

# A digital Twin Model for Improving Enterprise Performance in Uzbekistan

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**Abstract**—The article discusses models for the development of the digital economy in the countries of the world and proposes a digital twin model to improve the efficiency of enterprises in Uzbekistan

**Keywords**—*digital economy; digital technologies; digital infrastructure; digitalization; electronic business; digital twin model*

## I. INTRODUCTION

The development of the digital economy (DE) in the countries of the world takes place according to different models, thus discrepancies are associated with different development priorities and special national management methods. Taking into account various features of development and management methods, we can note the following models of development: the model of the digital service sector (Great Britain) and digital production (Germany), the model of predominance of public (China) or private (USA) management. The main factors of success in digital transformation in the company's activities include the level of development of the innovation system (capable to generate innovations and quickly transfer them to mass production), as well as the education system (which should provide highly qualified personnel for DE). The introduction of digital technologies allows businesses to enhance their potential both organizationally and technologically. Enterprise virtualization models are associated with the government's adoption of development programs, models of DE and the directions of its formation. Taking into account various approaches, experts suggest technological, process, platform, and growth-based approaches to model formation [1].

## II. MOTIVATION TO DEVELOP THE MODEL

Currently, the platform approach of the enterprise virtualization model is used for the development of e-Commerce DE sectors. Today, financial transactions, especially banking are being digitalized at a significant pace. New members such as Alibaba Group with its own payment system and Amazon.com are entering the financial market. On the other hand, banks are being to be engaged in new, unusual activities. The main components and features of the enterprise virtualization model in "industry 4.0" include the followings [2]:

- horizontal integration of business processes and value creation processes (value networks) - end-to-end processes within a single information space of the enterprise-with a consumer and with a supplier;

- vertical integration of the internal production chain of enterprises (networked manufacturing) - data collection from Executive mechanisms up to the planning system (ERP) and advanced control mechanisms from the ERP level and down;

- end-to-end digital integration of design processes (digital integration of engineering), continuous design engineering "Industry 4.0" (the Fourth industrial revolution) is a production organization concept the value of which is provided by integrating physical objects, processes, and digital technologies that monitor and create virtual copies of physical processes in real time, make decentralized decisions and allow machines to interact with each other and people.

Most of the research on the impact of digitalization of the economy is devoted to its impact on economic growth. Moreover, the positive impact of investments in the high-tech sector on the level of GDP of the European Union country is revealed [3]. It is also clear that digitalization has a positive impact on GDP per capita, the level of employment and the growth of the level of employment of the population [4]. Existing initiatives and current programs in the range of development countries highlight the factors influencing on socio-economic development, namely, a high level of inclusion of digital services, a sufficient level of investment, adequate income, sufficient level of digital literacy, high literacy, high level of complexity of involvement of the state in the development of initiatives and programs (the state creates a regulatory framework capable of developing digitalization sectors, to conduct a pilot test of the program, and then the business scales initiatives and support them).

In Uzbekistan, November 2019, a Concept of the national strategy "Digital Uzbekistan 2030" was published for the open discussion by the National Agency for project management under the President of the Republic of Uzbekistan [5]. The document includes 7 chapters. According to the developers, the materials of the presented document will allow to have accelerated development of the DE; create a DE based on a favorable environment for the development of innovative products; improve the efficiency of public administration; provide convenient public services to the population and business entities.

In accordance with the concept of "Digital Uzbekistan 2030", the main directions of digital development of the country include:

- development of digital infrastructure;
- development of human capital and digital skills;
- creating a system of public administration based on digital data;
- creating an ecosystem of digital innovations;
- creating an effective information security system.

The implementation of the main directions and priorities of the concept will be carried out through the implementation of activities defined in national, branch, sectoral plans and strategies of development, as well as the inclusion of three components in the development process:

- businesses that use digital innovations to introduce new business models, invest in infrastructure and employees to develop their digital skills;
- the society that expands opportunities for the use of digital technologies by creating demand for digital products, increasing the level of digital literacy and competencies, increasing the income of the business environment in its composition, or creating new business models;
- the state that supports the entire process of digitalization, provides education, promotes investment, exports of services and goods, increases the level of trust of citizens and businesses, and guarantees flexible legislative regulation.

