Radivojević, D., Džino, J., Radivojević, M., & Džino, S. (2022). Offering services based on data warehouse as a new trend in the work of public administration. *STED Journal, 4*(2), 21-28.

OFFERING SERVICES BASED ON DATA WAREHOUSE AS A NEW TREND IN THE WORK OF PUBLIC ADMINISTRATION

Davor Radivojević[1], Jefto Džino[2], Mladen Radivojević[3], Stefan Džino[4]

[1,3]International University Travnik, Aleja Konzula – Meljanca bb, 72 270 Travnik, Bosnia and Herzegovina, davorradivojevic@gmail.com, *radivojevicmladen60@gmail.com*
[2]Council of Ministers of Bosnia and Herzegovina, Ministry for Human Rights and Refugees, Trg BiH 3, 71 000 Sarajevo, Bosnia and Herzegovina, *jefto.dzino@mhrr.gov.ba*
[4]PR SYSTEMFINITY, 11 000 Belgrade, Republic of Serbia, *dzino.stefan93@gmail.com*

ORIGINAL SCIENTIFIC PAPER

ISSN 2637-2150
e-ISSN 2637-2614
UDC 004.8.021:004.9
DOI 10.7251/STED2202021R

Paper Submitted: 04.10.2022.
Paper Accepted: 02.11.2022.
Paper Published: 30.11.2022.
http://stedj-univerzitetpim.com

Corresponding Author:
Jefto Džino, Council of Ministers of Bosnia and Herzegovina, Ministry for Human Rights and Refugees, Trg BiH 3, 71 000 Sarajevo, Bosnia and Herzegovina, jefto.dzino@mhrr.gov.ba

ABSTRACT

The subject of the research is the analysis of services that should be offered by public administration toward legal entities and natural persons. We will suggest that it uses real-time intelligent IT systems based on data storage based on the data warehouse. Our opinion is that such systems implemented in the public administration of Bosnia and Herzegovina could offer an appropriate service to each user at a time when they need the service in a form that suits them, on the spot where he is in the moment of delivery and in the quantity that he needs. In order for a public administration to be able to offer an appropriate service, it must know its users much better and know which service they need at what time. In this paper, we analyze self-service as well as the necessary activities for all that. These are all activities that should be carried out in the future, and this work could contribute to the implementation of these processes.

Keywords: Public administration, data warehouses, self-service, service provision, digitalization.

INTRODUCTION

We live in a time when new and rapid changes in the environment occur every day, to which we need to adapt as soon as possible, often on the go. There are already existing, and new companies that offer tools (Information technology) to help with all the work, are emerging. Among these tools are Business Intelligence tools to. 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.

In this paper, public administration will imply: a system of bodies, organizations and bodies and an interdependent set of competencies, tasks and duties, specifically related and guided

by the application of legal norms, organizational instruments, management methods, processes and procedures to fulfill the mandate of the elected government. By public service, we imply services delivered by public administration (administrations, administrative organizations, and local self-government units, (municipalities and cities) or the public sector, to legal and individual persons).

Knowledge and potentials established on the knowledge form the basis of intelligent real-time IT systems of any organization or public administration. In these areas, due to inadequate treatment, knowledge often stagnates or is lost in terms of further learning and increased competencies. Knowledge is lost when an individual leaves public administration as well as due to insufficient cooperation and documentation of work procedures. The transition of developed and some developing countries from an "industrial society" to a "knowledge society" (Dzwigol, Dzwigol-Barosz, & Kwilinski, 2020) has resulted in increased awareness of the importance of, knowledge which is a key lever for growth, development and more efficient service.

Identical tasks are not set in front of the public administration institution as in the front of the production and other service organization, and respectively business entity in the economy, at least not in the area of gaining a competitive advantage (Kwilinski, 2019). Public administration is confronting with almost the same dynamic environment, with constant demands for simplification of procedures, and with more efficient mutual communication and efficient provision of services to legal and individual persons (Ubaldi, Gonzalez-Zapata, & Barbieri, 2020). When communicating with the public administration (management), due to its static nature, legal and individual persons spend a large part of their time, and today it has become a particularly expensive "goods".

The problem is that the requirements for the improvement of public administration services must be carry out within the limited budget, and no significant improvement of services are not expected in the coming years. If we want to enable domestic business systems equal competition in the domestic and easier access to the world market, the public administration is obliged to simplify and unify its business processes, improve management programs, complete investments in the necessary information and communication infrastructure (Hagendorff, & Wezel, 2020) with the ultimate goal of implementing the practice of electronic and mobile administration (e-m-Government).

