

# A Review of The Challenges of Paperless Concept in the Society 5.0

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## ABSTRACT

The world will start a new era of society where technology and humans can collaborate to solve social problems. Many countries have ridden into the 4.0 era in the industrial revolution. In reality, Japan began to introduce Society 5.0, where the concept was the answer to the industrial revolution 4.0. Society 5.0 applies the human-centered concept based on information technology. In fact, there has been no in-depth study of the advantages and challenges of implementing paperless in various fields. The purpose of this paper is to review the challenges and the advantages of the paperless concept using Narrative Literature Review to provide an objective analysis of the paperless concept. The objects research discussed including industry/manufacturing, education, medical, and government. This paper provides an in-depth study and analysis of the paperless concept's advantages and challenges related to hardware and software maintenance, data security and reliability, human resources technical skills, social interaction, and disaster recovery strategy.

**Keywords:** Paperless, Green Computing, Society 5.0, Digitalization

**Article Info:** Received October 12, 2020; Revised January 23, 2021; Accepted January 31, 2021.

## 1. INTRODUCTION

The era of the industrial revolution resulted in several positive and negative effects. One of the negative effects is global warming (Murthy, 2013). An exponential increase in surface temperatures and the greenhouse affects a changing climate, especially global warming (Stephens et al., 2016). The causes of global warming are deforestation happened everywhere. It occurs because of the wood as raw material for paper. Those needs are increasing every year (Rumpa et al., 2017). Some policies used to reduce global warming are the green computing concept to improve environmental conditions (Anwar, 2013). One of the concepts of green computing is the paperless concept using E-Documents. The use of e-documents will reduce paper waste and introduce a paperless system to society (Agarwal et al., 2014).

Paperless is a concept where paper-based will be replaced by using digital resources as a means of information (Dhumne, 2017). The paperless concept is a new effort from using paper to reduce paper waste and solve environmental problems caused by paper

products. A study shows that some people and institutions are interested in going towards the concept of a paperless environment. They began to use electronic mail as long as there is an internet network (Rosalee Carr, 2005). Besides being comfortable, the paperless paper is a very effective strategy for managing considerable information (Hattingh, 2001). Although many institutions have applied the concept of paperless, they still failed to implement a paperless (Ashby, 2001) fully. Some consideration of both the benefits and disadvantages is still being evaluated in implementing the concept, especially in the Electronic Document Management System (EDMS).

A survey was conducted by EASY Software in the United Kingdom in 2013. The survey was used to determine the business benefits of using the Electronic Document Management System (EDMS). The rejection by users is still an issue that must be considered. One of the highlights is the lack of technical skills. The fear of making mistakes is a barrier to the paperless challenge. The results of the survey prove that "resistance to change by users" produces 32%. Whereas 12% said, "resistance to change in terms of team management."

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Other problems presented were budget problems (22%) and challenges from a technical or IT perspective (20%) (Frear, 2014).

In fact, there has been no in-depth study of the advantages and challenges of implementing paperless in various fields. This paper provides an overview of the advantages offered in using the paperless concept. In addition, in-depth studies will be carried out to find the challenges of using paperless in various fields. This study examines several areas that have the potential to use the paperless concept, including industry and manufacturing, education, medical, and government. Therefore, this paper aims to find out more details about the paperless concept, advantages, and challenges in various sectors. This study uses Narrative Literature Review to provide an objective analysis of the paperless concept.

## 2. THEORETICAL FRAMEWORK AND METHOD

Basically, the concept of green computing has provided a good idea for reducing the use of energy, materials, and resources. For example, the most prominent role in environmental preservation efforts is the paperless system. This section will discuss research related to the use of paperless in various fields. There are several studies focused on the concept of paperless and digitalization. The discussion in this paper is categorized into four fields. There are paperless in industry and manufacturing, paperless in education, paperless in medical, and paperless in government. These fields have the same common characteristics in managing policies in the paper-based system.

### 2.1. Paperless on industry and manufacturing

The paperless system in the industrial and manufacturing field can be found in several sections. One of them is the aviation industry and several business headquarters. To increase the business model at the operation level, an aerospace industry, TITANIA, needs innovative technology to upgrade its efficiency, lead times percentage of fulfillment, business scalability, and new relevant services. They have pushed to use a paperless based methodology for administering the quality of control. They marked a significant change in the company ratio's performance and the efficiency process (Astola et al., 2017).

On the other hand, some studies discuss digitalization as one of the primary trends transforming society and business. Digitalization is the key to supporting internal efficiency in an organization or supporting external occasions (Parviainen et al., 2017). Other research supports how digitalization affects business perspectives, information, techniques, and quantitative analysis of risk management in the industrial era 4.0 (Ivanov et al., 2019).

