

Džino, J., & Džino, S. (2023). Digitalization of public administration in Bosnia and Herzegovina with a special focus on the field of it staff management and ICT infrastructure management. *STED Journal*, 5(1), 25-43.

DIGITALIZATION OF PUBLIC ADMINISTRATION IN BOSNIA AND HERZEGOVINA WITH A SPECIAL FOCUS ON THE FIELD OF IT STAFF MANAGEMENT AND ICT INFRASTRUCTURE MANAGEMENT

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ABSTRACT

Digitization of public administration is a choice that has no alternative. The analysis of public administration in Bosnia and Herzegovina was research through the trends of changes in public administration and refers to: working conditions, access to work execution, developments with IT personnel, business conditions, investments, needs for new technologies, equipment and security.

The key factor in every public administration is personnel. In the paper, we have presented an analysis of the employment of IT personnel at the level of B&H and the facts that emerged from the conducted analyses. Management of IT personnel, their need, recruitment and stimulation in public administration is a big challenge. An analysis of the current situation, trends and solutions is given through the available data. In order to digitize public administration, investments are also needed, of course these investments should be well thought out and guided by examples of good practice. Based on available data, analyses of investments in ICT in public administration at the level of institutions of B&H and Brčko District were carried out. An example of good practice was presented and solutions were given.

Keywords: Public administration, data warehouses, self-service, service provision, digitalization, IT personnel, Digital technologies, Digital transformation.

INTRODUCTION

The impact of digital technologies on our lives, work and communication is increasing every day. Information technologies play a major role in all fields of human activity. In the most of the developed countries digital transformation of public administration is rather slow; the development is far behind of the officially defined and announced schedules (Sidorenko, Bartsits, & Khisamova, 2019). Companies that can best respond to rapidly and frequently changing markets have better competitive advantages than those that fail to

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keep up with the pace dictated by the globalization process (Kale, 2020). Regardless of the industry sector, regardless of the user base, web technology will be the main driving force for change (De Kare-Silver, 2020). We expect faster response times, faster delivery and personalization. This change in attitudes means that public administration must adapt and innovate like all other organizations. And where industries do not keep up, they risk lose market share in favor of smaller and more agile new players (Rowles, & Brown, 2017). In all sectors of society and economy, digital transformation is a catalyzer for new transformations that bring new functionalities, services, products, models and experiences. Today, even the concept of electronic business has been overcome to, for the reason that it implies that outdated, non-electronic business also exists as a parallel analog way of doing business.

Digitization, apropos is the transformation of public administration, enables new, faster, more networked and better quality of the work with citizens, the economy, but also with all organizational units of public administration.

In Public Administration, development directions must be aligned with the Agenda for Sustainable Development (United Nations, General Assembly [UNGA], 2015).

METHODOLOGY, HYPOTHESES AND RESEARCH OBJECTIVES

The approach to the selection of research questions and the setting of hypotheses is guided by the desire to obtain missing information about the way human resources are managed in the field of IT at the level of institutions of B&H, as well as investments in ICT. The researchers have defined access to publicly available data from the field of employment of IT personnel and implementation of public procurement for ICT at the level B&H institutions. As the main sources for collecting data from the domain of human resource management from the field of IT, the Agency for Civil Service (2022) was taken, and the collection of data on public procurement included 75

institutions that are on the budget of B&H. The data were collected from the websites of institutions from public procurement plans or public procurements which have been carried out. The main goal and the general initial reason was the effort to obtain an assessment of the actual situation in the institutions of B&H, that is, to obtain an overview and missing information about the management of IT personnel and public procurement for ICT in the institutions of B&H.

The researchers agreed on the following research questions and problems:

- Q1: Have the institutions of B&H been exposed to changes in work and functioning since the appearance of the Corona virus (COVID19).
- Q2: Do the institutions of Bosnia and Herzegovina have a defined policy for hiring IT personnel?
- Q3: Do the institutions of Bosnia and Herzegovina invest in ICT in a planned way?

The goal of data collection and their analysis are the changes to which public administration has been exposed since the emergence of the Corona virus (COVID19), as well as the purchase of information on the quality of IT personnel management and the justification of investment in ICT infrastructure.

The following research hypotheses were set:

- H1: The Public Administration has been exposed to changes in work since the appearance of the Corona virus (COVID19) in several areas.
- H2: In the set of collected data on published public advertisements and internal competitions published by B&H institutions through the Agency for Civil Service, there are a small number of positions for IT personnel.
- H3: In the set of the institutions at the B&H level from which data on investments in ICT were taken, investments were made in fragmented ICT infrastructure.

RESEARCH CONDUCTED AND RESULTS OBTAINED

The research that was conducted and presented in the paper was conducted on publicly available public administration data for the level of institutions of Bosnia and Herzegovina. The goal of the research is to collect data on the changes to which the Public Administration in B&H has been exposed since the emergence of the Corona virus (COVID19) and to perform an analysis of trends in public administration. In the continuation of the paper, an analysis of the collected data related to the employment of personnel as well as data on procurement and investment in ICT for the level of institutions of B&H is presented.

An example of good practice from the surroundings is given. A solution for the improvement and digitization of the Public Administration at the level of the institutions of Bosnia and Herzegovina was presented.

For authorities and organizations in B&H institutions and the public sector, digital transformation brings an approach to develop public administration as a digital public administration in such a way that it engages its employees, optimizes its operations, transforms its services, creates new services and improves interaction with users.

We propose the implementation of appropriate infrastructure that could ensure this. We believe that the next period should be marked by a greater connection of all administrations, administrative organizations and local self-government units, and that the proposed concept could be implemented.

