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## **DEVELOPMENT OF MOBILE AND WEB APPLICATIONS IN THE CONTEXT OF UKRAINE'S DIGITAL TRANSFORMATION ON THE EXAMPLE OF DIIA**

**Annotation:** *The article highlights the role of mobile and web applications in the process of digital transformation and their contribution to improving the comfort of citizens' lives. It has been established that the availability of a convenient and accessible application can help improve the quality and speed of public and commercial services. In addition, the article provides recommendations for further digitalisation of the Diia app and the necessary measures for its further development.*

*The market for mobile and web applications is highly competitive and rapidly changing, which results in some projects not reaching successful completion due to the large number of competitors and rapid technological development. There are also problems with data security standards in Ukraine and the lack of national legislation regulating the industry. One of the biggest challenges to the country's digital development is the level of digital literacy among the population, which limits access to digital technologies and services. In addition, there are problems with creating an infrastructure that supports the development of mobile and web applications. Also, there are often problems with creating competitive digital products that meet international standards and user requirements.*

*The impact of the mobile application Diia on the digital transformation of Ukraine has been analysed in the article. It has been provided an overview of the application's functionality, its impact on various aspects of citizens' lives, and considered the prospects for its development. Also there are some data on the development of mobile and web applications in Ukraine. It is noted that the mobile application Diia plays an important role in providing citizens with access to various public services in electronic form, which helps to improve the efficiency and convenience of service provision, reduce corruption and the cost of providing them.*

*The features of the mobile and web application market have been identified. The importance of ensuring the quality and security of mobile applications has been considered. They give examples of shortcomings and problems that may arise when using such applications and consider possible ways to solve them. During the study it was identified what kind of specialists were needed for further digitalisation of the country.*

*The development of mobile and web applications is an important factor in Ukraine's digital transformation. In particular, the development of new applications and improvement of existing ones can help improve the efficiency of public services, provide citizens with convenient and quick access to various services, reduce the cost of providing them, and reduce corruption.*

**Keywords:** *mobile application, web application, digital technology, information technology, information system, decision support, Diia, digital transformation, security.*

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## **РОЗРОБКА МОБІЛЬНИХ ТА ВЕБ-ДОДАТКІВ В КОНТЕКСТІ ЦИФРОВОЇ ТРАНСФОРМАЦІЇ УКРАЇНИ НА ПРИКЛАДІ «ДІЯ»**

*Анотація:* У статті висвітлено роль мобільних та веб-додатків у процесі цифрової трансформації та їх внесок у підвищення комфорту життя громадян. Встановлено, що наявність зручного та доступного додатку може сприяти підвищенню якості та швидкості надання державних і комерційних послуг. Крім того, у статті наведено рекомендації щодо подальшої цифровізації додатку «Дія» та необхідні заходи для його подальшого розвитку.

Ринок мобільних і веб-додатків є висококонкурентним і швидко змінюється, що призводить до того, що деякі проекти не досягають успішного завершення через велику кількість конкурентів і швидкий розвиток технологій. Також існують проблеми зі стандартами безпеки даних в Україні та відсутністю національного законодавства, яке регулює галузь. Одним із найбільших викликів для цифрового розвитку країни є рівень цифрової грамотності населення, який обмежує доступ до цифрових технологій та послуг. Крім того, існують проблеми зі створенням інфраструктури, що підтримує розробку мобільних і веб-додатків. Також часто виникають проблеми зі створенням конкурентоспроможних цифрових продуктів, які відповідають міжнародним стандартам і вимогам користувачів.

У статті проаналізовано вплив мобільного додатку Дія на цифрову трансформацію України. Надано огляд функціональності додатку, його впливу на різні аспекти життя громадян, розглянуто перспективи його розвитку. Також є дані про розвиток мобільних і веб-додатків в Україні. Зазначається, що мобільний додаток Дія відіграє важливу роль у наданні громадянам доступу до різноманітних державних послуг в електронному вигляді, що сприяє підвищенню ефективності та зручності надання послуг, зменшенню корупції та вартості їх надання.

Визначено особливості ринку мобільних та веб-додатків. Розглянуто важливість забезпечення якості та безпеки мобільних додатків. Наводяться приклади недоліків і проблем, які можуть виникнути при використанні таких програм, і розглядаються можливі шляхи їх вирішення. Під час дослідження було визначено, які спеціалісти потрібні для подальшої цифровізації країни.

