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Professional paper

TRANSFORMATION OF E-ADMINISTRATION INTO DIGITAL ADMINISTRATION AND SMART CITIES AND VILLAGES

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Abstract

This research paper will present the concept of data collection that provides the possibility of applying analytical methods, including business intelligence and methods, techniques and tools for processing large amounts of business data. The importance and amount of data in all areas, including municipalities, is growing year by year. In the past, municipalities have lagged behind the private sector in the area of business intelligence, but in recent years progress has been felt in this area. Currently, municipalities are still exploring and learning what solutions are available for smart cities and communities. As determined by European and national strategies in this area, education in the field of data will be key, because as the work shows, there is still a lot of room for improvement. In any case, the work will contribute to a better understanding of the importance of smart cities and municipalities and business intelligence, because it was presented to all holders of the municipal budget and will be used as a basis for further activities of the Municipality. municipality in this area. Last, but not least, policies in this area, both European and Slovenian, aim at increasing digitization. We are in a period when so-called smart cities, smart villages, smart municipalities are being born. Business intelligence is also key in this light, as it enables smart communities to make better decisions and thus achieve their goals more easily. It could be said that business intelligence gives intelligence to smart municipalities. I estimate that in the future, despite the current lack of knowledge in the field of data, municipalities will increasingly be digitized, digitally transformed and that there will be more and more solutions and good practices in this area. The municipality will follow the goals of digital transformation and the goals of the Digital EU Agenda and will definitely achieve them by 2030, which means that with the help of business intelligence, it could be transformed into a smart municipality. However, it is difficult for me to estimate what the level of transformation will be, which I could explore in further analyses.

Keywords: *Data analysis, business intelligence, digitization*

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THEORETICAL BACKGROUND

According to the digital government maturity model, establishing an e-government model is only the first step towards public administration becoming a mature organization for digital services. The first thing to understand is that while e-government is measured by the number of services available to citizens, digital government will be measured by reducing the number of services in favor of a comprehensive experience (Di Maio, 2016).

Another point is that digital government is not an end goal, but a means to achieve affordable and sustainable government services. It's a situation that Di Maio, executive vice president of Gartner, described as smart government (governance). Gartner's Digital Government Maturity Model describes five key stages on the road to smart government (Di Maio, 2016):

- ✓ Today there are many offices on the first level and this corresponds to a more traditional model of e-government. Here, the main focus is on the digitization of existing services, such as vehicle registration and taxation or applications for state benefits. Success is measured in terms of increasing the number of online services to increase efficiency and save costs. To move forward, CIOs need to move from simply digitizing services to collecting and using data generated during service delivery.
- ✓ Open data. Many government organizations have open data programs in place and have established an open data platform that is heavily focused on the use of open public government data by citizens and businesses through the development of mobile applications and dashboards. To move forward with digital transformation, CIOs should transform their agencies from mere suppliers of data to consumers of open data coming from other government and non-governmental organizations. In addition, they should plan how to expand the open data initiative beyond public data.
- ✓ Focus on data. This level represents a real turning point in the transformation of digital government. Data becomes a key focus. Treating all data as open (which does not necessarily mean public, but accessible through a single interface) opens up countless opportunities for innovation. New ways of aggregating and analyzing data within and across agency boundaries will lead to new services and new service delivery models, likely to involve non-governmental entities as intermediaries.
- ✓ Completely digital. At this level, the organization has fully recognized the importance of a data-centric approach to transformation and regularly seeks opportunities for innovation based on open data principles. Data is used more often outside of the office, leading to easier interactions based on understanding the context and situation of the participants. Privacy will remain a primary concern and will determine the extent to which data can be used to transform the service. New value-added services are created using data. This could include tax advice from agencies that have real-time insight into a taxpayer's situation or childcare services based on contextual information about applicants' foster families. Traditional and new services will be available through various channels, including non-governmental ones, and data will be shared not only between agencies, but also with external partners such as banks, employers, merchants, where possible and in full compliance with privacy laws.
- ✓ Digital transformation is now the norm, and the innovation process is predictable and repeatable. The CIO is taking on a larger and renewed role as an information and data steward, charged with prioritizing and managing the portfolio of transformational opportunities presented. Challenges will remain, however, including maintaining a sustainable digital transformation and preparing for the arrival of smart machines in key business processes.

