DIGITAL TECHNOLOGY ECOSYSTEM AND FOUNDATION OF DIGITAL TRANSFORMATION

Truong Dinh Dung(*)

Technical College of Communication

Abstract: *The article provides an overview of the platform as well as the trend of digital transformation in Vietnam. Digital transformation is an inevitable trend not only in our country but in the whole world. In Vietnam, the digital transformation process has begun to take place, and positive results have been achieved in all three pillars: digital government, digital economy and digital society. Digital transformation is the process of applying new technologies in the digital technology ecosystem, such as IoT, 5G, AI, Big data, Blockchain.*

Keywords: *Digital transformation, digital technology ecosystem, digital government, digital economy, digital society, IoT, 5G, AI, Bigdata, Blockchain, FPT, e-government.*

Received 5 December 2021

Revised and accepted for publication 26 January 2022

(*) Email: seventruong.bg@gmail.com

1. INTRODUCTION

Digitization is understood as the conversion of real values to digital values or the conversion of information from physical, analog to digital form (represented by binary numbers 0 and 1). The information is put on the computer system and processed by software, making it easy to store and search 1. Digital transformation is the use of interconnected digital technologies and data to create new operations or changes to existing ones. Digital transformation refers to the economic and social impacts of digitalisation.

In order to develop policies that are relevant to the digital age, it is important to be aware of the key elements of the evolving digital ecosystem and some of the opportunities and challenges that come with it apply them.

The digital technology ecosystem (Figure 1) may include components, such as: Internet of Things (IoT), 5G wireless networks (5G networks), cloud computing (Cloud computing), data analytics, Big data, AI (Artificial Intelligence), Blockchain, Computing power with interactions and complement each other, opening up new ability. Some of these technologies have been a part of our daily lives.

Figure 1. Digital technology ecosystem

2. CONTENT

2.1. Internet of Things IoT

Internet is a network that connects devices such as computers, smartphones, etc. to each other to exchange and share data. The IoT is a system where the Internet is connected to the physical world through sensors. Sensors are responsible for sensing signals from the environment such as temperature, pressure, light, ... and converting them into data forms in the internet environment. Then the signals will be processed and made changes according to the user's requirements2. Currently, they are often applied through applications on smartphones or on computers. IoT promotes process automation and reduces labor costs, playing an important role in connecting the physical and digital environments.

Figure 2. IoT application in smart home design

2.2. 5G mobile network

5G is an inevitable development trend and it has the potential to completely change our society in the future. The first advantage of 5G network is extremely fast transmission speed, 20 times to 100 times faster than 4G's speed. The new generation of wireless networks is capable of transmitting large amounts of data in a very short time, greatly reducing latency. This big enough difference can bring about radical changes.

The speed and bandwidth of 5G can really help IoT. Everything from smart air conditioners to smart lights popping up in your home, 5G will provide the capabilities you need to connect everything easily3.