Another thing was also shown by several companies in the use of paperless to make cost savings. A subsidiary owned by Sonoco, Sonoco-Alcore, has 30 tubes with a core factory and six paper company in

Europe. They implement UPM Raflatac DogBone RFID tags to reduce costs related to lost inventory and manual labor. "Printing houses can return in many points by using RFID technology. Paper roll traceability at the core level allows continuous printing through several phases without losing important paper type and quality information of the material. Material leftovers from the foregoing run can be re-used for new printing work. In savings, it can result in more than 10% savings in substance costs" (Europe, 2010).

On the other side, many companies begin toward a paperless concept by scanning their documents and saving them on the storages with specific folder structures. This is a good start, but the process has difficulties implementing standards. Therefore, to overcome that issue, the best way to start is using Electronic Document Management System (EDMS). A good one should apply naming conventions, security settings, and necessary workflow when a document is added to the system—this stops the user from implementing standards conventions (Bailey, 2012).

According to the study, the disadvantages of paperless are computer software and hardware maintenance. It needs much money, hires a capable IT person, and maintains the security of the documents. Moreover, paperless requires much time and expensive costs to train employees to move towards a paperless concept. The paperless society also has some weaknesses, including human error. Documents scanned incorrectly will give an incomplete record (Dhumne, 2017).

### 2.2. Paperless on education

Education as an important part of efforts to increase human resources has a vital role. Various efforts are made to support the improvement of education quality. The revolution of technology allows a learning system without paper. Several projects and research have succeeded in utilizing technology in the education process. One of them is using an e-learning system (Amandangi et al., 2020; Chiang et al., 2019; Cooper & Caroline Erolin, 2018; R. Narayanan et al., 2019; Oztekin et al., 2013). A study was conducted to look at the effects of several e-learning systems such as Google and Moodle. They found several advantages as thought shortening the distance and time both students and teachers. It has a good effect on students (Rumpa et al., 2017). On the other hand, technology in the accounting process has long been used, but the technology has not been fully used in the education process. A satisfaction survey of the effectiveness of using the technology also shows a good number from the accounting students (Teeter et al., 2001).

Furthermore, in the e-learning system, a Computer Assisted Assessment (CAA) can help teachers in the assessment process (Calvo et al., 2019; Conole & Warburton, 2005). A new system has been developed to complement the e-learning system. This breakthrough is automatic scoring for essays and short answers without a paper system (Alzahrani et al., 2015; Pribadi et al., 2017; Ramalingam et al., 2018). It can help teachers to

provide assessment using a short essay or descriptive essay. Other research related to e-learning is Automated Item Generation (AIG). This field's focus is on generating items automatically (Gierl & Lai, 2015; Liu et al., 2018; Prasetyo et al., 2020). The AIG system can produce tens or even hundreds of questions using only one question template. Both studies utilize technology to reduce paper waste and increase the effectiveness in education. Necessary studies about the benefit and deficiency of e-learning in higher education are carried out to determine the system's effectiveness. The factors that affect the effects are generally influenced by human and technology machines themselves (Arkorful & Abaidoo, 2014).

However, the disadvantages of a paperless system are the requirement of digital devices and internet connection. It needs an expensive cost. Furthermore, digitalization will eliminate face-to-face interaction during the learning process. The sustainable use of social media can lead to underdeveloped students' skills, especially in social interactions, including social skills, reading, and writing (Shonfeld & Tal, 2017).

### 2.3. Paperless on medical

Moreover, the medical sector also began using the concept of paperless as an effort to digitize the environment of a medical institution. Several studies made them move towards a paperless concept. Positive indicators have been demonstrated through technology, which can carry out the medical record and document management through the automation system. Moreover, besides the speed and improvement of service quality, using a paperless system reduces miss information from a large amount of data available at the medical institution (Salomi & Maciel., 2017). Paper-based certainly will not be replaced directly with the paperless concept. In a few decades, the paper might be lost but not soon because of several things. Paper is still a very vital thing in the medical field (Dykstra et al., 2009).

Other advantages of a paperless concept are the subtraction and decrease in hard copy data storage. Nevertheless, the issues of size and cost of electronic data storage also become apparent in a truly digital environment (Middleton et al., 2009). However, E-mail's potential disadvantages bypass the regular administrative filtering in the electronics medicine areas. The consequence is some unnecessary and unimportant e-mails received by the clinician. The thing worried about physicians is communication through electronic technology because it can deteriorate the patient-physician relationship. Inaccurate information on the web can cause patients to worry about doing something (Podichetty & Penn, 2004).

