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STATISTICAL ASSESSMENT OF THE IMPACT OF DIGITAL TECHNOLOGIES AND AUTOMATED SYSTEMS ON HUMAN RESOURCES IN THE PUBLIC ADMINISTRATION SYSTEM

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In this article, the impact of digital technologies and automated systems on human resources in the public administration system is studied based on statistical analysis. World experience and digitalization processes implemented in the case of Uzbekistan are analyzed, changes in labor efficiency, speed of service and employee participation are shown. At the same time, practical recommendations on existing problems, ways to overcome them, and long-term effectiveness of digitalization are given. This study deeply reveals the role and importance of digital transformation in public administration.

KEYWORDS: ***Digital Technologies, Automation, Public Administration, Human Resources, Digitization Efficiency, Labor Productivity, Cyber Security, Digital Transformation.***

INTRODUCTION

In today's era of the digital revolution, public administration systems are striving to increase efficiency by implementing modern technologies. Digitalization processes are creating new opportunities in human resource management and helping to optimize work processes. In particular, many functions that used to be performed manually are being replaced by automated systems with technologies such as artificial intelligence, big data, and blockchain.

Global research shows that by 2023, the global revenue from improving the efficiency of the use of digital technologies in public administration systems will reach $2.4 trillion [1]. At the same time, international statistics confirm that about 40% of civil service employees need to develop digital skills. In Uzbekistan, as part of the “Digital Uzbekistan-2030” program, more than 60% of state institutions are digitizing their work processes [2]. This has a significant impact on increasing the efficiency of human resources and reducing the volume of labor.

In this context, this article aims to determine how digital technologies and automated systems in the public administration system affect human resources and to assess this impact on a statistical basis.

The article also analyzes the practical results of digitalization in the public sector, their positive and negative impacts. These analyses are studied using the example of Uzbekistan.

LITERATURE ANALYSIS ON THE TOPIC

In particular, the study by Emily Thompson and Michael Rodriguez entitled “Digital Transformation in Public Administration: Impact on Human Resource Management” examined how the introduction of digital technologies in public administration affects human resource management processes. The authors note that as a result of digitalization, the processes of personnel selection, professional development, and performance evaluation have significantly improved. It is also noted that the possibilities of data analysis through automated systems have expanded and decision-making processes have accelerated [3].

In a study titled "Automation and Workforce Dynamics in Government Agencies," authors Laura Jenkins and Robert

[1] *https://www.worldbank.org/en/programs/govtech/gtmi*

[2] *PF-6079-no. 05.10.2020. Strategy " Digital Uzbekistan-2030" confirmation and effective done increase measures about*

[3] *Emily Thompson & Michael Rodriguez. "Digital Transformation in Public Administration: Impacts on Human Resource Management". "Journal of the Knowledge Economy". 2023. (https://link.springer.com/article/10.1007/s13132-023-01214-y?utm)*

Miller analyzed the impact of automated systems on workforce dynamics in government agencies.

The authors note that automation may reduce some traditional tasks, but that highly skilled personnel will be required to manage new technologies. They also note that developing digital skills is important for civil servants [4].

"E-Government Initiatives and Human Capital Development" by Sophia Martinez and David Lee scientific The study examines the relationship between e-government initiatives and human capital development. The authors argue that the introduction of digital technologies creates a need for civil servants to improve their skills and acquire new skills. It is also noted that digitalization processes require a rethinking of human resource management strategies [5]. Scientific research entitled "The Impact of the Introduction of Digital Technologies in Public Administration of Uzbekistan on Human Resources" analyzes the processes of introducing digital technologies into public administration in Uzbekistan and their impact on human resources. The author emphasizes that as a result of digitalization, there is a need for civil servants to improve their qualifications, acquire new skills, and increase their work efficiency. It is also noted that automated systems have simplified work processes and saved time [6].

Also, another scientist, Dilshod Rahimov, in his study entitled “The Impact of Automation in Public Services on Human Resources Management,” studied the processes of automation in public services and their impact on human resources management. The author emphasizes that some tasks may be reduced as a result of automation, but highly qualified personnel are required to manage new technologies. It is also noted that the development of digital skills is important for civil servants [7].