Розробка мобільних і веб-додатків є важливим фактором цифрової трансформації України. Зокрема, розробка нових додатків та вдосконалення існуючих може сприяти підвищенню ефективності надання державних послуг, наданню громадянам зручного та швидкого доступу до різноманітних послуг, зменшенню вартості їх надання та зменшенню корупції.

**Ключові слова:** мобільний додаток, веб-додаток, цифрові технології, інформаційні технології, інформаційна система, підтримка прийняття рішень, Дія, цифрова трансформація, безпека.

## 1. Introduction

In the modern world, digital technologies have become an essential component of business and government development. Digital transformation helps improve the quality of life of citizens, ensures the efficiency of government and commercial entities, and contributes to the country's international competitiveness. One of the key industries that is actively developing in the context of Ukraine's digital transformation is the development of mobile and web applications.

The Diia mobile app is one of the most successful one among other app development projects in Ukraine and provides wide access to various public services. This project will allow us to find out what benefits the use of mobile and web applications adds to the provision of quality and efficient public services, as well as how the introduction of these technologies affects the process of digital transformation in Ukraine.

## 2. Analysis of research and publications.

An analysis of existing research on this topic shows that the development of mobile and web applications is an integral part of digital transformation. For many years now, the world has been witnessing an increase in the use of mobile and web applications as tools to simplify processes and

make life easier for users. Studies have shown that mobile and web applications have great potential for economic development and socio-economic progress.

In particular, in the European Union, Japan and the United States, it has been shown that the development of mobile and web applications has increased productivity and business efficiency. Studies also show that the use of mobile and web applications in various aspects of life, including the public sector, healthcare, education, transport and logistics, can improve the quality and speed of service delivery and promote innovation.

Regarding Ukraine, there are studies that show that the development of mobile and web applications can have a positive impact on the country's economic development and socio-economic progress. For example, the introduction of the Diia mobile application was an important step in Ukraine's digital transformation and contributed to the improvement of public service delivery.

The analysis revealed some problems and shortcomings related to the development of mobile and web applications in the context of Ukraine's digital transformation. These include:

1. Insufficient number of domestically produced web and mobile applications, which leads to the dominance of foreign products in the market.
2. Insufficient number of web and mobile application development specialists in Ukraine.
3. Poor quality of web and mobile applications, which limits their popularity and effectiveness.
4. Problems with the security of personal data of web and mobile application users.
5. Lack of unified standards for the development of web and mobile applications in Ukraine, which leads to discrepancies and inconsistencies between different products.
6. Insufficient support from government agencies for the development of web and mobile applications in Ukraine.
7. Lack of a national strategy for the development of web and mobile applications in Ukraine.

These problems are becoming an obstacle to the full development of web and mobile applications in Ukraine and their impact on the country's digital transformation.

### **3. The purpose of the study.**

The purpose of the article is to study the impact of the mobile application Diia on the digital transformation of Ukraine and to consider topical issues of development of mobile and web applications in the context of digital technologies in Ukraine. The article aims to find out how the use of mobile and web applications affects the country's digital transformation and to explore the possibilities for further development of these technologies in Ukraine on the example of the successful implementation of the Diia mobile application

## **4. Results of the study**

### **4.1 Analysis of the state of development of mobile and web applications in Ukraine.**

An analysis of the state of development of mobile and web applications in Ukraine shows that this industry is currently quite active and promising. In recent years, there has been an increase in the number of companies developing mobile and web applications. In Ukraine, there are already more than 2,000 such companies engaged in application development, including mobile applications for iOS and Android.

However, despite this, there are some problems and shortcomings in the development of this industry in Ukraine. One of the main problems is the low level of salaries in the IT industry, which leads to an outflow of qualified personnel abroad. Also, there is insufficient number of specialised educational institutions that train specialists in mobile and web applications in Ukraine.

In addition, the mobile and web application market in Ukraine has some specific features. In particular, it is quite competitive and fast-changing, which leads to the fact that some projects do not reach successful completion due to the large number of competitors and rapid development of technologies. It should also be noted that there are problems with data security standards in Ukraine and the lack of national legislation regulating this industry.