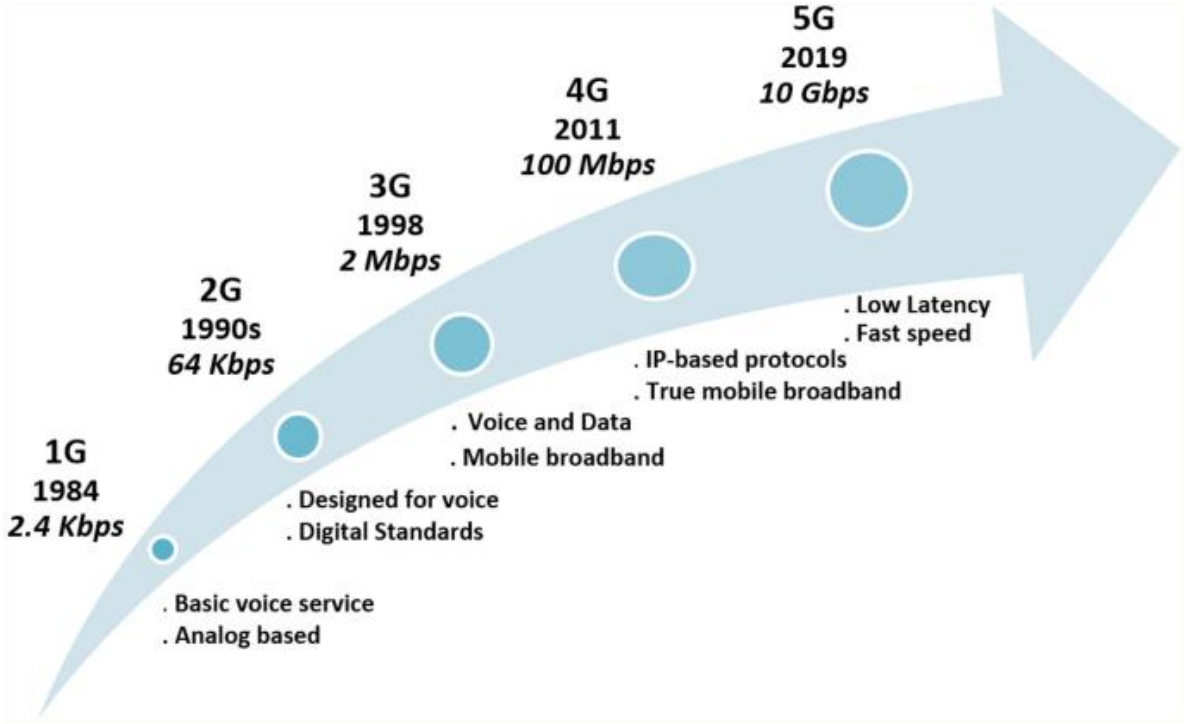

Figure 3. Evolution of 1G to 5G

2.3. Cloud computing

Cloud computing is a technology that allows computing power to reside in virtual servers, called clouds, on the Internet of service providers, allowing customers flexible on-demand access to many computer resource type. Cloud computing has revolutionized the computer industry, fundamentally changing the way resources are used, the structure of operations as well as the storage, distribution and processing of information 4. Cloud computing increases service flexibility, availability, scalability, diversity, and ubiquity of computing resources in a way that facilitates other digital technologies, such as AI, big data.

Figure 4. Cloud computing application in banking

2.4. Big data analytics

The term "big data" generally refers to data that is characterized by its processing speed, and variety. It is powered by IoT, and a number of other technologies, such as artificial intelligence, cloud computing, and powerful computing power. The data generated by billions of connected smartphones, devices and sensors is enormous. If previous technology needed a very long time to process such data, today's digital technology allows processing and analysis in a much shorter time to extract information, knowledge or present information. make decisions appropriately5.

2.5. Artificial intelligence

AI is the ability of machines and systems to acquire and apply knowledge, including by performing a variety of cognitive tasks, such as sensing, language processing, pattern recognition, learning, decision-making, etc. determination and prediction. AI will not only respond mechanically to what has been programmed, but also can "think" and make decisions on its own beyond the scope of the original programming. AI will set its own goals and continuously improve execution methods, from past data, until it finds the most optimal and effective way to accomplish the set goals. Recently, we have also been approached with the concept of AIoT which is a combination of artificial intelligence (AI) technology with Internet of Things (IoT) infrastructure to achieve more efficient IoT operations, improve interaction between human and machine, enhancing data management and analysis capabilities6.

Figure 5. Combination of AI and IoT

2.6. Blockchain blockchain technology

Blockchain is currently the technology trend of the times, in which all data is encrypted into blocks and linked together to form a long chain. Every time a new information or transaction occurs, the old information will not be lost, but instead, the new information will be saved in a new block and appended serially to the old block to form a new block chain. Each block contains information about initialization time (timestamp), transaction information and is linked to previous blocks through hash information (hash). Blockchain allows applications to verify ownership and make secure transactions for a variety of assets7. It is a ledger or a spreadsheet that is maintained and stored on a network of computers. The network regularly updates the database everywhere it exists, so that all copies are always identical. This means that everyone else in the network can see and verify the records and there is no need for a middleman to act as a validator. Transactions in the blockchain are processed according to the consensus mechanism, which is a set of rules that determine the contributions of the members of the blockchain system.