AREAS - TRENDS OF CHANGES IN THE PUBLIC ADMINISTRATION IN BOSNIA AND HERZEGOVINA

In order for the Public Administration in B&H to take the first step towards digitization, it is necessary to recognize the importance of information and communication technologies (ICT) and information technology (IT) staff as the bearers of these changes within the Public Administration bodies and organizations. Since the emergence of the Corona virus

(COVID19), the Public Administration in Bosnia and Herzegovina has been exposed to major changes in nine areas (trends):

- The first is the way of working, where unlike the previous traditional way of going to work, office, equipment and the like, the performance of work is reoriented to work from a remote location in the home environment. This posed a challenge for employees: additional space for work, equipment for work, as well as high-speed Internet connections that enabled this kind of work, and a great challenge for the Public Administration institutions to provide access to their resources, Internet connection, security, continuous work process, etc.
- Another trend that has emerged is the sudden great need for different profiles of IT personnel. This is due to the fact that the change in the way of doing business was conditioned by the adaptation of the Public Administration in terms of IT and communication for this, IT personnel were necessary, which the Public Administration had in smaller numbers or did not have.
- The third trend that emerged is the departure of IT personnel from the Public Administration. The Public Administration in Bosnia and Herzegovina has its own complex organization that has established systematization and salaries. The outflow of IT personnel is significant due to the fact that the same or similar jobs are paid multiple times on the market. The incoming staff do not have many years of work experience and many do not have experience in the public sector.
- The fourth trend is that, despite the lack of IT personnel at the level of B&H institutions, no vacancies for IT personnel have been published, both for those who are missing and for those who have left.
- The fifth trend, is not adopting the budget of the institutions of B&H, where the level of IT needs is reduced to maintenance during 2020, 2021 and half of 2022. The budget for 2022 was adopted at the end of the year, so that public

procurements related to capital investments had a very short period for initiating the procedure and for the realization of public procurement. Public administration is not as flexible as the private sector and adjustment to existing circumstances is very difficult. Public administration is subject to budget planning, which requires a period of one year and is called the budget calendar (Ministry of Finance and Treasury of Bosnia and Herzegovina [MFTBH], 2022), which is prescribed by the Law on the Financing of Institutions of Bosnia and Herzegovina. Procurement is carried out through the Public Procurement System, and the time that passes from the day when the planning of the budget item is started until the time when the public procurement is realized is more than one year (in the best circumstances) and up to two years from the point of view of daily market movements and price changes. This is an inflexible and strictly focused approach. To be clear, the transparency, economy and justification of public procurement in the Public Administration are not disputed, but the existing legal framework cannot ensure a flexible and functional public administration, which can respond to all challenges. Processes in public procurement are managed according to the waterfall model.

- The sixth trend is the priority of human health, which arose in the circumstances of Corona virus COVID19. Observing now, from a shorter time distance, although we have not yet come out from the aforementioned circumstances of the infection, we can say that everything was subordinated to the main priority - human health.
- The seventh trend is the need for software's that were necessary for work and that facilitated work processes. The need for SaaS, SaaS, IaaS and Cloud services are expressed.
- The eighth trend, the need for hardware, different types of equipment for ICT infrastructure and

- The ninth trend, security, which gained great importance in this period.

With this, we proved the first hypothesis H1: The Public Administration was exposed to changes in work since the appearance of the Corona virus (COVID19) in several areas. These changes had a great impact and the further work of the public administration was marked by these trends.

The Council of Ministers of Bosnia and Herzegovina adopted the Decision on the adoption of the interoperability framework of Bosnia and Herzegovina, which was published in the Official Gazette of Bosnia and Herzegovina, number 53/18, as well as the Information Society Development Policy of Bosnia and Herzegovina for the period 2017 - 2021, which was published in the Official Gazette of Bosnia and Herzegovina, number 42/17.

PERSONNEL

As personnel management is a key aspect of every company, like that the Public Administration must have access to personnel planning and employment of the personnel at the highest level, for the purpose of improving public administration. To that end, we conducted a survey of publicly available data on the employment of personnel with higher vocational education in the Public Administration at the B&H level. The admission of personnel with a higher vocational education to employment in the public administration in the institutions of Bosnia and Herzegovina is carried out through the Agency for Civil Service, which is an independent administrative organization responsible for ensuring the employment processes of civil servants' request of institutions at the B&H level. Through this agency, employment is not carried out for positions for which a high school diploma is required, so this research does not include their employment, which is carried out by the institutions individually.

The research is conducted on publicly available data found on the website of the Civil Service Agency Bosnia and Herzegovina.

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On the website of the Civil Service Agency, you can find information on:

- Ongoing competitions and
- Competitions that are closed.

For the purpose of research, the period from January 01, 2020 until October 07, 2022 was taken. Every single announcement posted

on the website was opened, analyzed and a data set downloaded for this research. By analyzing the displayed data for the period from January 01, 2020 until October 07, 2022, we note that 277 announcements were published (both public announcement and internal announcement) for 666 jobs. Which is shown in Figure 1.

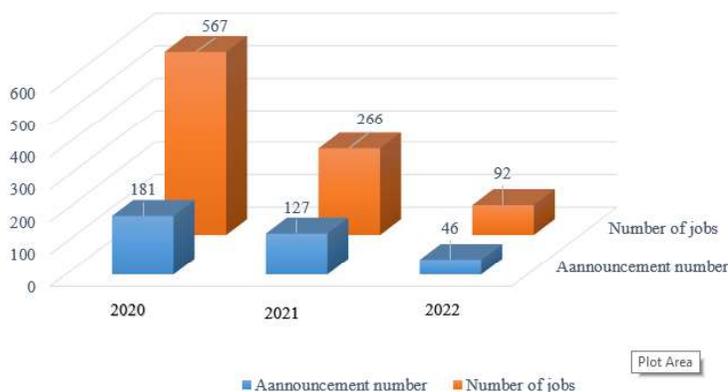


Figure 1. The relationship between the number of published announcement and the number of jobs

For every published advertisement, there are 2.61 vacancies which have been announced. There has been a noticeable steady decline in published announcement over the last three years.

In the mentioned period, 78 internal announcements for 260 jobs were published, which is presented in Figure 2. - Published internal announcements and the number of

jobs. For every published announcement there are 3.31 vacancies which are announced. When we compare the number of published public and internal announcement, it looks like as on the Figure 3 - the relationship of published public and internal announcement.