### 2.4. Paperless on government

The suitable sector implementing paperless is the government sector. To improve their services, an online government service called e-government was developed. The architecture of e-government is separated into four parts, including access layer, e-government layer, business layer, and infrastructure

layer. Logical connections from every layer will make possible the data exchange and services both government and the public (Ebrahim & Irani, 2005). For example, Indonesia implements an integrated e-KTP system in various government services. This technology utilizes Near Field Communicator embedded in every e-KTP. Maulana proposed the concept of broad integration with e-KTP in many government institutions and commercial companies. The concept uses a decentralized network data model without violating privacy laws. Apart from the high server requirements, a decentralized model can reduce server infrastructure costs (Maulana, 2019). In addition to infrastructure problems, the process of digitizing data also has to experience a problem. A survey conducted by Muhtarhadi in Kalibaru village found that the implementation of e-KTP could not reach 100%. Some factors that caused the data recording process's difficulty include administration and organization, state apparatus resources, and facilities and infrastructure (Nursalim, 2014).

On the other hand, security holes always threaten government-owned servers from hacker attacks and virus spread. Some hacker attacks on government sites are recorded in several countries such as Russia and Nigeria. A Russian court in balkaria sentenced and fined a hacker who attacked the local government website (Asia, 2015). Furthermore, a series of cybercrimes also occur in Nigeria. They attack the public and government sectors (Oni et al., 2019). These Cybercrime activities are also a concern for the Indonesian government. Indonesia became the first rank to provide hacker attacks both domestically and abroad (Saputra, 2016).

## 2.5. Methodology

### 2.5.1. Object of research

Our research object is the application of paperless in industry and manufacturing, education, medical, and government. These areas are very suitable targets in the application of paperless to support this research. The selection of papers used in this study results from publications in journals or proceedings that discuss paperless development, digitization, computation, and the use of computer applications. The articles selected in each field consist of a minimum of 4 articles related to paperless use.

### 2.5.2. Review method

This research was conducted using a Narrative Literature Review, a comprehensive, critical, and objective analysis of the topic. This study's stage includes selecting a review topic, gathering, reading and analyzing the literature, and writing the review. We choose papers that are relevant to the topics in each field to be studied. Furthermore, the paper will be classified according to the implementation in each field. The analysis of the article is used to determine the advantages and disadvantages of the application of paperless. The final process is to summarize the challenges of using paperless based on studies and

analysis.

### 3. RESULTS AND DISCUSSION

The studies previously discussed provide information about paperless utilization in several fields. This stage analyzes various studies on the use of the paperless concept and presents them in Table 1. In-depth studies have been carried out to get the main points on each of the advantages and challenges in various fields. Based on the disadvantages analyzed in Table 1, it can be concluded and grouped into several sections. The grouping will be carried out for the study of the challenges of the paperless itself. The paperless challenges that can be used as a review and study in the future are as follows.

#### 3.1. Hardware and software maintenance

Implementing a paperless concept requires a computer infrastructure, including hardware and software. Apart from expensive purchasing costs, the maintenance cost of both devices is also not cheap. However, this is comparable to the benefits gained from using digital data. The high price of the original software is also a problem for organizations. Illegal use of the software is a digital crime. However, organizations can move from license software to open-source software that can be used freely (Joia & Vinhais, 2017). Nevertheless, the open-source application certainly has some shortcomings. The contribution of resources from open source users will increase competitive advantages and improving existing weaknesses (Ghapanchi et al., 2014).

The open-source platform was also developed to support educational activities. The architecture of opensource is implemented in the form of e-learning, which can improve the core functionality of the e-learning system. Community is an important part of the process of increasing reliability, safety, quality, and evaluation (Khan & UrRehman, 2013). One of the widely used open-source e-learning is Moodle. A study was applying Moodle as a teaching tool for physics. Students are very interested in using the online-based system (Martín-Blas & Serrano-Fernández, 2008).

In the paperless concept, the most crucial hardware requirements are related to data storage—the storage device functions as a file safe on the computer or cloud server. In the past 15 years, flash memory has become a part of digital data storage tools. However, Solid-State Drive's arrival (SSD) will soon replace the storage disk and push the floppy into extinction. SSD has an excellent speed and performance compared to previous products, HDD which still uses a rotating disk. The device is very reliable because it uses devices and electronic components. Thus, the maintenance costs will be reduced (Micheloni, 2017).

