

# The 4.0 Industry Technology in Fashion Industries

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**Abstract**—The fashion industry as one industrial parts creative already very open and ready to face Industrial Revolution4.0. The presence of Industry 4.0 is considered more profitable because it gives opportunities for companies to grow and develop. Draft "smart factory" seems to be here for answer the challenge this. As sector other industries, fashion industry too did not escape the influence of the Industrial Revolution4.0. Digital transformation strategy implemented with combine technology as Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), and Additive manufacturing (3D-Printing) with digital connectivity has been revolutionized most of the manufacturing processes in the fashion industry 4.0 today. This paper aims to examine the impact of the 4.0 industrial revolution in the fashion industry today. The method used in this paper is a literature review that is delivered descriptively, by reviewing certain journals as many as 15 journals, based on the years 2011-2021. The results that can be concluded from this paper are 4.0 . technologies these are just a few method industry fashion can create personalized clothing for consumers. And process production enables efficient production. In the near future, an increase in the number and efficiency of smart factories expected to make marketing in industry more fashion easy and general.

**Keywords**—industry revolution 4.0, fashion industry, smart factory

## I. INTRODUCTION

The rapid development of digital technology creates a new phenomenon in technological progress in the industrial world which is commonly referred to as the industrial revolution 4.0. The current evolution of the Industrial Revolution has triggered many new technological advances that have been welcomed by the wider community. This Industrial Revolution began in 2011 with the term Industry 4.0. The term was first coined in Germany and Industry 4.0 was shaped by the digital revolution. This industry is believed to be able to increase productivity, and Industry 4.0 is an industry that is directly related to digitalization, the scope of which depends on various types of technology [1]. Revolution 4. 0 introduces modern innovations in technology that supports the connectivity of all performance components in the industry by collaborating on cyber technology and automation technology (cyber physical system) on an ongoing basis [2]. The concept of applying industrial technology 4.0 is centered on automation assisted by information technology in the application process, so that

human involvement in the manufacturing process can be reduced (see figure 1).

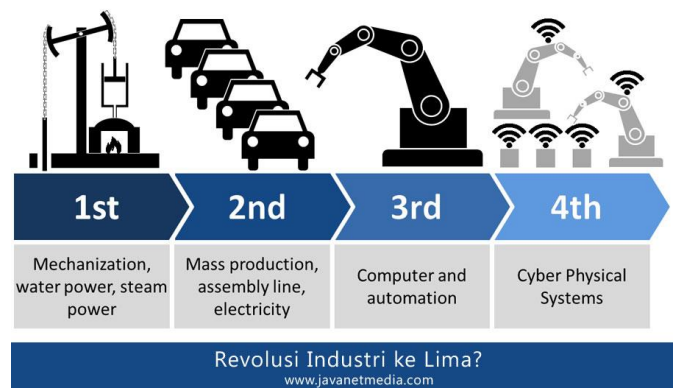


Fig. 1. The Development of the Industrial Revolution

Historically, the current industrial revolution is the 4th generation. The first industrial revolution (Industrial Revolution 1.0) occurred between the late 1700s and early 1800s [3]. During this period of time, manufacturing evolved from focusing on manual labor performed by humans and assisted by animals to a more optimal form of work, with the help of technology in the use of water and steam powered machines and other types of machine tools. With the invention of the steam engine, the national economy and per capita income also increased six times, resulting in new changes to regenerate the Industrial Revolution through more advanced development [4]. At the beginning of the 20th century, the world entered the second industrial revolution (Industrial Revolution 2.0) with the introduction of steel and the use of electricity in factories. The introduction of electricity allowed manufacturers to increase efficiency in creating early factory machines capable of working automatically. It was during this phase that mass production concepts such as assembly lines were introduced as a way to increase productivity. This is marked by the advent of electricity, which makes production costs much lower than before. In 1913, a production line using the invention conveyor belt was born, and the car that many people had assembled the previous car was produced, but after that, the invention car was produced at once, and all the workers produced it. Now it is possible. Trained to be able to track only one field so that they can work according to their respective fields. In 1870, the first production line with