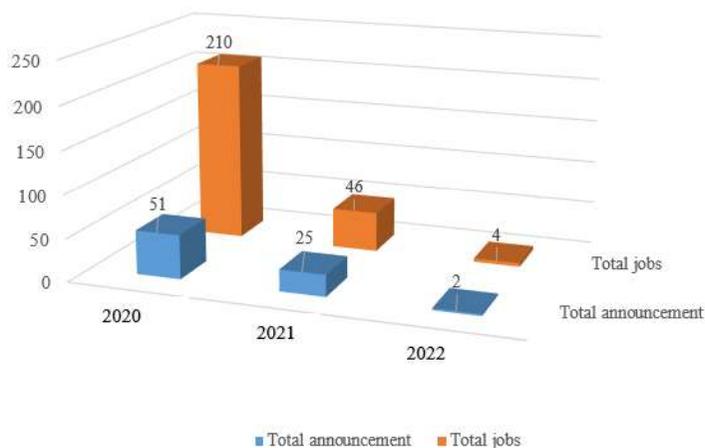


Figure 2. The Published internal announcements and the number of jobs

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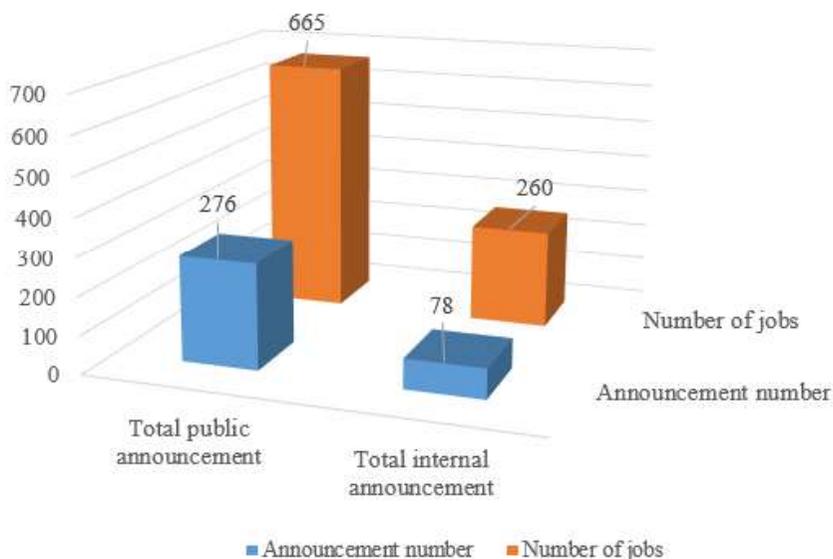


Figure 3. The relationship of published public and internal announcement

We can state according to the Figure 3, that the number of internally advertised announcements is evidently smaller compared to published public announcements.

From all published announcements, data was collected on announcements published for interns and volunteers, which is presented in Figure 4. – The number of announcements and positions for volunteers.

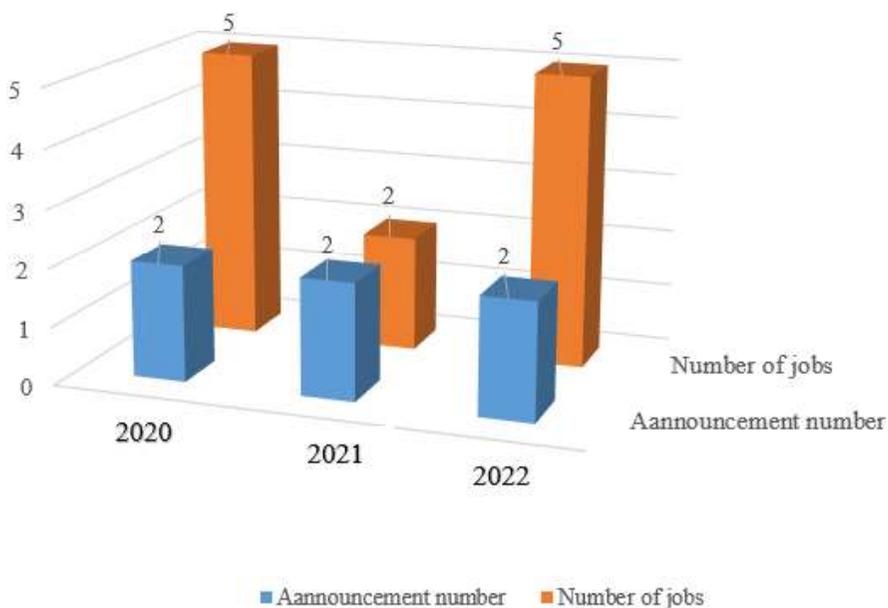


Figure 4. The number of announcements and positions for volunteers

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The total percentage of positions for volunteers for three years according to the total number of jobs is 0.01%, and as can be

seen from the overview by years from Table 1 - The number of announcements and jobs for volunteers in the last three years.

Table 1. The number of announcements and jobs for volunteers in the last three years

	Year			
Announcement for volunteers	2020	2021	2022	Total
Number of announcements	2	2	2	6
Number of positions	5	2	5	12

Based on the data that we have obtained and which are shown in the previous figures and tables, we state that the number of both announcements and positions for volunteers is very small.

The number of published positions for trainees, which is presented in Figure 5, has had a constant growth in the last three years.

From the data in Table 2, it can be concluded that according to the number of

published announcements, the number of positions for each announcement is 1.92. The percentage of participation of the total number of positions for trainees for three years according to the total number of published jobs is 14.71%. From the obtained data, we note that the number of published positions for trainees is small.