However, the availability of powerful Internet resources and the development of mobile and web applications in Ukraine is currently a highly relevant issue, as digital transformation is becoming increasingly important for the country. In recent years, some steps have been taken towards Ukraine's digital transformation, in particular with the launch of the Diia mobile app. Nevertheless, there are still challenges that hinder the full development of digital technologies in Ukraine.

One of the biggest challenges is the low level of digital literacy among the population, which limits access to digital technologies and services. In addition, there are problems with creating an infrastructure that supports the development of mobile and web applications. Also, there are often problems with creating competitive digital products that meet international standards and user requirements.

Considering the above problems, it is reasonable to analyse the development of mobile and web applications in Ukraine on the example of the Diia application. This will allow us to identify the advantages and disadvantages of using this application, as well as to determine the prospects for the development of digital technologies in Ukraine.

#### **4.2 The role of the Diia mobile application in Ukraine's digital transformation**

Diia is a mobile application developed by the Government of Ukraine to facilitate the interaction of citizens with government agencies. The app provides access to more than 70 online services, including obtaining a certificate of no criminal record, paying fines, making a doctor's appointment, or receiving electronic versions of documents.

In order to use the Diia application, the user needs to download it to their smartphone and go through the authorisation procedure using an Electronic Digital Key, Ukrainian passport or mobile phone number. After that, the user can select the desired service from the list, fill in the required information and submit the application.

One of the most important benefits of the Diia app is that it simplifies and speeds up the procedure for obtaining documents and services, which can have an impact on increasing public trust in government and reducing corruption. In addition, Diia contributes to reducing bureaucracy and improving the quality of public services by moving to an electronic format.

The Diia mobile application has a wide range of functionality that allows you to perform various tasks and receive services online. The main functions of the Diia app include:

1. Online services of government agencies: The Diia app allows users to contact various government agencies, such as the Ministry of Internal Affairs, the SFS, the State Labour Service and others, to obtain various services. In particular, the app allows users to apply for a passport, register a car, and order a passport office and other services.

2. Medical services: using the Diia app, you can find hospitals and clinics in your city, make an appointment with a doctor and receive other medical services.

3. Financial services: the Diia app allows you to check your bank account balance, pay utility and other bills; make money transfers and other financial transactions.

4. Educational and cultural services: the Diia app contains information about various educational and cultural events taking place in the city and allows you to sign up for them.

5. Commercial services: the Diia app allows you to order services such as food delivery, hotel reservations, and other commercial services.

6. Business services: the Diia app contains various business tools, such as the ability to register a sole proprietorship, extracts from the Unified State Register, and others.

Steps in the algorithm of the Diia app:

1. Download and install the application on a mobile device or website on a PC.
2. Register a new user by entering your personal data.
3. Authorisation in the application, entering your login and password.
4. Selecting the desired service or application function. For example, open a document, submit a service request, or pay bills.
5. Filling in the required fields and sending a request to perform the action.
6. Waiting for the result of the action.

7. Receive the result of the action in the form of a notification in the application or by email.
8. Ending a session with the application by logging out of the account.

The Diia app provides access to various government services, including:

1. Obtaining electronic certificates on the existence/absence of a criminal record, military service, residence registration, etc.
2. Obtaining information on utility bills, account balance, making payments online.
3. Applying for a passport and an internal passport, preparing other documents (including for travelling abroad).
4. Obtaining a building permission.
5. Obtaining medical prescriptions and making an appointment with a doctor in electronic form.
6. Obtaining various permission (for example, for weapons, for travelling to the temporarily occupied territory, etc.)
7. Applying for unemployment benefits and receiving information about vacancies on the labour market.
8. Obtaining a permission for the use of radio frequency resources.
9. Making appeals to the authorities.

The app also has the ability to check fines and trace missed calls, make an appointment with a doctor or add a driver's licence to a virtual wallet.

The Diia mobile app has several advantages, including:

1. Convenient and simple interface: the application has an intuitive interface that allows users to easily find the functions they need and perform various actions.
2. Wide range of services: Diia provides access to a variety of public services, allowing citizens to obtain the necessary documents and services without leaving their homes.
3. Speed and convenience: Thanks to the use of mobile technologies and electronic identification, the process of obtaining documents and services is significantly accelerated and simplified.
4. Saving time and money: Diia allows citizens to save time and money that were previously spent on travelling to government offices and paying for various services.