These studies provide important information on the impact of digital technologies and automated systems on human resources in public administration. In particular, digitalization processes create the need to reconsider human resources management strategies, improve employee qualifications and acquire new skills. Also, through automated systems, work processes can be simplified and efficiency can be increased.

RESEARCH METHODOLOGY

This study uses three main methods to assess the impact of digital technologies and automated systems on human resources. Statistical analysis compares performance before and after digitalization to quantify changes in efficiency. This method evaluates the amount of labor productivity, time, and money saved.

Sociological survey and interview method state of employees digital to technologies adaptation level and their technological to processes was attitude to study help This gives method employees psychological adaptation and the process how much positive acceptance what he did analysis to do for important.

Time series analysis and digital technologies current from doing before and then indicators far term during to observe opportunity This gives method state under the management technological of changes dynamics and far term efficiency assessment for is applied. This methods together state under the management digitization practical and theoretical aspects complete to illuminate opportunity gives.

ANALYSIS AND RESULTS

Today, the introduction of digital technologies in the public administration system is gaining importance all over the world. Large-scale projects are being implemented worldwide to increase the efficiency of management through artificial intelligence, automated data systems and big data. In particular, in Estonia, the e-Estonia platform has made it possible to digitize public services by 99%. This has not only increased the speed of management, but also increased the efficiency of human resource use to a high level. Also, in Singapore, artificial intelligence and IoT (Internet of Things) are being used as part of the Smart Nation initiative . State administration is being fundamentally reorganized based on the Internet .

In Uzbekistan, the process of digitizing the public administration system is also continuing steadily. As part of the “Digital Uzbekistan-2030” strategy, a number of state institutions have been digitized, as a result of which work processes have been automated and the efficiency of service provision has increased. For example, the provision of more than 200 services in electronic form through the Unified Interactive Public Services Portal has reduced the involvement of human resources and significantly increased the speed of service provision. The Ministry of Public Education has also introduced the “Open EMIS” system, automating the process of managing employee data.

These changes in the world and in our country show that digital technologies and automation not only optimize processes, but also create new opportunities for improving the quality and efficiency of human resource management. This indicates that modern public administration must adapt to the digital revolution.

We analyze the effectiveness of digitalization in public administration systems based on statistical indicators

[4] *Prof. Laura Jenkins & Dr. Robert Miller. "Automation and Workforce Dynamics in Government Agencies". IGI Global. 2023*

[5] *Dr. Sophia Martinez and Dr. David Lee." E-Government Initiatives and Human Capital Development." Public Organization Review.2023*

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Indicators of public services before and after digitalization

Indicators	Before digitization (2020)	After digitalization (2023)	Growth percentage
Service show speed (day)	15	5	+66%
Employee participation rate (%)	70%	40%	-30%
Work productivity (tasks/day)	50	80	+60%

From the table data, it can be seen that digitalization has improved service speed by 66%, increased productivity by 60%, and significantly reduced human resource involvement.

With the introduction of digital technologies, the speed of service provision in public administration systems has been reduced from 15 days to 5 days, which represents an improvement of +66%. The volume of employee participation has decreased by 30%, as automation has made it possible to carry out processes that do not require human participation. Productivity has increased by 60% in terms of the number of tasks completed per day, which has helped to increase the efficiency of processes.

This of changes main reasons as the following confession to grow must :

– Automatic data processing capabilities have accelerated processes.

– Automated systems have made it possible to perform repetitive tasks without human intervention.

– Productivity has increased due to the shift to using personnel's labor in more complex, creative, and strategic tasks.

In order to study the impact of digital technologies and automated systems on human resources in the public administration system, a sociological survey and interviews were conducted among 200 civil servants in 2023. This study examined employees' adaptation to digital technologies, their attitude to the automation process, and the challenges they faced. 85% of employees admitted that technology has simplified their work processes, which confirms the direct impact of digital systems on productivity. At the same time, 78% of respondents noted that they saved time due to automation. However, 30% of employees had difficulties in adopting technology, which indicates that there is still work to be done to adapt employees to new systems.

This of changes main reasons as the following confession to grow possible :

– Technologies work processes simple and fast to be help gave .