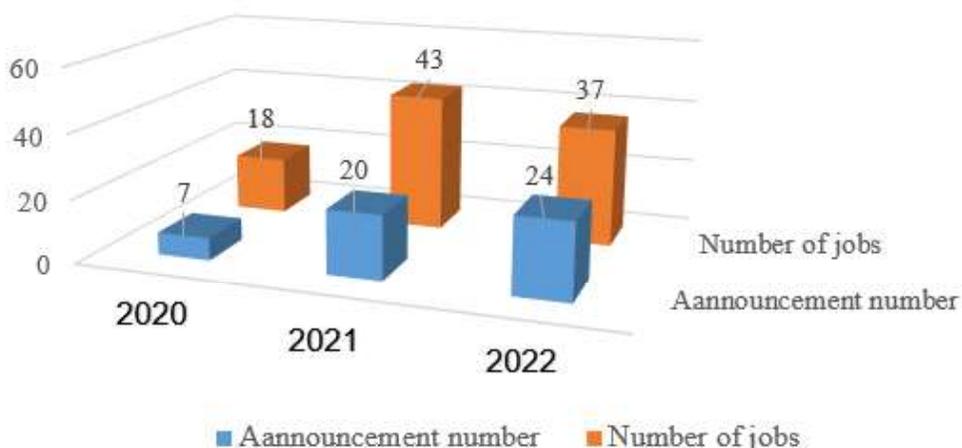


Figure 5. The number of published positions for trainees

Table 2. The number of announced positions for trainees in the last three years

	Year			
Trainees	2020	2021	2022	Total
Number of announcements	7	20	24	51
Number of positions	18	43	37	98

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The reason for completing the analysis of announcements for volunteers and interns is that you cannot be employed in the Agency for Civil Service if you do not have at least one year of work experience. The question is, how will someone gain work experience, and above all it refers to the field of IT, if the institutions do not provide the opportunity to gain work experience for interns?

From the analysis, we conclude that it is necessary for institutions to enable the acquisition of work experience for interns in order to give the opportunity to gain work experience in IT after completing their studies and to choose the best for their needs

from those who have successfully completed it.

Furthermore, an analysis of public advertisements for IT was carried out, according to the positions held by civil servants, as follows from the lowest to the head of the organizational unit: expert associate, senior expert associate, expert associate, and head of the organizational unit. The analysis includes interns and volunteers for whom an IT qualification is required, as shown in Figure 6.

Table 3. shows an overview of published announcements for IT positions for the last three years.

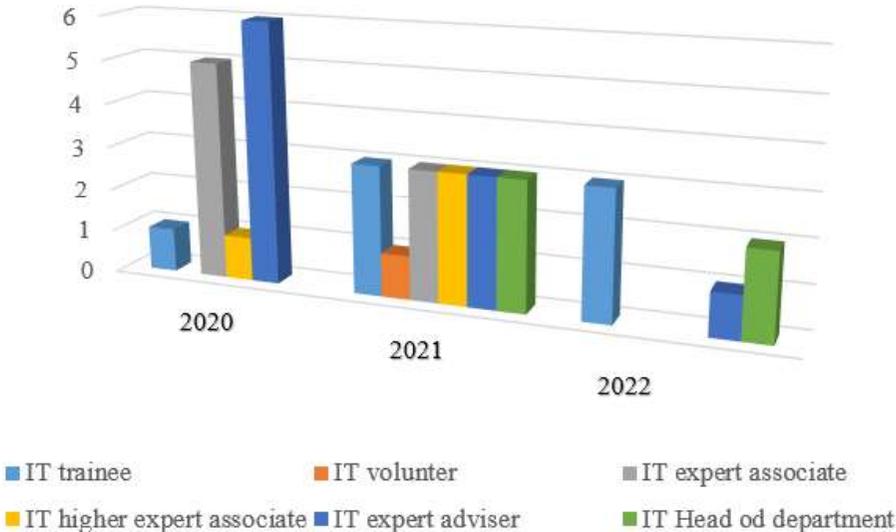


Figure 6. The number of the published public announcement for IT positions

Table 3. The overview of published announcements for IT positions by position and year

		Public announcements for IT positions per year		
No.	Position	2020	2021	2022
1	IT trainee	1	3	3
2	IT volunteer		1	
3	IT expert associate	5	3	
4	IT higher expert associate	1	3	
5	IT expert adviser	6	3	1
6	IT Head of department		3	2
Subtotal		13	16	6
Total				35

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In accordance with the collected data, which are shown in Table 3, it can be concluded that the number of announcements in 2022 is significantly lower. In total, in three years, public announcements were published for 35 IT positions, that is, for permanent employment, 27 IT positions. When comparing the number of published IT positions to the total number of published working places, we come to the data that announcements for IT positions took part in a

percentage of 4.05% of the total published jobs.

On Figure 7 - internal ads for IT positions, we see by year the number of IT positions that have been announced. How it looks by age and position it can be seen in Table 4. In accordance with the collected data, which are shown in Table 4, it can be concluded that the number of internal advertisements has been declining since 2020.

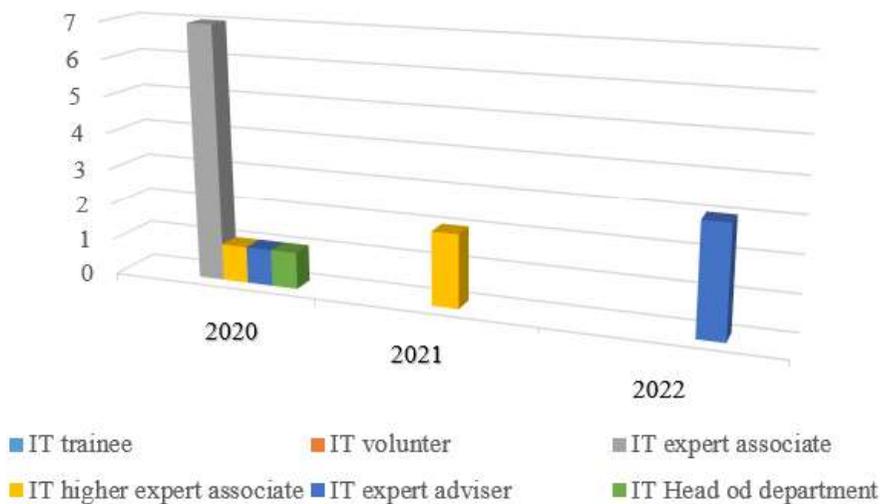


Figure 7. The Internal announcements for IT positions

Table 4. The internal announcements for IT positions per years

Internal announcements for IT positions per years				
No.	Position	2020	2021	2022
1	IT expert associate	7		
2	IT Higher expert associate	1	2	
3	IT Expert adviser	1		3
4	IT Head of department	1		
Subtotal		10	2	3
Total				15

In total, internal advertisements for 15 IT positions were published in three years. When comparing the number of internally published IT positions to the total number of

published jobs, we come to the data that published internal IT positions accounted for 2.25% of the total published jobs.