However, the app also has some drawbacks, for example:

1. Technical problems: at some stages of using the app, you may experience technical problems, such as delays or crashes.
2. Low number of services: currently, only a limited list of public services and documents required by citizens is available in the Diia app.
3. Territorial restrictions: the Diia app is available only to Ukrainian citizens, which may make it difficult for foreign citizens living in Ukraine to obtain documents and services.

The Diia mobile application plays an important role in Ukraine's digital transformation. It is one of the most successful projects in the field of government electronics, which has made it possible to significantly simplify citizens' access to public services.

The Diia app allows citizens to easily contact government services, make payments, receive medical services and receive salaries. The app also enables interaction between government institutions, reducing the time required to exchange information and providing more effective control over the actions of government agencies.

In addition, the Diia app is one of the main tools of Ukraine's digital transformation, which allows the national economy to become more competitive and attractive to foreign investors. It improves the quality of public services and speeds up the process of their provision, which is important for attracting foreign investment in various sectors of the country's economy.

The Diia mobile application is contributing to Ukraine's digital transformation by providing access to electronic government services and simplifying the procedures for obtaining documents. The app allows users to apply to government agencies and receive electronic services such as ordering a passport, driver's licence, registering a place of residence and many others.

This reduces the need to physically visit government offices, which increases the speed and convenience of receiving services. It also helps to reduce corruption and ensure more transparent procedures.

The Diia app also contributes to increasing the level of digital literacy of the population, as users need to have skills in working with electronic services to utilise it. This, in turn, helps to develop the digital economy and increase the country's competitiveness in the digital world.

Thus, the Diia mobile app is an important tool for the development of the information technology sector in Ukraine, helping to implement digital technologies and accelerating the country's digital transformation.

### **4.3. Analysis of the use of the Diia mobile application and its impact on Ukraine's digital transformation**

An analysis of the use of the Diia mobile application shows that it has become an important tool in Ukraine's digital transformation. According to the Ministry of Digital Transformation, Diia is already used by 18.9 million people, or every second Ukrainian. Ukrainians have used Diia.Signature more than 20 million times.

One of the main advantages of Diia is the convenience and speed of receiving services. For example, the app can be used to register for COVID-19 vaccination, issue a passport, see a doctor, get information about your finances, and more. The app also allows users to save time and avoid queues at government offices.

However, unfortunately, the application has some drawbacks. In particular, some users complain about problems with the stability and speed of the application, as well as the inconvenience of some interfaces and the complexity of some procedures. In addition, there are questions about the protection of personal data collected by the app.

Despite these shortcomings, the Diia mobile application plays an important role in Ukraine's digital transformation, facilitating efficient and fast receipt of services from the state. At the same time, it is advisable to continuously improve the application, correct identified shortcomings, and ensure proper protection of users' personal data.

The Diia mobile application has a significant impact on Ukraine's digital transformation. Below, we will consider in detail how this app contributes to the development of digital technologies in the country.

#### **1. Improving the accessibility of public services**

The Diia app allows Ukrainians to access most public services directly on their mobile devices. This reduces waiting time and makes it easier to get the information you need. This has made the process of providing public services more accessible to citizens, which has a positive impact on their satisfaction and trust in government agencies.

#### **2. Reduced bureaucratic procedures**

The Diia mobile application reduces the number of bureaucratic procedures that often become an obstacle to obtaining public services. Most procedures can be completed electronically, without the need to visit government offices and stand in queues. This significantly saves time and effort for citizens and allows government agencies to use their resources more efficiently.

#### **3. Stimulating the development of digital technologies**

The Diia app is an important step towards the development of digital technologies in Ukraine. It helps accelerate the digital transformation process and improve the quality of public services. In addition, the Diia mobile application uses modern data encryption and personal information protection technologies.

The Diia app uses a digital signature to guarantee the legal significance of the documents being signed. It allows for efficient electronic transactions and reduced processing time. In addition, the application allows you to interact with government agencies and access various public services, which helps to improve the availability of services and the convenience of obtaining them.

The Diia app also promotes e-governance and helps to avoid corruption schemes. In addition, the mobile application enables more effective control over the implementation of various programmes and projects financed from the budget.