SERVICE BASED ON NEW TECHNOLOGICAL SOLUTIONS

Digitization of public administration can help increase its efficiency and new technologies are becoming, not only a tool for the implementation of modern public administration, but also significantly determine the direction of change. We can assume that a high degree of digitalization of public administration will provide a higher level of quality of its services, increase the efficiency of its work, and ultimately offer services to users (Suray et al., 2019). Full digitalization of public administration will lead to the possibility of using self-service and offering services in real time.

The implementation of real-time intelligent IT systems in public administration presents a challenge, uncertainty, inconvenience, and sometimes results with resistance of certain interest groups. Resistance most often arises due to a lack of understanding of the usefulness of introducing the concept of Business Intelligence. Here we want to emphasize the advantages brought by the application of new technologies and service tools if they applied in public administration, which are studied and developed by modern IT science.

The current service environment is characterized by rapid and radical changes, and emphasizes the delivery of cheaper, more efficient and user-friendly services. Necessary changes in the service

environment require new service models in relation to current practice. There is a need to use such technologies that enable comprehensive, fast and efficient service or self-service based on all available data, information and knowledge, inside and outside public administration. The process of obtaining services from administrations, administrative organizations and local self-government units are shown in Figure 1.

The user requests certain services from the public administration as a service: Decisions, Rescript, Certificates, Excerpts and other services. Administrations, administrative organizations, and local self-government units provide about 170 different services to their users (data refer to services provided by public administration in Bosnia and Herzegovina).

In order for the service to be cheaper and more efficient and for services to be offered, service providers need to connect much more than currently is the case.

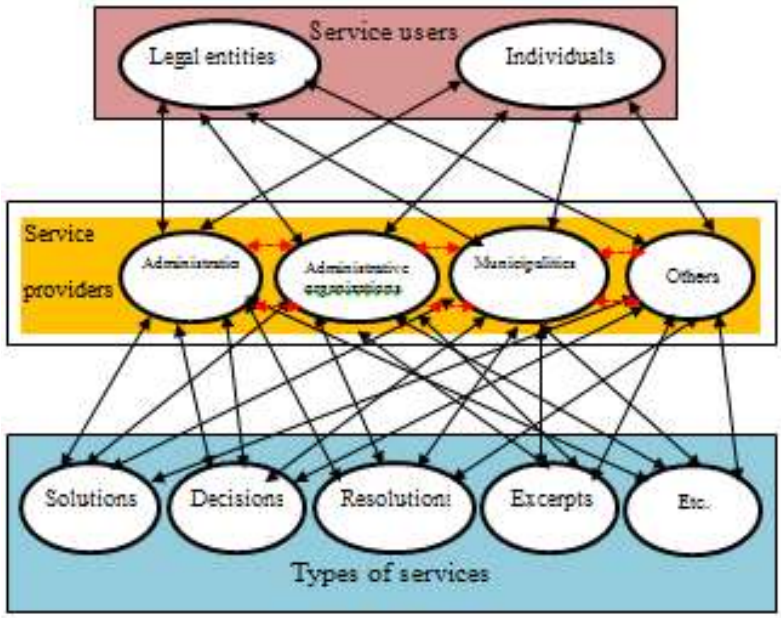

Figure 1. The process of obtaining services

Now the public administration provides a service to its users, and until the process of transferring to the new service, it should provide users with a transitional period of self-servicing.

Why would not the public administration allow a prospective student or High school student not to be able to forward their "Birth Certificate" in digital form to the appropriate High school or college? Why could not every owner of a Cadastral parcel pick up or forward to the necessary place the "Ownership List" in digital form.

What the user must have, and what the public administration must have in order to provide self-service, presented in Figure 2 without much detail. Could a High School or a particular College accept a "Birth Certificate" in digital form and does the current legislation allow it? An issue that we will not deal with, because that would go beyond the scope of this research.

The user can access the service in digital form using his computer, tablet or mobile phone. In order for the public administration to be able to self-serve the user, it must be able positively identify him in the authentication process. The authentication process can be carried out: by recognizing with certain identification documents (e-Signature), identification according to their face shape, identification according to fingerprint, identification

according to palm geometry, identification according to pupil of the eye, ear shape, handwriting, voice and the like.