As a result of the implementation of the concept, consumers are expected to receive high-quality and inexpensive Internet and mobile communications, eliminate digital inequality between cities and villages, supremacy of the electronic record and strengthen the confront against corruption. Taking into account the proposed concept of "Digital Uzbekistan 2030", the author suggests technological and industry models of virtualization of enterprises in Uzbekistan, which can be combined into a model of "digital twins" (Fig.1).

The digital twin model proposed for the use of activity virtualization in domestic enterprises is based on numerical modeling, which allows you to calculate the operational characteristics of the designed (developed) product and the influence of various factors [7]. Proper use of this model allows you not only to work with primary sources of information, but also to manage the process of product development and manufacturing itself, to analyze the current state, predict the long term state, plan, timely solve problems and take measures to eliminate them [8]. Domestic enterprises, the management of which sets a priority goal of rapid digitalization of all production processes, have a chance to become competitive organizations in modern innovative markets.

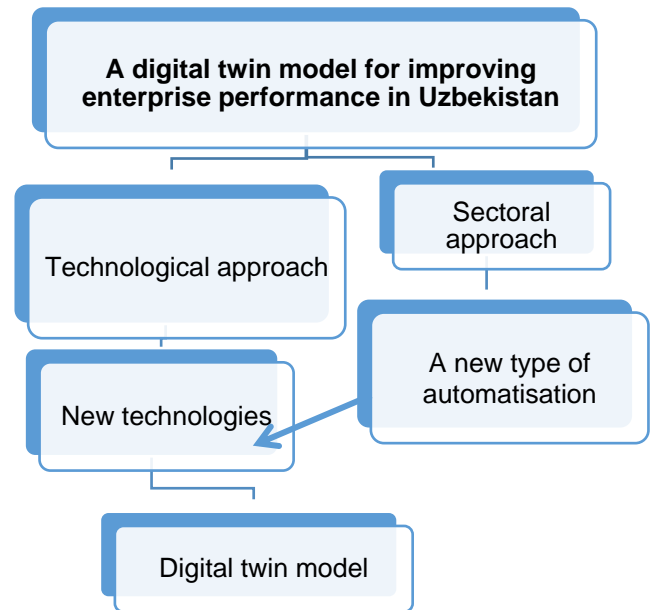


Fig.1. A digital twin model for improving enterprise performance in Uzbekistan [6]

The digital twin model makes it possible to consider a combination of various factors related to each other, which makes the production process more unhindered [9]. Among the most important features of digital twin models are the following:

- the ability to predict and simulate various physical processes, which is capable of timely elimination of failures;
- the possibility to use new technologies that allow you to process (accumulate) large massive data more quickly and efficiently;
- the existence of real parameters of the publication's functioning, reflecting the current situation and allowing you to assess the possibility of an accident (failure) at the current moment;
- models are considered to be stable elements.

### III. CONCLUDING REMARKS

The decision-making process is key in the work of industrial enterprises and structures, so the possibility of speeding up this process to account for the introduction of a new model is considered promising and necessary [10]. Digital twins are not inferior to their real counterparts in quality, which allows you to get access to the current characteristics of objects, mitigate risks, and create special conditions for operation and use.

The main advantages of using these models include [11]:

1. In the short term prospects: The ability to monitor assets and optimizations made with the purpose of using the data usage process and resource discounts for their use, regardless the professional sphere. The introduction of technology in the real sector of the economy in the next two to three years will help to

increase labor productivity by 10-25% and reduce the costs by 10-20%.

2. In the medium term prospects: it is necessary to use digital twin models in industry, as this increases not only management, but also operational efficiency. In the scale of large production and mass of production flows, it is important to optimize all processes, what would allow to monitor the condition in a timely manner, to perform preventive and repair work. It is necessary to note that in the use of the new concept there is one very important feature - implementation of innovations (especially at the stage of design), which will allow not only to monitor the current state and keep track of the correctness of all processes, but also create something new, perfect the system and processes for the production of new products, also in the framework of the implementation of business models, guaranteeing performance. It becomes possible to use digital twin models in old ones, which is associated with the possibility of creating new products based on them, taking into account the factors of conditions and opportunities for creation and implementation.

3. In the long term prospects the model of digital twins is implemented as a tool for introducing innovations in the scientific and production process, which becomes suitable for the collected and generated analytical data. Recommendations that are developed based on market and product analysis make it possible to create new business models.

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