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From the previous research, it can be clearly concluded that the Public Administration required a very small number of personnel.

In accordance with the conducted research and the facts we come to, we also proved hypothesis H2: In the set of collected data on published public advertisements and internal competitions published by B&H institutions through the Civil Service Agency, there are a small number of positions for IT personnel. It would be very interesting to analyze all the regulations on the systematization of jobs in all institutions of Bosnia and Herzegovina, because in order for competitions to be announced for IT positions, it is necessary to include them in the systematization. We believe that this is one of the causes of such a small number of advertised IT positions, of course it also speaks to the understanding of the importance, need and role of IT personnel in the Public Administration.

We state that the management of IT personnel at the level of B&H institutions must receive a completely different approach. The need for IT personnel will neither stagnate nor decrease, but the opposite - the need for IT personnel is constantly increasing. The platform that encourages one's workplace to action may not yet be clearly visible, but as science fiction writer William Gibson said, "the future is already here-it's just not evenly distributed" (Greenway, Terrett, Bracken, & Loosemore, 2018).

IT personnel are generators of development and improvement in the Public Administration. People who have an IT profile in today's modern market are desirable and needed in a large number of countries of the world, and for their employment and relocation, special advantages are created in our environment, such as in the European Union and in other countries of the world. This enables great mobility of people in the IT profession. On the domestic market there is a certain number of domestic and foreign IT companies that offer good salaries and favorable conditions compared to the Public Administration in Bosnia and Herzegovina.

Investments that are initiated through the introduction of new technologies must be accompanied by investment in knowledge.

The fact is that in the area of investments, the key is investing in people. Competent personnel in which the Public Administration invests will be able to better control costs, to better recognize the real needs of the Public Administration, citizens and the economy, and to extract the maximum from technologies with minimum investment.

DIGITALIZATION OF THE PUBLIC ADMINISTRATION FOR THE PURPOSE OF IMPROVING ITS SERVICES

The Public Administration that is able to use all the advantages and strengths of new technologies will become more agile and create conditions for more efficient work, transformation of its services and employer's engagement.

Digitally mature organizations focus on integrating technologies to transform the way they operate as a whole, while those that are less digitally mature will use individual technologies to solve discrete problems as they arise or when they reach a level of pain that requires a solution. Strategy drives innovation, not technology (Fenton, Fletcher, & Griffiths, 2020).

The dynamic development of new technologies, a large increase in the amount of data, advanced analytics, machine learning, artificial intelligence and augmented reality bring numerous functionalities but also enormous opportunities for public administrations of all levels. Catching up with these challenges is the right way for new solutions and improvements in the functioning and work of the Public Administration. Beyond efficiency, the digitalization of public services in developed countries in Europe and beyond sends a strong signal at the international, national, and local level on the need for change and digital transformation to move into an era of transparency, quality of public services, and the fight against corruption (Androniceanu, Georgescu, & Kinnunen, 2022).

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The Public administration that introduces new technologies in its work increases its functionality, efficiency, introduces new services and products. Citizens ask the Public Administration to reduce the price of its services and thereby reduce budget funds, as well as to simplify its work so that users can use certain services regardless of the location and working hours of the Public Administration and in accordance with their needs. These directions of constant requests of users of the Public Administration are essentially both a strategy and a guideline for the improvement of Public Administration services. The results in the Public Administration can be great, a public administration that introduces new technologies on its way to digital transformation simplifies both its work and enables users to meet their needs in a simple, cheap and easy way - digital. Digital transformation has its phases, and as shown in Figure 8 - digital transformation, where the basic role and challenge is represented by the demands of public administration users, which the public administration should recognize and create new services and, of course, enable easy and simple use of those services.

We performed an analysis of publicly available data from public procurement plans or, where there were no public procurement plans, implemented public procurements. The data that was processed are not standardized, machine-readable and available in one location, so it was a big challenge to collect, process and analyze the data. The research was very extensive because the level of Bosnia and Herzegovina has 75 institutions.

Analyzing public administration and recognizing digital improvements in public administration can increase productivity, enable mobility, as well as create new digital services that can be applied to bodies and organizations in public administration, toward the economy and various users who are interested in digital public administration services. In order to achieve this in the Public Administration, it must recognize the aspirations of its employees and their interests to, respond to cyber threats and recognize how to manage the series of challenges facing it. In order for the Public Administration to succeed in facing a large number of challenges, it must significantly improve the skills of its employees.

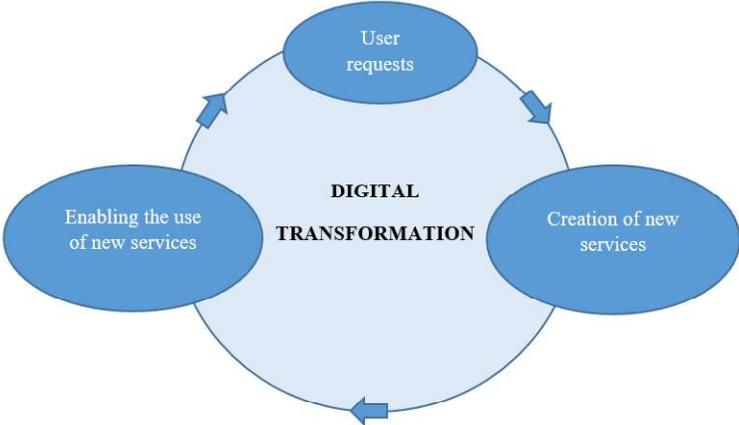


Figure 8. The Digital transformation

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Challenges of the Public Administration in the processes of digitalization and interoperability

By improving business processes, public administration introduces new tools that should be used by its employees. The modern world of business today operates in an environment of high degree of uncertainty and inability to predict the future. Currently on the market, supply far exceeds demand, and in a dynamic and turbulent business environment, as well as competition on the one hand and growing expectations of customers and service users on the other, there is a growing need for more efficient work of public administration also (Radivojević, Džino, Radivojević & Džino, 2022).