Identification of users in the process of self-service through fingerprint would be the cheapest solution because in the Agency for Identification Documents of Bosnia and Herzegovina, they are already in digital form.

After the positive identification, the user could access one of the services offered by the unique public administration service portal, shown in Figure 3. Each user of the self-service portal could access a certain digital service using a computer, tablet or smartphone.

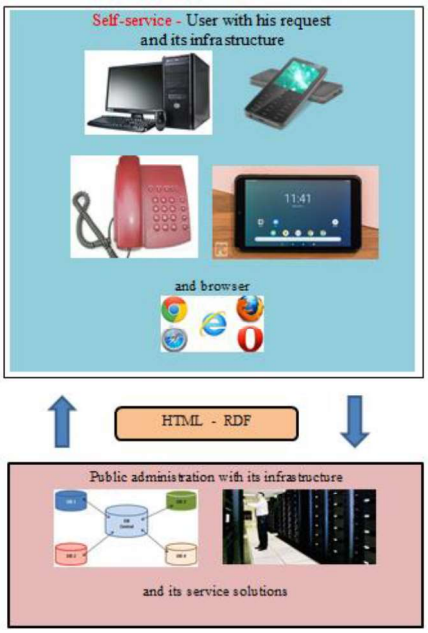

Figure 2. Self-service

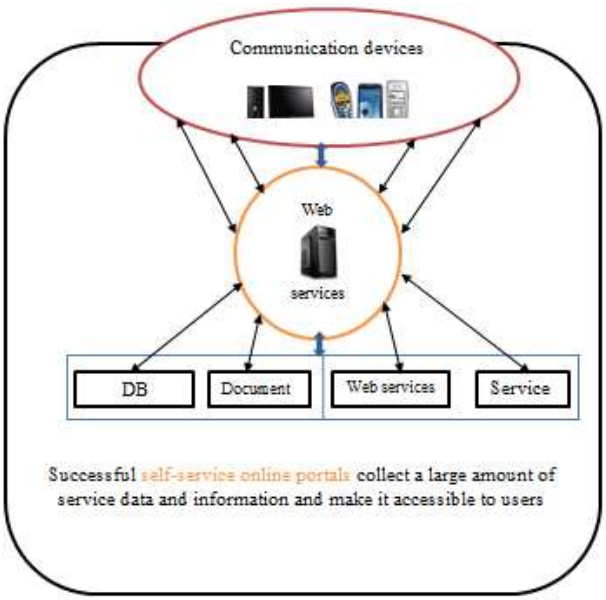

Figure 3. Public administration service portal

HOW ACHIEVE TO OFFER SERVICES

When creating a new service strategy of a successful administration, administrative organization and local self-government unit, elements that significantly contribute to providing and offering better services must be analyzed and determined, as well as providing better service and providing satisfaction to the user (his ardor). Their work and service they should establish on the advantages of common knowledge and skills of all employees in the entire public administration. This means that knowledge as the strongest weapon today in creating service advantage and offering services should be given much greater importance.

The registry offices of Municipalities and Cities could already offer "Excerpts from the birth register - Birth certificate" to all parents whose children are starting school, by sending them in paper form to the appropriate address of the parents. It is a classic service, and local self-government units do not use them. In order to be able to offer such a service in digital form, many other preconditions need to be met, related to both public administration and schools, which should be able to accept the document in digital form.

The first of the problems that arising when creating the preconditions and the necessary infrastructure for offering services is insufficient cooperation between the participants in the service chain. The development of information and communication technologies enables the successful solution of this problem because it provides better and more functional connections. The first step towards a "service-offering administration" is a set of methods, tools and applications that enable the operation of an intelligent real-time information system.

Real-time intelligent systems today considered as a special discipline that includes elements of strategy, service process, and service analysis and Information technology. They enable the collection, analysis, distribution and operation of service information between administrations, administrative organizations and local self-government units (public administration), all with the aim of better knowing the users, easier solving of service problems and offering appropriate services.

Already, an intelligent real-time public administration IT system, based on knowledge, could recognize the user's need and offer him the appropriate service ("SOLUTION - SERVICE WITHOUT REQUIREMENTS").