slaughterhouses was used in Cincinnati, USA. At that time, The car was created to facilitate the production process in the factory. This is because the previous land conversion tools still use animal and human power. This had made a huge difference in the 2.0 Industrial Revolution. Even during World War II, the manufacturing process for weapons such as tanks and planes was carried out in factories using production lines [3]. Industrial Revolution 3.0 begins from end 1950s. Industrial Revolution 3.0 started slowly when producer start to incorporate more technology electronics such as computerized in their factory. During at this time, manufacturers began to experience a shift with less emphasis on analog and mechanical technology and more on digital technology and automation software. Previously the Industrial Revolution 2.0 still required human labor in the production process of goods, but after the Industrial Revolution 3.0 came human labor was no longer needed, and in the Industrial Revolution 3.0, the industrial age era slowly ended and was replaced by the information age formed by electrical technology, and industrial revolution 3.0 was shaped by the use of electronic devices through information technology and production automation [5]. The Industrial Revolution 3.0 was born in the early 1970s, and the emergence of the Industrial Revolution again changed world civilization. Computer-controlled automation systems were used in the 3.0 Industrial Revolution if machines were still controlled by humans in the previous revolution. Communication systems that use digital technology accelerate the spread of access to information. And the use of electronics and computers in production automation is a testament to the development of the industry [4]. The era of the Industrial Revolution 4.0 is 2018 Starting from the year to today. This revolution is a combination of two technologies, automation and cyber. This technology is a style of data exchange and automation in manufacturing. Unlike the previous revolution, Industry 4.0 has developed the Internet of Things with new technologies, for example in the fields of robotics and science [1]. The existence of digital technology has a big impact on human life in the world. Many activities, such as work, human behavior and lifestyle, have changed to be more practical because they use automated systems to carry out their activities [6].

## II. THE TECHNOLOGY IN 4.0 INDUSTRY REVOLUTION

In general, Industry 4.0 describes the trend automation enhancement and data exchange in manufacturing technology and processes. These trends include smart factories, computing systems cloud, augmented reality (AR), virtual reality (VR), 3D printing, artificial intelligence (AI), big data, and the Internet of Things (IoT). Even in design Internet of Things for industrial use, machine in factory will equipped with connection wireless and sensors for create a manufacturing system that monitor and visualize the entire production process, even autonomous decision also can make directly by machine [7]. There are five technologies key in technology development based Industrial Revolution 4.0.

### A. Internet of Things (IoT)

Internet of Things (IoT) is a concept or program which allow object for transfer or send data over the network without assistance computer or human devices, IoT also refers to connection between physical objects such as sensors or machines and the Internet. IoT today currently experienced a lot of development evolution IoT can be seen from the level of convergence of wireless technology, microelectron dynamics (MEMS), Internet, and code QR (quick response). IoT is often identified use RFID (Radio Frequency Identification) as a communication method. In addition, IoT also includes technology-based sensors which we often see, such as wireless technology and QR codes. IoT capabilities that alone not indisputable. There are many technology that applied by IoT system, as sensors optics, latest Google technology, sound sensor Google Ai, and Amazon Alexa [2].

### B. Big Data

Big Data is a collection of processes consisting of a large number structured data and unstructured which used for support activities business. Big data itself in general is a development of the system databases. The difference is that the speed of the process, volume, and type available data generally more and more variety than DBMS (Database Management System). Big data consists of three components, namely volume (data storage capacity), velocity (speed in transferring data) and variety (type of data variation). In the production process, Big Data serves to determine the cause of a problem or failure in real time, make an intelligent and precise decision, detect an anomaly or deviant behavior in the production structure, reduce costs, time, and improve product performance [8].