It is very important that employees recognize the meaning and values that digital transformation brings. The modern employee does not always know and does not understand how to deal with the plenty of information. And after a while, he might realize how much resource he was unable to use (Vasilenko, & Zotov, 2020). The introduction of digital transformation brings huge amounts of data, for which an infrastructure that can support such data exchange and storage should be provided first of all. The same data should be integrated with quality and then used purposefully and safely.

Of course, the key challenge in public administration in Bosnia and Herzegovina is to provide such an infrastructure, which represents the first challenge regarding the establishment of digital services in public administration.

Another challenge is electronic data, data access and ownership. In public administration in Bosnia and Herzegovina, there are Regulations that regulate the rights of access to electronic data, which essentially are not completely in line with the Decision on the adoption of the interoperability framework of Bosnia and Herzegovina, published in the Official Gazette of Bosnia and Herzegovina, number 53/18. The fact is that interoperability cannot exist if authorities and organizations have databases, that is, they

collect data from their jurisdiction, which are quite understandably regulated by the Regulations on access and handling of data and which in essence do not allow data interoperability. In practice, it is evident, but it is difficult to explain, and to introduce changes - that alone represents a big challenge. Where is the essence of the problem? Accessing! From the position of the authority or organization that collects data from its jurisdiction, it must provide resources and personnel for this. It understands this data as his property. It protects them in the best possible way for reasons of security, data protection laws and a number of other legal and internal rules. In order for another body or public administration organization to use a part of the data set for its own needs without collecting it again, it is necessary to tackle a series of problems and obstacles.

Public administration has a large number of applications and services, its users use a large number of different devices - from smartphones, tablets, laptops and computers, and it is also connected to social networks, which means that a huge amount of data is exchanged. By increasing the number of employees, applications and services, the amount of data also increases greatly. As the needs grow, so do the procurements that service the fragmented infrastructure are growing.

The Investments in ICT in public administration at the level of B&H institutions

We conducted a survey of investments in ICT at the level of B&H institutions, according to the Expenditure Schedule by budget users, which was published in the Official Gazette of B&H No. 42, based on publicly available data found on the institutions' websites.

As shown in Table 5. – The overview of the availability of publicly available data on investments in ICT for institutions that are on the B&H budget, we see that out of 75 institutions, 63 institutions have publicly available data for public procurement for ICT in 2022 or 84,00%. The 12 institutions have

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no data or no website, i.e. 16.00%. Eight institutions have very little publicly available data, which are not complete but still exists. Three institutions do not have a website, or do not have a publicly available PP plan. It is graphically presented in Figure 9, where we see that the largest number of institutions at

the B&H level have publicly available data on their websites.

According to publicly available data, after collecting data, sorting and grouping it into categories, we came to the results shown in Figure 10. – The Participation of individual items in procurement for ICT, 75 institutions which are on the B&H budget.

Table 5. The overview of the availability of publicly available data on investments in ICT for the B&H level

No.	Availability of publicly available data on ICT investments	Number of institutions
1	Data exist	55
2	Small amount of data	8
3	There is no data	9
4	Do not have Web page or PPP (public procurement plan)	3
Total number of institutions included in survey		75

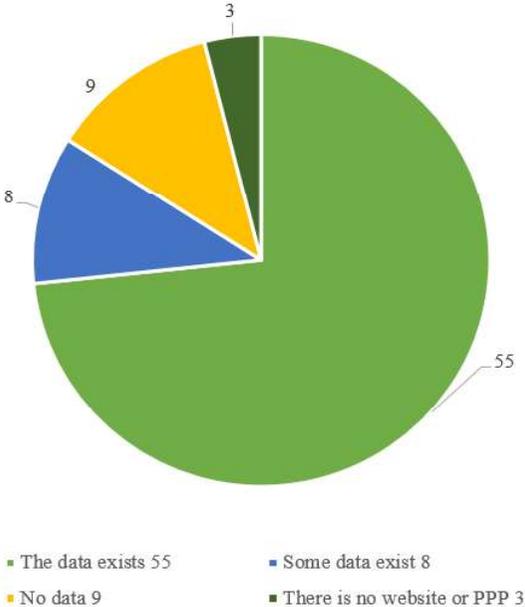


Figure 9. The institutions at the B&H level that have publicly available data and those that do not

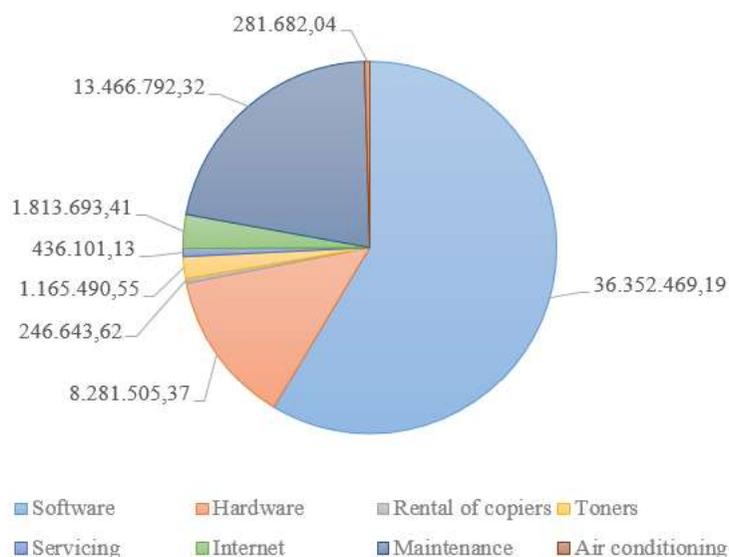


Figure 10. The participation of individual items in procurement for ICT, institutions which are on the B&H budget

And how it looks according to items and amounts can be seen in Table 6. – The

overview by amounts and the total amount of investment in ICT for institutions of B&H.