– Automated systems human by many time demand attainable tasks shortened .

– Digital of skills enough at the level underdevelopment technologies acceptance in doing to difficulties reason it has been .

State management in the system digital technologies current to do far term the impact study for time series analysis method This method is used. changes years during observation and the results compare through of the process efficiency to evaluate opportunity This gives analysis through labor productivity, service show speed and other important indicators how developed is determined. The following The table shows the years from 2020 to 2023. time between main indicators reflection delivered :

Years during state management in the system digital technologies under the influence labor productivity and service show speed change

Years	Labor Productivity (Task/Day)	Service Show Speed (Day)
2020	50	15
2021	60	12
2022	70	8
2023	80	5

Source : *Uzbekistan Republic of " Digital" Uzbekistan – 2030 Strategy within Digital technologies of the ministry annual analytical reports (mitc.uz) .*

The time-series indicators show significant year-on-year improvements in labor productivity and service delivery speed. Labor productivity increased from 50 tasks in 2020 to 80 tasks in 2023 (+60%), while service delivery speed decreased from 15 days to 5 days (-66%). These figures confirm the long-term effectiveness of the introduction of digital technologies in public administration.

This to changes following why to bring possible:

– Every year, technological processes are improved and more automated tasks are introduced.

– Automation and digital skills have led to increased productivity among civil servants.

– As the level of adaptation to digital systems increases year by year, processes have accelerated.

All analyses show that the introduction of digital technologies in the public administration system leads to increased productivity, time savings, and optimization of human resource participation. However, more attention is required to adapt employees to new systems and develop technological skills.

The impact of digital technologies and automated systems on human resources in public administration varies depending on the level of digitalization implemented in different countries and the development of infrastructure. The table below compares the key indicators of Estonia, Singapore, South Korea, the United Kingdom, the United States and Uzbekistan for 2024. These indicators are compared in terms of the coverage of digital services, the speed of service provision, the volume of employee participation and the growth of work productivity.

Comparative analysis of the impact of digital technologies and automated systems on human resources in the public administration system for 2024

Countries	Digital services coverage (%)	Service show speed (day)	Employee participation rate (%)	Productivity growth (%)
Estonia	99	1	20	80
Singapore	95	2	25	75
South Korea	92	3	30	70
Great Britain	90	4	35	65
USA	88	5	40	60
Uzbekistan	**85**	**5**	**40**	**60**

Source: *This data was compiled by the author based on reports from official statistical committees of countries and international organizations for 2024.*

Estonia is a leader in digitalization, with 99% of government services automated. Singapore (95%) and South Korea (92%) are also making effective use of advanced technologies. In Uzbekistan, this figure is 85%, which is a high result for developing countries.

In Estonia, the service time is only 1 day, which indicates that the process is fully automated. In Singapore and South Korea, this figure is 2 and 3 days, respectively. In Uzbekistan and the USA, the service speed is 5 days, which also indicates that the digitalization process is ongoing.

In Estonia and Singapore, employee participation has decreased significantly, reaching 20% and 25%, respectively. This indicates a high level of automation. In Uzbekistan and the United States, this figure is still high - 40%, which indicates the need to improve the automation process.

Estonia (80%) and Singapore (75%) achieved high levels of efficiency, while Uzbekistan (60%) and the United States (60%) achieved average levels. These figures indicate the potential for further digitalization.

As can be seen from the table, advanced countries (Estonia, Singapore) have ensured the effective use of human resources as a result of the introduction of digital technologies. Uzbekistan, on the other hand, is consistently developing in this direction, achieving significant results in increasing the speed of service provision and productivity. However, to achieve greater efficiency, it is necessary to deepen digitalization, retrain employees, and improve infrastructure.

Although significant positive results have been achieved in the process of introducing digital technologies and automated systems in the public administration system, there are a number of problems in this area. Below we will analyze these problems and the measures being taken to solve them:

1. Insufficient digital skills. Many civil servants lack the skills needed to effectively use digital technologies. Some employees are struggling to adopt new systems.

The following measures are being taken to address these issues:

✓ Training courses on digital technologies are being organized for employees.

✓ The "Digital Skills" program, supported by the Ministry of Digital Technologies of the Republic of Uzbekistan and International Financial Institutions, is being implemented, providing free training to thousands of employees.