If we look at the problem from a technical point of view, the setting of an intelligent public administration IT system in real time is a public administration IT system, but in essence completely different. The data sources of such a system are different, they come from administrations and administrative organizations, but also from the environment, and from service users, from social networks and the like, and the presentation of information is complete and unambiguous. The new system implies an intelligent system of planning and analysis of events in public administration, reduced to the language of numbers (binary notation). The intelligent IT system in public administration does not currently exist as a finished product, but its manufacturers offer technological platforms and knowledge for installation and upgrading to an intelligent IT system in real time. In such a system, the availability of data, information and knowledge about service users, service providers, service processes and their interrelationships is easy. Such a system enables a view of the entire public administration, whereby each user can be offered exactly the service he needs at a certain moment.

The first step that the public administration must take is to create a unified public administration Data warehouse.

PUBLIC ADMINISTRATION DATA WAREHOUSE

Employees in public administration (administrations, administrative organizations and local self-government units) now need easily accessible and

consistent data and information presented in such a way that at the same time, accurately and concisely give an overview of all their own services as well as necessary data on service needs. However, complex working and service conditions generate an increasing number of service events within and outside the public administration, and the data obtained are most often stored in operational databases. Due to the size of such databases, it is not possible to search them in real time. Those who work in the service process need the right data in the right form and in the right place to be able to work more efficiently and serve better. The current information system should provide not only data but also information and knowledge whose content, speed of access and manner of presentation corresponds to the current needs of both employees and service users.

For the needs of operational services, classic databases are used, most often based on a relational model, and they reflect an up-to-date, real state. With some data, every trace is lost during the update, and in order to serve the users and make the correct service decisions, it is necessary to have an insight into the time sequence of service events, so such databases are not a satisfactory solution.

As a result, new forms of organizing data in computer memory are now increasingly being used. A new generation of computer systems has been developed based on the concept of Data warehouse. The Data warehouse contains data collected from various sources, historical data on the work and service of public administration as well as data on service needs. It designed to enable data retrieval, online analytical processing, reporting and support for the real-time service process. Problems related to the single Data warehouse of public administration may relate to data management, data quality and problems that may arise in the use and sharing of data, and their privacy (Fredriksson, Mubarak, Tuohimaa, & Zhan, 2017).

In terms of technical requirements and content, the unique databases of the Public Administration in Bosnia and Herzegovina are completely different from traditional databases and transaction systems. Classical (operational) databases are their premise, but unique public administration data warehouses must rely on a multidimensional concept in their design. An important feature of a Data warehouse is its purpose. Data in a unified public administration data warehouse must be collected and organized in such a way that they are easily accessible and that they can be used in a quick and easy way for the purposes of service or analysis of the service process itself.

The Data warehouse is a user-oriented, integrated, time and content-stable data set, in the first phase with the aim of helping to provide services. User orientation of data means that they organized around the service process, in a way that provides data, information and knowledge about specific service processes (Wirtz, Weyerer & Geyer, 2019).

Data collected in the Data warehouse are from different sources and always stored in the same format - they are integrated, consistent and displayed in a standardized way.

Building data warehousing is a continuous process of planning, building and collecting data and information on services and service needs, and collected from various sources and their use, maintenance, management and continuous improvement. In such a complex construction process, it is important to have a vision of what is to be achieved by creating a unified public administration Data warehouse. An important role of the warehouse is to develop and use knowledge based on the collected and processed data and information.

It must be in mind that the implementation of a unified data warehouse is an expensive investment and that it must be a continuous process. Therefore, the decision to introduce a unified public administration data warehouse is primarily a strategic issue and an issue of better service and service provision, not a matter of technology (Radivojević, Filipović i Kremenović, 2012). Therefore, during the

decision-making process on the creation and implementation of a unified data warehouse of public administration, it is necessary to harmonize a number of issues important for the establishment of a single warehouse. Prior to implementation, it is necessary to identify service interest in the construction and use of data warehouses for service purposes, develop criteria for determining the service usability of data warehouses, identify data sources for filling the warehouse, decide on size, determine type from the aspect of content, determine physical location, make decisions on the construction or purchase of data warehouses, to make the selection of the most favorable tools and systems for database management, to solve the issue of hiring the necessary new personnel, etc. At the end of the implementation follows the commissioning of the system, training of users in order to completely use the installed tools. Figure 4 shows the role of the data warehouse in offering services.