#### 3.2. Data security and reliability

The digital world cannot be separated from the potential of hackers and viruses. With the increasing use of smartphones, computers, and the internet of things, preventing attacks and increasing security are becoming

a major concern. Some special attention is directed towards ransomware viruses (Yaqooba et al., 2017). Ransomware, a virus that corrupts all files contained in a computer. This virus variant is very dangerous. The virus attack can trigger damage to paperless data files that we have stored on a computer or cloud server. However, several studies have been conducted to try to detect and give early warnings of this virus. Nolen Scaife from the University of Florida created software detecting and warning ransomware virus threats (Scaife et al., 2016). The software will analyze suspicious activities run on the computer using several indicators. Effectively, the software can significantly reduce the number of virus attacks and reduce the number of victims who lose data.

On the other hand, hackers have also become the focus of discussion in the digital world. All data on the penetration server will be corrupted and stolen by irresponsible people. Research shows that cyber-attacks in cyberspace generate losses of \$ 445 billion per year (Samtani et al., 2017). In addition to financial losses, the victims will lose data stored on the server. To deal with these problems, a rule and law regarding electronic transactions violations are created to protect electronic systems (Safitri, 2018). Despite having clear laws, there are still many hacker attacks on various websites. It happens because of poor website security. Several techniques can be used to conquer SQL injection attacks. One of them is combinative evasion techniques (Huang et al., 2017). Besides SQL injection, an attack that damaged the web is a web shell. This script will be planted on the server to be accessed continuously. To overcome this problem, Yu Li et al. created a novel Shell Breaker system (Lia et al., 2019). With some previous studies, data security on computers and servers can be maximized according to the studies that helped data security and reliability.

#### 3.3. Human resources technical skill

Another problem that became a challenge is the digital skills that every user must-have. It is certainly not everyone has expertise in that field. However, effective computer skills will improve productivity in an organization. A study shows that a behavioral technique to computer skills coaching can be substantially recovered by tucking Symbolic Mental Rehearsal (SMR). The conclusions reveal that practitioners can use the concept of SMR to improve the effectiveness of computer skills training (Davis & Yi, 2004).

Moreover, training cost can be a burden for companies or institutions that want to improve digital skills. However, the training can be completed by utilizing the digital world itself without presenting experts. Children's Hospital uses a clinical information system using the client-server concept. They use training to reduce training costs by using video tutorials on basic functions during working hours. The information is arranged in a module with a time of 15 to 20 minutes. Over six weeks, 13 staffs from a total of 14



**Table 1.** The Advantages and Disadvantages of Paperless

<b>Field</b>	<b>Advantages</b>	<b>Disadvantages</b>
Industry and Manufacturing	<ul style="list-style-type: none"> <li>a. Efficient business processes/rule (Astola et al., 2017)</li> <li>b. Fast service (Parviainen et al., 2017)</li> <li>c. Reliable document management (Bailey, 2012; Ivanov et al., 2019; Lim, 2012)</li> <li>d. Productivity increases (Europe, 2010)</li> </ul>	<ul style="list-style-type: none"> <li>a. Expensive hardware and software costs</li> <li>b. Requires IT personnel</li> <li>c. Training cost for labor</li> <li>d. Data security</li> </ul> <p>(Dhumne, 2017)</p>
Education	<ul style="list-style-type: none"> <li>a. More innovative learning (Chiang et al., 2019; Cooper &amp; Caroline Erolin, 2018; Oztekin et al., 2013)</li> <li>b. Fast and accurate assessment with a computer (Liu et al., 2012)</li> <li>c. Reduce operational costs (Alzahrani et al., 2015; Pribadi et al., 2017; Ramalingam et al., 2018)</li> <li>d. Ease of collaboration with a student (Rumpa et al., 2017)</li> <li>e. Accommodate large and small classes (Prasetyo et al., 2020; Rumpa et al., 2017)</li> <li>f. Access anytime and anywhere using the internet (Rumpa et al., 2017)</li> </ul>	<ul style="list-style-type: none"> <li>a. Expensive digital device and internet costs</li> <li>b. underdeveloped skills in reading from books and writing on paper</li> <li>c. A tendency to ignore the academic aspects or social aspects</li> <li>d. Decreased teacher and student interaction</li> </ul> <p>(Shonfeld &amp; Tal, 2017)</p>
Medical	<ul style="list-style-type: none"> <li>a. Digitally medical records</li> <li>b. Service improvements</li> <li>c. Patient data integration</li> <li>d. Environmental friendliness</li> </ul> <p>(Salomi &amp; Maciel., 2017)</p>	<ul style="list-style-type: none"> <li>a. Issue of size and cost of electronic data storage (Middleton et al., 2009)</li> <li>b. deterioration of the patient-physician relationship (Podichetty &amp; Penn, 2004)</li> </ul>
Government	<ul style="list-style-type: none"> <li>a. Increased data security</li> <li>b. Service improvement</li> <li>c. Transparency and openness</li> <li>d. Work remotely and mobile with a virtual office</li> <li>e. Time efficiency</li> </ul> <p>(Ebrahim &amp; Irani, 2005)</p>	<ul style="list-style-type: none"> <li>a. Hacking and virus potential (Asia, 2015; Oni et al., 2019; Saputra, 2016)</li> <li>b. Difficulties in digitizing existing documents (Nursalim, 2014)</li> <li>c. Hardware and software maintenance problem (Maulana, 2019)</li> </ul>



