the media transfer process. Consequently, the outcomes of media transfer will be accurate, both in terms of data and information. The degree of the archivist's role and activity determines who is the most qualified.

c. Optimalization of SIKD, SIKS, SIKN, JIKN with a mobile system or smartphone.

The solutions in different filing information systems can be through the same data format, in order to exchange data between systems. There is Perka ANRI about the standard dynamic and static archive data elements for SIKN, it is Perka Anri No. 21 the year 2011.

d. Processing and presenting the archive as information

When an archivist performs their obligations according to the law, they have contributed to their duty and authority to manage dynamic and static archives. Changes started by a visionary, proactive individual, which an archivist may do via their creative thought process. How to carry out the transformation while adhering to archival principles by the archive's stored content and accessible information, and by the archive's worth (Lin, Milligan, Wiebe, & Zhou, 2017). As a result, collaboration is required to invest in human capital, culture, and technology in a timely, accurate manner consistent with the spirit of 3T and triple-A at anytime, anywhere, and in any way. An archivist requires the following qualities: respect culture, responsibilities- responsive, excellence, scientific Igor, professional, encouragement, creativity, trust-technology-minded (Al Hinai, 2017).

The role of Archivist in the industrial revolution 4.0 and society 5.0 in multicultural interaction competence (Flores, Xu, & Lu, 2020). Archivists as functional positions have independence in their duties

and carry out their responsibilities. In the industrial revolution 4.0 and society 5.0, archivists have a role to can give information to society, the archivist must have good on communication, and competent in intercultural communication (Bak, Allard, & Ferris, 2020). They must also have enough knowledge of their own culture and cultural.

3.2.1 The role of Archivist in the industrial revolution 4.0 and society 5.0 in new literacy (big data, technology or coding, humanities, cybersecurity)

Any practical archivist needs to use information and communication technology to actively research the content and growth of knowledge that already exists in archives and papers, and that can also be found solely in tacit form. A large amount of data administration and usage should fall within the purview of archivists, who should be responsible for both data administration and consumption (Jo & Gebru, 2020).

It is still possible to employ archives management concepts in archival research and preservation, even if the Industrial Revolution 4.0 has changed the way archives are managed (Morrar et al., 2017). Therefore, despite technical advancements, archivists continue to be highly sought in Industrial Revolution 4.0.

3.2.2 The role of Archivist in the industrial revolution 4.0 and society 5.0 in lifelong learning for 4C (critical thinking, communication, collaboration, creativity)

Information experts, including, in this case, is archivists, must begin to realize that their role is not limited to the operational level but must be able to explore their role at the strategic level (Al Hinai, 2017). Because if archivists are still trapped in a technical mindset, work routines, then they cannot compete with machines, computers, robots, or artificial intelligence itself (Cox, Pinfield, & Rutter, 2019). As per the condition of society now, there are not many difficulties in the context of the application of technology in various fields of community life, including in archivist work. In short, specifically in the context of our discussion of the role of archivists,

I emphasize again that archivists in the industrial era 4.0 and society 5.0 must be able to develop new concepts in archival empowerment, not only limited to work routines (Fukuyama, 2018; Onday, 2019). The role of archivists in industry 4.0 and society 5.0 will continue to exist as long as the power of creation and imagination is maintained and even developed (Nagy et al., 2018).

4. CONCLUSIONS

This study indicates that archivists in the fourth industrial revolution and society 5.0 have important roles, specifically in research, technology, and higher education. They should have excellent skill and professional; multicultural interaction, information, communication, and technology competencies; and 4C skills. Moreover, they must be aware of their operational and strategic level roles; encouragement to develop a relevant concept of systems with the dynamic of the industrial revolution and society; and capabilities for analyzing archives contents for decision and policy making, actively documenting and managing the flow of knowledge in their institutions.

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