The Diia app also helps to reduce government spending on public and business services by providing convenient and quick access to various public services and facilities.

Thus, the Diia mobile application plays an important role in Ukraine's digital transformation, contributing to the efficient use of digital technologies and improving the quality of public services.

#### **4.4. Prospects for the development of mobile and web applications in Ukraine**

Ukraine has a great potential for the development of mobile and web applications. Currently, there are already a large number of local companies developing software for mobile devices and applications for the Internet. However, there are still many challenges that stand in the way of mobile app development in Ukraine.

One of the main problems is the lack of qualified developers. Unfortunately, not all Ukrainian universities have the required number of programming courses to teach students how to develop mobile applications. This means that app development companies are often forced to look for specialists abroad.

Another problem is the lack of a standardisation in the mobile app industry. This complicates the process of interaction between developers and users, and may result in applications that are not compatible with mobile devices.

There is also a problem with financing start-ups that develop mobile applications. There are not enough investors in Ukraine who are willing to invest in such projects, which makes it difficult for them to develop and distribute.

However, despite these challenges, the development of mobile and web applications in Ukraine has significant potential.

The main prospects for the development of mobile and web applications in Ukraine lie in increased integration with other areas of life, such as healthcare, education, transport and the banking sector. Another important area is the development of applications aimed at improving the quality of life of citizens, in particular in the areas of healthcare, environment, culture and sports.

In addition, the development of mobile and web applications in Ukraine can help improve the business environment and attract investment into the country's economy. These technologies can be used to automate many processes in various industries, which will increase productivity and reduce costs.

Another important aspect of developing mobile and web applications is ensuring their security and protection against abuse. It is necessary to develop mechanisms for protecting user data and verify the sources of information coming into the application.

In general, the development of mobile and web applications is an important element of Ukraine's digital transformation, allowing for easier access to services and a better quality of life for citizens.

For further digitalisation of Ukraine and improving the functioning of the Diia app, developers can take the following steps:

1. Expanding the app's functionality: adding new services and features that would meet the needs of different groups of the population.
2. Improving the interface and user experience: developers can conduct surveys among users, take into account their suggestions and improve the interface and user experience.
3. Improving cybersecurity: it is important to ensure the reliability and security of users' personal data, as well as protection against hacker attacks.
4. Expanding the network of partners: the ability to contact partners from different industries and services will increase the functionality of the application and improve its usefulness for users.
5. Implementation of innovative technologies: developers can use new technologies, such as artificial intelligence, blockchain, and others, to improve the functionality of the application and ensure greater efficiency of use.

These measures can help the developers of the Diia app improve its functionality and increase the level of digitalisation in Ukraine.

To implement the digitalisation process and further develop mobile and web applications in Ukraine, specialists from various fields are needed. The main groups of specialists required to implement digital transformation projects in Ukraine include:

1. Software developers - specialists in the development of software, including mobile and web applications, who can create and develop software products to meet the needs of users and companies.
2. Designers - specialists in user interface and visual design who can create attractive and functional interfaces for mobile and web applications.
3. Analysts - specialists in data analysis and interpretation who can help developers understand user needs and behaviour, as well as collect and analyse data to improve applications.
4. Testers - software testing specialists who can check the operation of mobile and web applications and identify errors and deficiencies in the operation of applications.
5. Product managers - project management specialists who can manage the development and implementation of mobile and web applications, ensuring communication between developers, customers, and other stakeholders.
6. Security experts - cybersecurity professionals who can ensure application security.

## 5. Conclusions.

Based on the analysis of the existing studies, it can be concluded that mobile apps and web applications have become an integral part of our lives and have great potential for the digital transformation of Ukraine. The example of the Diia app demonstrates how the introduction of digital technologies into public services can make them much easier and more convenient for the public.

Unfortunately, however, there are drawbacks, such as the lack of digital literacy among some segments of the population, as well as the problems with infrastructure and internet access in certain regions of Ukraine.

To further Ukraine's digital transformation, it is necessary to attract specialists from various fields, such as programmers, engineers, marketers, designers, etc. Mobile app developers should strive to continuously improve their products, taking into account user needs and technological innovations.

Overall, digital transformation is essential for the development of the economy and the improvement of the quality of life of Ukrainian citizens, and mobile apps and web applications are a key tool for its implementation.

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