Figure 6. Chain of blocks in the blockchain

2.7. Computational power and supercomputers

Computing power and supercomputing are the synergies of processing power to deliver performance far beyond what is possible with a typical computer. Quantum computers are expected to become a great step forward in the history of supercomputers, with super processing capabilities being a research trend in the world to develop new techniques in solving problems. Prediction quantum computing will create a new revolution in human life with quantum computers, artificial intelligence, and many applications in different fields.

2.8. Digital transformation in Vietnam

In Vietnam, the process of digital transformation has begun to take place, especially in industries such as finance, transportation, tourism etc. According to Minister of Information and Communications, Vietnam is ready for strong digital growth. Accordingly, this year will be the year to strongly promote digital transformation in all industries on a national, all-people and comprehensive scale, and the first year to implement new strategies with digital infrastructure, data, postal, network information security, digital technology industry, digital technology enterprises, digital government, digital economy and digital society etc.

The government and authorities at all levels are making efforts to build an e-government towards the digital government. More than 30 cities are also planning to build Smart City with new technology platforms etc. Vietnam's e-government ranking according to the United Nations' assessment in 2020 increased by 2 places, ranking 86/193 countries, 23/47 in Asia and 6/11 in Southeast Asia. Vietnam's composite index is higher than the world and regional averages, belonging to the group of countries at a high level; the rate of online public services at level 4 nationwide in 2020 will reach 30.86%, exceeding the target set by the government. As of August 20, 2021, the rate of online public services at level 4 nationwide reached 65.11% **Error! Reference source not found.**.

Specialized data transmission network for Party and State agencies has connected to 100% of ministries, branches and localities; 100% of districts, towns and cities. A number of databases to create the foundation have been built such as: Database on insurance, electronic civil status, business registration, education etc. In which, the national database on population officially operated from July 1, 2021. The national document interchange axis has been built, operated and promoted effectively in the exchange of documents in electronic form.

In 2021, the number of Vietnamese digital technology companies and their revenues experienced growth of nearly 10 %. We have seen an increase in the number of outstanding Vietnamese-made digital products, as well as products in the international market. Vietnam’s ranking in digital technology has also increased globally. Due to its many benefits, IoT is considered as one of the digital transformation technologies used by many Vietnamese businesses in their business digital transformation process. This technology provides detailed, transparent visibility into a company's goods and activities. Companies that integrate IoT may be able to more closely manage the operations of their businesses. Meanwhile, the specific data, insights, and analytics provided by IoT technology enable

businesses to achieve key digital transformation goals such as operational efficiency, increased agility, and increased mobility.

Compared with businesses in the US and Europe, the digital transformation process in Vietnamese enterprises is less risky and simpler. Businesses are under increased pressure to optimise their user experience and to create personalised service experiences for each customer. Digital transformation will help Vietnam's enterprises do this more effectively.

As a pioneering technology corporation in the IT field, rich in experience in consulting and implementing digital transformation projects, for many years, FPT has been accompanying to promote overall and global digital transformation. representing the Government, leading organizations and businesses on a global scale. FPT will coordinate with consulting companies to consult the Government of Sierra Leone on the strategy of socio-economic development and digital transformation. FPT's long-term strategic goal is to become a digital enterprise and stand in the top 50 global leading end-to-end DX solutions and services providers by 2030 year, with a focus on profitability, productivity and innovation. On March 16 in Hanoi, Mr. Jacob Jusu Saffa, Minister and Chairman of the Office of the President representing the Government of Sierra Leone and Mr. Truong Gia Binh, Chairman of FPT, signed a cooperation agreement to promote national digital transformation. and train digital workforce for Sierra Leone **Error! Reference source not found.**.