Table 6. The overview by amounts and the total amount of investment in ICT for institutions of B&H

No.	Participation of individual items in procurement for ICT, institutions which are on the B&H budget	Amount (KM)
1	Software	36,352,469.19
2	Hardware	8,281,505.37
3	Rental of copiers	246,643.62
4	Toners	1,165,490.55
5	Servicing	436,101.13
6	Internet	1,813,693.41
7	Maintenance	13,466,792.32
8	Air conditioning	281,682.04
Total		62,044,377.63

The data are grouped into the above 8 categories, according to the principle of the most frequent occurrence in the data. For the purpose of grouping the data into categories, after consultation with the researchers, several related data were included in one category.

The total amount of the budget of B&H institutions is 1,073,600,000.00 KM and the allocation, according to publicly available data, for ICT at the level of B&H institutions is 62,044,377.63 KM or 5.78%.

From diagram number 9 and table number 6, it can be seen that the largest allocations are for software or percentage

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58.59%, then for maintenance 21.71%, for hardware 13.35%, procurement of toner 1.88%, servicing 0.70 %, for air conditioners 0.45% and rental of copiers 0.40%.

For the sake of comparison, we took publicly available data for Brčko District. According to publicly available data, after

collecting data, sorting and grouping it in the same way as with the institutions of B&H, we came to the following data, which are shown in Figure 11. – The Participation of individual items for the procurement of ICT in the budget of Brčko District.

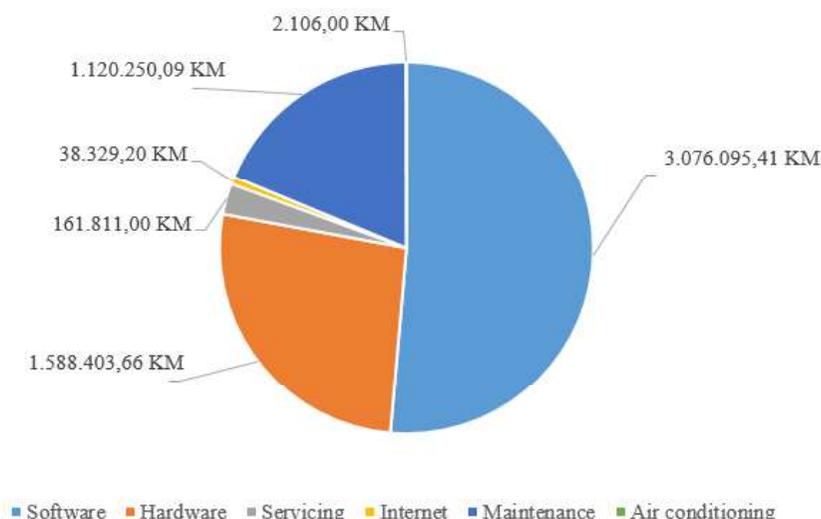


Figure 11. The participation of individual items in procurement for ICT, in budget of District Brčko

We did not find data for the purchase of copier rental and the purchase of toner, so they did not need to be displayed. From Table 7. - The overview of amounts for individual items and total allocation for ICT in the

Brčko District, it can be seen that the largest allocations are for software or percentage 51.38%, for hardware 26.53%, maintenance 18.71%, for servicing 2.70% and air conditioners 0.04%.

Table 7. The overview of amounts for individual items and total allocation for ICT in Brčko District

No.	Participation of individual items in procurement for ICT, in budget of District Brčko	Amount (KM)
1	Software	3.076.095,41
2	Hardware	1.588.403,66
3	Servicing	161.811,00
4	Internet	38.329,20
5	Maintenance	1.120.250,09
6	Air Conditioning	2.106,00
Total		5.986.995,37

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The total amount of the Brčko District budget is 261,163,267.00 KM and the allocation, according to publicly available data, for ICT for the Brčko District is

5,986,995.37 KM or 2.5%, as shown in Figure 12 - Allocation for ICT in the budget of Brčko District institutions.

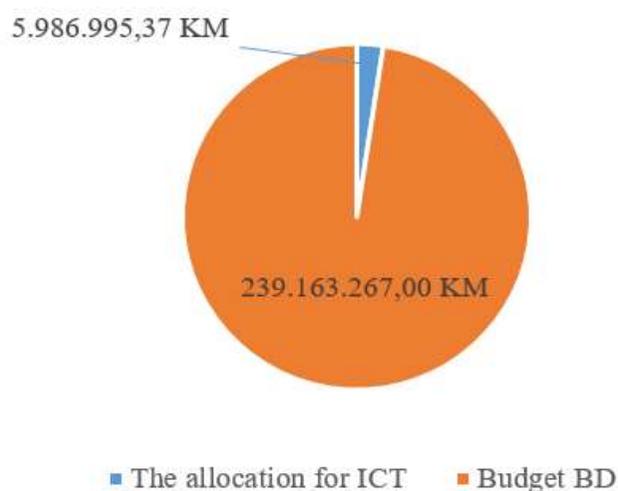


Figure 12. The allocation for ICT in the budget of Brčko District institutions

When we compare the number of fifty-five institutions at the level of B&H or 73.33% that have publicly available data to twenty institutions or 26.66% that have no data or have very little data, we can state that up to the size of 26.66% are increasing the funds allocated for ICT. In essence, this fact is important in this research from the point of view of spending funds for ICT, apropos, that there are available funds that we believe can be invested in the data center. We have also provided an example of approximate costs for the construction of a data center, and we conclude based on the research and facts that it is a worthwhile investment. There is also the fact that various types of ICT equipment were donated by various international organizations for the work of institutions of Bosnia and Herzegovina, but these data were not recorded, because public procurement was carried out by the organizations that allocated the equipment. Of course, the work of institutions requires both hardware - computers, and software - licenses, servicing, maintenance and other types of ICT

equipment, and together with the data center, it all forms one functional unit.