2. Dependence on software errors in automated systems . Automated systems can sometimes stop functioning or produce incorrect data due to software errors. This leads to uncertainty and lack of trust in processes.

The following measures are being taken to address these issues:

✓ Regular system updates and maintenance practices are being strengthened.

✓ By involving local IT specialists, reliable software tailored to government systems is being developed.

✓ Backup systems and cloud technologies are being implemented, which will prevent outages in case of emergencies.

3. Limited financial resources. Digitization and automation require significant financial outlays, which are sometimes slowed down by a lack of resources.

The following measures are being taken to address these issues:

✓ The attraction of grant and loan funds is being strengthened in cooperation with international financial institutions and donor organizations.

✓ Digitalization projects are being financed by involving the private sector in the processes based on the "public-private partnership" model.

✓ In Uzbekistan, programs to support "Technoparks" and IT startups are being expanded, ensuring their contribution to improving technological processes in public administration.

4. Cybersecurity issues. Cybersecurity threats are increasing as a result of the digitalization of government systems. The risk of data theft or system breaches remains relevant.

The following measures are being taken to address these issues:

Modern encryption technologies are being implemented to protect data in government systems.

✓ The activities of IT universities and training centers have been expanded to train specialists in specialized cybersecurity.

✓ The security level of government systems is being continuously audited as part of the "E-Security" program.

5. Insufficient development of internet infrastructure in the regions . The internet infrastructure required for the effective use of digital technologies is not equally developed in all regions. Agencies and citizens in remote areas face restrictions in using these services.

The following measures are being taken to address these issues:

✓ As part of the "Digital Uzbekistan-2030" strategy,

work is underway to expand high-speed Internet access in all regions of the country.

✓ Internet access is being provided to remote areas through the use of satellite technologies and wireless communication.

✓ "Digital Centers" have been established throughout Uzbekistan, providing citizens and employees with access to free digital services.

Systematic measures are being taken to eliminate existing problems in the process of digitization of the public administration system . These measures will not only solve existing problems, but also allow for further improvement of the efficiency of public administration and provision of quality services to citizens in the future.

CONCLUSION AND SUGGESTIONS

Today, the introduction of digital technologies and automated systems in the public administration system is one of the main factors in increasing efficiency and optimizing resources on a global scale. As can be seen from the analysis of this study, digitalization helps to achieve significant progress in human resource management. In particular, the speed of public services, the accuracy of data processing, and the efficiency of employees are significantly improved. At the same time, together , one row problems eliminate to grow for consistent efforts necessity determined .

Conclusion

Digital technologies and automation state under the management service quality increases , time saves and from resources effective use opportunity gives .

To analyzes according to, developed services in countries (Estonia , Singapore) almost complete automated , this and efficiency sharp increased . In Uzbekistan and this process continue is doing, and this in the direction noticeable results is visible.

Still digital skills development, internet infrastructure expansion and security issues solution to do countries for important task become remains.

Suggestions

Employees qualification increase In Uzbekistan state of employees digital technologies application skills develop for wide comprehensive training programs organization to be Special IT trainings and certification programs current to be done demand is being done.

Technological infrastructure improvement . All in the regions high high-speed internet networks expansion and digital to services wide opportunity create necessary . Artificial companion and wireless networks edge in the regions current to do separately attention worthy.

Automated systems development State management for adapted, stable working and cybersecurity level high was automated systems working exit and current to do necessary . Systems permanent updated to stand It is also important to provide .

Public-private partnership development Private IT companies with cooperation to do through innovative solutions working exit and financial resources attraction to do process acceleration possible .

Monitoring and assessment system current to do Digital technologies current to do and automation the results regular monitoring and assessment system working exit This process is necessary . during there is shortcomings determination and them own on time eliminate to grow opportunity gives. State management system digitization according to take going affairs Uzbekistan in the region leader from countries to one convert to the possibility has. Digital technologies wide current to do and automation processes right management through state management efficiency noticeable at the level increases and to the population being shown services quality improves. With this together , in the future this in the direction international from experience active use and national to oneself to the essence suitable innovations implementation to grow necessary

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