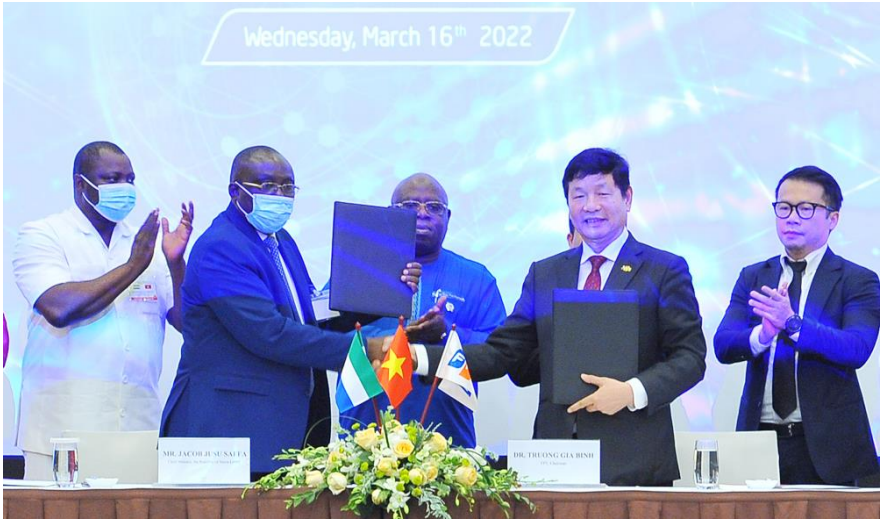

Figure 7. Representatives of the Government of Sierra Leone and representatives of FPT signed a cooperation agreement on March 16 in Hanoi.

3. CONCLUSION

Digital transformation will affect everyone, will solve the frustrations brought about by the traditional way of operating. It will be human-centered and each citizen plays a key role when participating in the digital transformation process in the most effective way, through changes in habits, living, working and transacting in society. Using data and digital

technology to redesign government operations to make decision-making and social management more effective, lead the country's digital transformation, and promote socio-economic development fast and sustainable.

Vietnam is the country which has advantages in digital transformation. According to the vice president of Tibco, Vietnam has very impressive economic growth rates with an expected GDP growth rate of 6.5% for 2021. Vietnam also has great advantages in human resources in technology. There are many schools that are training their staff in IT, which is the source of high-quality labour force majoring in technology and data science. The release that another advantage that Vietnam can enjoy in the digital transformation process is the lower risks than other countries. Since the information and technology systems in Europe and the US are very large, they have to meet high risks, especially with core systems, every time they need to make adjustments to digitise phases of the production process. Meanwhile, the systems in Vietnam bear little systematic risks. Vietnam can carry out digital transformation faster and safer. It is the right time for Vietnam to grab opportunities to boost its growth **Error! Reference source not found.**.

However, Vietnamese small and medium enterprises are facing barriers in digital transformation such as lack of digital skills and human resources (17%), lack of strong enough information technology platform to enable digital transformation (16.7%), lack of digital thinking or digital culture challenges in the business (15.7%) **Error! Reference source not found.**, **Error! Reference source not found.**.

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HỆ SINH THÁI CÔNG NGHỆ SỐ VÀ NỀN TẢNG CỦA CHUYỂN ĐỔI SỐ

Tóm tắt: *Bài viết nghiên cứu tổng quan về một số công nghệ nền tảng cũng như xu hướng chuyển đổi số ở Việt Nam.Chuyển đổi số là xu thế tất yếu không chỉ ở riêng nước ta mà trên bình diện toàn thế giới. Tại Việt Nam, quá trình chuyển đổi số đã bắt đầu diễn ra, và đã đạt được những kết quả tích cực ở cả 3 trụ cột là chính phủ số, kinh tế số và xã hội số. Chuyển đổi số là quá trình áp dụng các công nghệ mới trong hệ sinh thái công nghệ số như IoT, mạng 5G, trí tuệ nhân tạo AI, phân tích dữ liệu lớn Big data, công nghệ chuỗi khối Blockchain.*

Từ khóa: *chuyển đổi số, hệ sinh thái công nghệ số, chính phủ số, kinh tế số, xã hội số, IoT, 5G, AI, Big data, Blockchain, FPT, chính phủ điện tử.*