In accordance with the conducted research and presented facts, we also proved the hypothesis number H3: In the set of institutions at the B&H level, from which data on investments in ICT were taken, investments were made in fragmented ICT infrastructure.

From the conducted research, we can conclude the following:

- That the mentioned categories are necessary for the work of all institutions, and that the allocation of funds is multiplied.
- That the largest allocations are for software, with that we mean that allocations for project tasks for new software, software, licenses and the like.
- That allocations for maintenance of software, hardware, networks, ICT infrastructure are very significant.
- Procurement of hardware is a necessity and the quality of work and the possibilities of public administration depend on it. We emphasize here that

the life of hardware obsolescence is getting shorter, and thus the need for its replacement is more frequent.

- Servicing is a service that requires specific knowledge and skills that must be in accordance with technologies.
- Based on the comparison of allocations for ICT at the level of institutions of B&H and Brčko District that the allocations are in line with the possibilities of the public administration level - bigger budgets, bigger possibilities.

What we highlight in particular are data for renting copiers and purchasing toner. We note that one of the purposes of digital transformation is to make these two categories disappear or be reduced to the smallest possible need.

The Example of good practice

According to the conducted research of good practices that work, we give an example of the Data Center of the Government of Serbia, called the State Center for Data Management and Storage - Data Center, which is located in Kragujevac and was put into operation in the middle of 2022, and it cost 30,000.000.00 euros. The facility of the State Data Center in Kragujevac covers a plot of four hectares and is a complex of two facilities with a total of 14,000 square meters. About 50 personnel from the fields of IT, mechanical engineering and energy take care of its work. In this center, a super computer that cost 2,000,000.00 euros, a national platform for artificial intelligence in Serbia, etc. was put into operation. All this opens up enormous opportunities in development. In addition to its purpose for state administration, the data center also has a commercial side, so that it can provide services for all interested clients, which greatly supports its profitability, sustainability and creates opportunities for further development and improvements independent of the budget. The data center in Kragujevac won contracts with Oracle and Huawei, which is an argument in favor of the profitability of the data center.

CONCLUSION

Where is the solution? And that is the third challenge of the Public Administration - based on the analyzes carried out and the facts presented, in our opinion the solution lies in a large data center of public administration, in the form of "big data" or "data leak", where public administration data would be collected on the institution servers, where, according to established procedures, rules and established approaches, access to a defined set of data through the service would be approved. This would ensure that institutions use certain sets of data for their needs and in accordance with the given rights, without possessing, store or maintain these data at all. In this way, data redundancy would be ensured, as well as the collection, storage and maintenance of personal and other data in one place. This solution represents a pragmatic, simple, safe, economical and organizationally acceptable approach, which, in all the mentioned aspects, enables the public administration to lower its costs and spend less budget funds. To conclude, the vision of the establishment and development of the data center, as well as its project task, should be broadly set so that the data center can develop and improve. Public administration, the economy, citizens, universities, scientific institutions, etc. benefit from this approach.

What would be the opposite of that - the current situation, where data collection is multiplying, the necessary infrastructure, hardware, security and a number of other factors for that, which when they get together according to the institution costs, give a set of funds that exceed the required funds on an annual level for the proposed solution.

Based on the conducted research and analysis, we come to the conclusion that investment in ICT of each individual institution or organization exceeds its capabilities, if it achieves this, with great efforts, investments and enthusiasm of employees, the same resources are not able to be used by other institutions or organizations. Institutions with small budgets or organizations in this case remain on the margins, and are unable to follow the pace of

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development. Multiple repetition of individual investment in ICT resources leads to repetition of the same costs and requirements for their maintenance and functioning.

Digitalization is transforming traditional business and opening up new opportunities to increase efficiency and revenue while providing better customer service. Digitalization affects many industries and changes the corporate landscape and the rules that apply (Milani, 2019). The digitalization of public administration institutions is successful to the extent that its smallest link is digitized and is able to adequately respond to the demands of citizens, business and public administration.

In work, it is important to adhere to standards, and one of the guidelines should be ten good reasons for Standardization (Institute for Standardization Bosnia and Herzegovina [IFSBH], 2020).

The solution that we believe would be the most acceptable is that for institutions at the B&H level: Perform the construction of a data center or data centers, which are designed and built according to the most modern standards; Consider the investments based on public-private partnership. As investments in infrastructure are extremely large and demanding, here we would recommend joint investments according to the best practices that have proven themselves in the IT world; Establish professional informal or formal bodies at the level of institutions of B&H that would deal with needs and investments in ICT; Support through investment funds in scientific research in this area.

In accordance with the facts obtained on the basis of the research carried out in this work, the public administration at the level of institutions of B&H should: Recognize the role and importance of IT personnel; Every institution recognizes both the jobs and the role of IT staff and includes them in its systematization of jobs; Special wage categories for IT positions are established through regulations or other acts and find a way to provide funds for education and training.

We believe that through these proposals, further development and improvement of the Public Administration in the direction of digitalization of public administration would be enabled, both to preserve and attract new IT personnel. The improvement of digital transformation is the connection of employees, business processes and new technologies. Digital business transformation is the process of leveraging digital technologies and support capabilities to create a powerful new digital business model. Through this approach, both employees and public administration are improved. Understanding how new technologies can improve business is also the creation of a starting point for the transformation of public administration. This approach aims to enable digitalization at every step, from small institutions to large institutions, and to realize interoperability in full capacity. Such an approach would enable the creation of a multitude of services for citizens as well as for the economy and the public administration itself, and accordingly enable further sustainable development.

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NOTE

During the research, the authors, in order to collect freely available data, accessed a number of 74 web addresses that are not individually listed here, but can be forwarded on request to anyone interested in the research.