### C. Artificial Intelligence (AI)

AI is the simulation of human intelligence in machine programs which allow thinking and acting machine asman. AI can be defined as something programs that can take rationalization and actions that most likely to achieve a aim certain. Development artificial intelligence Keep going continue from time to time, adjust with the needs of the manufacturing industry. For example the use of machines that can calculate production as one of the line production in manufacturing industry [9].

### D. Cloud Computing

Cloud Computing is processing power system computing that simultaneously connects computer devices to other computers via network Internet. cloud computing makes it easy user by installing application by manual which is then used to access information via Internet. In the production process, cloud computing serves to improve stakeholder performance, and get system updates regularly (up to date) [10].

### E. Additive Manufacturing (3D-Printing)

Additive manufacturing also known as 3D printing, is a transformative approach to industrial production that enables

the manufacture of lighter and more robust components and systems. The production process in Additive Manufacturing is a printing process by adding thousands of small layers that form the finished product. This manufacturing process requires a special computer and special software called CAD. The software informs the printer of the shapes and layers to be created. The cartridges used in the manufacturing process use different materials depending on the manufacturing requirements. In the manufacturing process, printing is done layer by layer [11].

With the industrial revolution 4.0 which applies the concept of mechanical automation and does not require human labor to implement it. Of course, this situation is a good opportunity for industry players to add value to efficiency in the work environment, where time is a very valuable thing for the industry.

III. THE FASHION INDUSTRY IN 4.0 INDUSTRY REVOLUTION

The fashion industry as one industrial parts creative already very open and ready to face Industrial Revolution 4.0. The presence of Industry 4.0 is considered more profitable because it gives opportunities for companies to grow and develop [12]. The most important thing for the fashion industry is the innovation in creating fashion styles and strategies to attract consumers so that efficiency and effectiveness in the production process are important. therefore concept "smart factory" seems to be here for answer the challenge this [13]. As sector other industries, fashion industry too did not escape the influence of the Industrial Revolution 4.0. Digital transformation strategy implemented with combine technology as Internet of Things (IoT), Augmented Reality (AR), Virtual Reality (VR), and Additive manufacturing (3D Printing) with digital connectivity has been revolutionized most of the manufacturing processes in the fashion industry 4.0 today [14].

A. Internet of Things (IoT)

Connectivity provided through technology which are called Internet of Things (IoT) which could connect person to machines and machines to machine. IoT is one of the keys from draft smart factory. IoT allow manufacturing to improve process control production and solve problems in real time. one of the fashion brands that have implemented IoT technology in manufacturing is Burberry with apply concept smart factory. Burberry with history more than 100 year, fashion company it claims that the factories are connected completely and highly automated. Burberry will continue to use AI technology to optimize the balance between production quality and effectiveness in shipping goods [15] (see figure 2).



Fig. 2. Smart factory implementation on fashion brand Burberry

B. Virtual Reality (VR) and Augmented Reality (AR)

VR and AR potential become a technology that can revolutionizing the fashion industry at the moment. World virtual which served with the presence of VR & AR brings interest for fashion lovers around the world. So far the use of VR & AR has been applied in various fields and fashion industry activities. One of them is the use of AR in fashion shows [16]. This matter allows the viewer to scan the model based on work designer without presenting the actual model to catwalks. VR technology is the new opportunities for retailer, with this technology its makes possibility for the consumer to experience shop simulation virtual in shop virtually. VR allows consumer for trying on hundreds of outfits in a relatively short time briefly before making a purchase [17] (see figure 3-5).