can complete all the tutorials given on each function. They study independently during working hours. Thus, it does not require much money in the training process (Hlusko et al., 1998). This is an example of implementation in other fields that will utilize the concept of paperless with digital systems.

On a large and broad scale, an institution also requires a lot of IT personnel. It allows the need for many IT experts in various fields. Some of the focus needed are hardware, software, network, data scientist, and others. In the field of hardware, experts are focused on managing a variety of physical computer devices. On the other hand, an expert in software fields usually become a programmer and manage all the necessary software needs. Network experts will handle network problems and the entire network infrastructure. Lately, many companies need data scientists to analyze the data in their organizations. This has become a new trend in the digital world to find essential things obtained in data analysis. The data can be used and acted upon to support decision-making in the organization (Kim et al., 2015).

### 3.4. Social interaction

The presence of technology makes humans spoiled with everything. The use of paperless positively contributes to the increased use of gadgets to its users. Some of the negative effects of using gadgets include speech or language delay, attention deficits, learning problems, negative impacts on character, and others (Munir, 2018). Besides, social interactions that should be carried out directly become disrupted. This results in a lack of emotional management and communication skills, especially in children (Suhana, 2017).

On the other hand, the process of human communication becomes faster and easier with digital devices. Social media becomes a tool to interact with other people using the internet network. The easiness provided includes online collecting school assignments, virtual class meetings (Chiang et al., 2019), online resources, work remotely, and the easiness of sending and receiving information. Nevertheless, some of these conveniences must apply the principles of the Socio Technical System (STS). The concept consists of human interactions, organizations, and technical systems (Dalpiaz et al., 2013). It requires a social requirement run in technical terms as a form of requirements on human-computer interaction (Whitworth, 2019).

### 3.5. Disaster recovery strategy

Various disasters can occur in the world. It becomes material that must be thoroughly discussed how data recovery strategies and data handling after a disaster occurs. Several ways can be implemented on the problem of post-disaster data recovery, including traditional disaster recovery and cloud disaster recovery. Tian Jun-Feng et al. (2018) explained that cloud storage could solve the disaster recovery strategy's problems. This cloud storage model can be widely accepted in various fields. However, some cloud storage service providers must ensure data security and reliability with the QoS (Quality of Service) requirements. The

proposed method is disaster recovery based on hierarchical data.

A study has proven that cloud-based disaster recovery is more efficient and cheaper than traditional models. Hamadah & Aqel (2019), in their article, introduced a proposed model in a disaster recovery strategy using two metrics made of a recovery time objective and a recovery point objective. Several experts have assisted the design in the field of information technology. They ensure security and reliability problems and a faster recovery in the event of a disaster.

In addition to the data, several problems that arise due to disasters are damage to communication infrastructure. It will cause new problems in the post-disaster data recovery process. A disaster recovery network must be prepared to supply urgent situation in the communication process. A paper describes the disaster recovery network model using a portable disaster recovery network architecture. The combination of networks surveyed is cellular networks, wireless local area networks, wireless mesh networks, geographical area networks, and wireless personal area networks. The problem faced is in the construction of network infrastructure that must be made well (R. L. Narayanan & Ibe, 2012).

## 4. CONCLUSION

On the one hand, the paperless concept has the advantage and good effect on the environment compared to the paper-based concept. However, on the other hand, some challenges must be considered from several aspects related to paperless concept use. Based on this research's objectives, an in-depth study of paperless application has been carried out in various fields. We found several advantages and challenges of implementing paperless in each field. The emergence of information technology can be a solution to paperless problems in the world. This is evident from several studies that have been reviewed previously showed a positive thing about using the paperless system. In this paper, an analysis and study of the paperless challenges have been carried out based on information on the lack of applying paperless from various perspectives. The study results in a cone towards challenges in hardware and software maintenance issues, data security and reliability, human resources technical skill, social interaction, and disaster recovery strategies. The conclusions from this study can be used as reference material for future research. Furthermore, this research can be used as a material consideration in determining policies that can help improve human welfare and environmental improvement in the future.

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