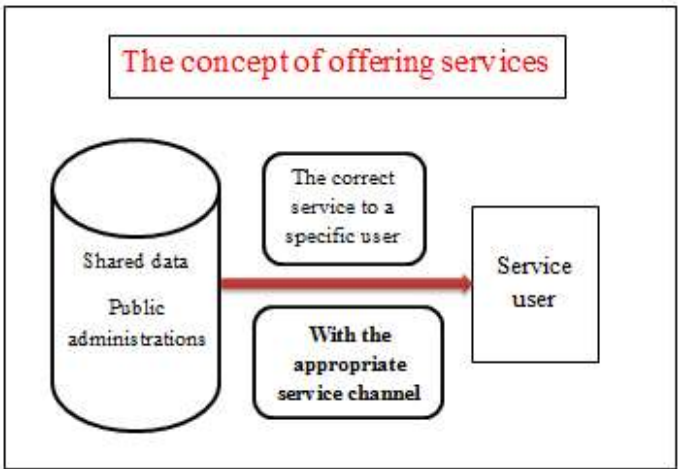

Figure 4. The role of the data warehouse

If we want a unique public administration data warehouse to fulfill its goal and purpose of existence, it must meet the following preconditions:

- ensure access to data and information for all employees and service users;
- It must contain a large amount of detailed information about the service, the service provider, and the service user;
- All service transactions relevant to efficient service, self-service and service provision must be recorded in the data warehouse;
- updating the data warehouse should be an ongoing process;
- It must always be available and designed in such a way that it can serve any purpose that sometimes cannot be foreseen;
- must be expandable;
- must meet appropriate measures to protect the confidentiality of sensitive data.

In this paper, we listed some of the issues that may lead to different thoughts about the work and role of public administration. Will it happen that by offering the services of an individual administration and administrative organization, they simply "shut down"?

Can it happen that all jobs taken over by a "NEW PUBLIC ADMINISTRATION" based on new technological solutions and knowledge? Management without employees.

Can new technologies lead to a single and unified public administration?

Let these and similar questions remain unanswered now, because that's certainly what there's a lot of work to be done.

CONCLUSIONS

Guided by the conducted analyses, we propose the concept of self-service and offering services by the Public Administration to its users based on Data Warehouses. The modern world of business today operates in an environment of a high degree of uncertainty and the impossibility of predicting the future. In the conditions of a dynamic and turbulent business environment, as well as competition on the one hand and increasing expectations of customers and users of services on the other hand, the need for more efficient work of Public Administration is growing.

Based on the considerations carried out, we propose that the future direction of development in Public Administration should be directed towards "administration that offers services" as a set of methods, tools and applications that enable the functioning of an Intelligent Information System in real time. Real-time Intelligent Systems include elements of strategy, service process, service analysis and information technology. They should enable the Public Administration to collect, analyze, distribute and operate service information between administrations, administrative organizations and local self-government units (Public Administration), all with the aim of better knowing users, easier solving of service problems and offering appropriate services. We also propose a single repository of Public Administration data. The complete digitization of Public Administration will lead to the possibility of using self-service and offering services in real time.

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.

REFERENCES

Dzwigol, H., Dzwigol-Barosz, M., & Kwilinski, A. (2020). Formation of global competitive enterprise environment based on industry 4.0 concept. *International Journal of Entrepreneurship*, *24*(1), 1-5.

Fredriksson, C., Mubarak, F., Tuohimaa, M., & Zhan, M. (2017). Big data in the public sector: A systematic literature review. *Scandinavian Journal of Public Administration*, *21*(3), 39-62.

Hagendorff, T., & Wezel, K. (2020). 15 challenges for AI: or what AI (currently) can't do. *AI & SOCIETY*, *35*(2), 355-365.

Kwilinski, A. (2019). Implementation of blockchain technology in accounting sphere. *Academy of Accounting and Financial Studies Journal*, *23*(2), 1-6.

Radivojević, M., Filipović, Z. i Kremenović, O. (2012). *Od elektronskog poslovanja do poslovne inteligencije u javnoj upravi.* Banja Lika: JU Službeni glasnik Republike Srpske.

Suray, I., Suprunenko, S., Kartashova, O., Bondar, O., Gerashcenko, V., & Karpenko, R. (2019). Public Administration and Innovation Policy in a Networked Society. *International Journal of Recent Technology and Engineering*, *8*(4), 3604-3609.

Ubaldi, B., Gonzalez-Zapata, F. & Barbieri, M. P. (2020). *Digital Government Index 2019 Results.* Retrieved June 15, 2022 from http://www.oecd.org/gov/digitalgovernment-index-4de9f5bb-en.htm.

Wirtz, B.W., Weyerer, J.C. & Geyer, C (2019). Artificial intelligence and the public sector—Applications and challenges. *International Journal of Public Administration, 42*(7), 596-615.