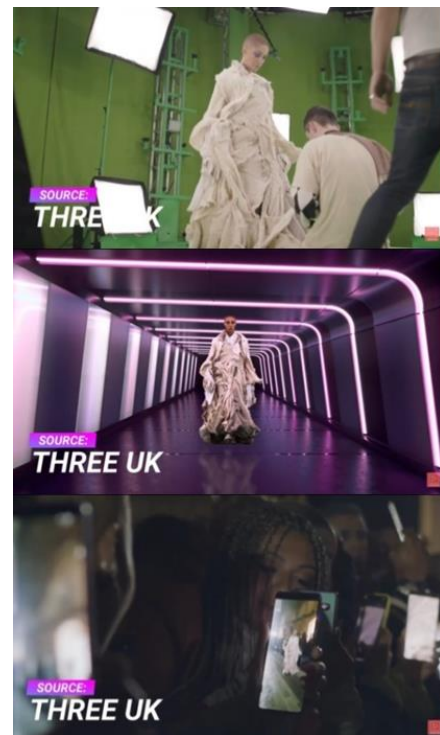


Fig. 3. VR and AR fashion show process





Fig. 4. AR technology in fashion brand Zara

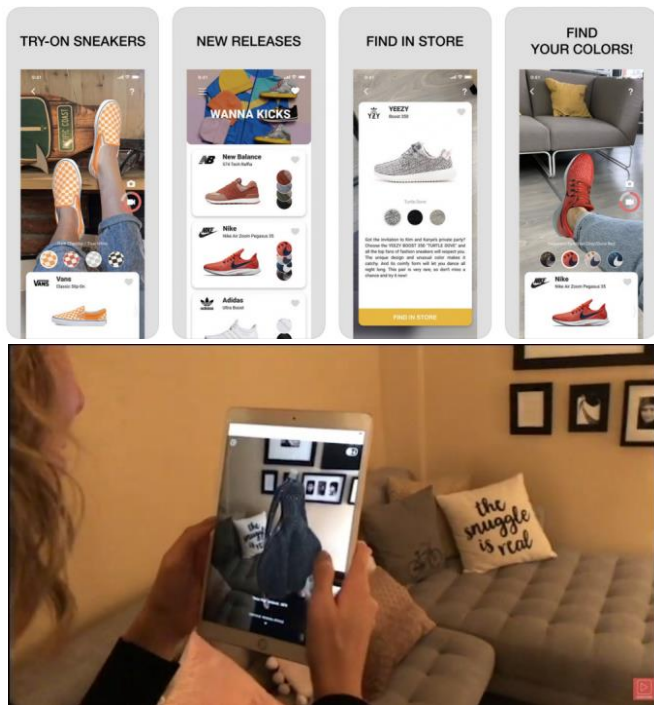


Fig. 5. AR technology in the online shopping process

C. Additive Manufacturing (3D-Printing)

3D printing is an interesting aspect of additive manufacturing design to be used in the fashion industry because it allows designers to work more easily in creating fashion designs with extraordinary innovations in the fashion industry, such as in the manufacture of textiles and accessories. This technology has given a lot of freedom to the designers in terms of geometry. For example, with 3D-printing designers can create complex designs for various projects within the fashion industry. From shoes and accessories to dresses with 3D printing, the fashion industry is starting to tap into the full

potential of 3D printing and develop interesting objects. Some garments developed thanks to 3D printing technology would be too complex and expensive to make using other manufacturing methods. Used for forming object 3D from digital files. Objects are built layer by layer to make desired object from certain materials [18] (see figure 6).



Fig. 6. An example of a 3D-Printing textile & fashion product

IV. CONCLUSION

All of these benefits also apply to industry manufacture in fashion industry. In general, the manufacturing innovations brought by Industry 4.0 allow companies to optimize existing systems and develop it into more efficient process. More specifically, smart manufacturing can realize the concept of mass customization that affordable. Companies can achieve this goal by redesigning processes more production organized with focus on modularization system and cost efficiency. There

are many forms of advanced digital technology that used by clothing company and shoes special. These tools include:

- Augmented reality and computer vision for fitting and design processes.
- Artificial intelligence for shopfloor operations.
- machine learning for logistics.
- 3D-printing to produce comfortable and innovative synthetic clothing.
- robotics for product packaging and distribution processes.

4.0. technologies these are just a few method industry fashion can create personalized clothing for consumers. And process production enables efficient production. In the near future, an increase in the number and efficiency of smart factories expected to make marketing in industry more fashion easy and general.

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