Smart cities

Cities are developing rapidly. More than half of the world's population currently lives in urban areas. By 2050, this figure is expected to rise to 68% (United Nations, 2019). In my opinion, cities have been forced to adopt business intelligence solutions due to higher population density and the challenges associated with it. Thus, there are already examples of good practice in cities. In most cases, a municipality is a broader term and includes a larger number of towns or cities. Using the example of cities, I explore solutions that already exist and which, in my opinion, are useful for a smart municipality.

With a growing population, we are faced with the need to improve various public systems, from infrastructure to connectivity. The development of technology enables support in providing more efficient systems of energy, transportation, resources, jobs and other services for residents. The result of digital transformation is the

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transformation of cities into "smart cities" (CB Insights, 2021).

A smart city is therefore a place where traditional networks, systems and services become more efficient thanks to the use of digital and telecommunication technologies for the benefit of residents and the business sector. In addition to using ICT for more efficient use of resources and ensuring less emissions, this also means smarter urban transport networks and improved systems for the supply of drinking water, waste water management, lighting and heating of buildings (European Commission, 2018). It also means more interactive and responsive public administration, safer public spaces and meeting the needs of an aging population.

Sustainable development of urban areas is a key challenge for city administrations. It requires new, efficient and simple technologies and services, especially in the fields of energy, transport and ICT. These solutions require integrated approaches in research, development of advanced technological solutions and their application (European Commission, 2020).

A city is considered "smart" when it has the ability to collect and analyze large amounts of data from various industries, from urban planning to garbage collection. In a smart city, a complex network of interconnected sensors, devices and software must be built and maintained. This should enable the city to become a more sustainable and efficient environment for its residents (CB Insights, 2021).

Smart cities use a number of technologies, including (Richmond et al., 2022):

- ✓ ICT,
- ✓ physically connected devices that use the Internet of Things (Internet of Things, hereinafter referred to as IoT),
- ✓ artificial intelligence (artificial intelligence, hereinafter AI)
- ✓ block chain technology (blockchain, hereinafter referred to as BC)

These technologies communicate with each other to collect and make sense of large amounts of data that they use to improve city management components and systems.

An ICT network is built from many devices and sensors that are connected in an IoT network and can instantly transmit data using wireless technology and cloud computing. For example, traffic can be monitored with various sensors. Cloud computing-based technology receives, analyzes and manages traffic data on the fly. This data also enables a better understanding and response to changing needs over time and can even be used to improve traffic safety.

We cannot think about smart cities without thinking about smart environmental management, which depends on innovative climate and geospatial technologies based on artificial intelligence and data analytics. Artificial intelligence has the potential to improve our response to climate change and the overall quality of the environment in smart cities (Richmond et al., 2022). Smart cities can also use blockchain technology for some systems.

Ultimately, a successful smart city should theoretically be able to respond to input, much like an intelligent organism, seamlessly and efficiently providing exactly what the city and its residents need without wasting resources. At the same time, the possibility of human errors would be reduced (Herath & Mittal, 2022).

Many areas across the city are becoming "smarter", from traffic control to water management, with different companies working on different components (Richmond et al., 2022; CB Insights, 2021):

- ✓ Public health: The COVID-19 pandemic has highlighted the potential of smart cities to strengthen pandemic preparedness. Incorporating smart city technology such as thermal cameras and IoT sensors with artificial intelligence can help prevent the spread of infectious diseases.
- ✓ Traffic management: Smart technology can be used to connect vehicles, infrastructure, public transport and people to improve mobility and safety. Streets can be equipped with sensors that monitor data both on the road and through citizens' cars and smartphones in order to gain insight into traffic flow patterns,

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roadblocks, roadworks, road conditions and more.

- ✓ Management of parking lots: Driving around the parking lot wastes energy and increases traffic congestion. With the use of smart technology, as shown in Figure 7, this can become a problem of the past. Sensors embedded in the ground can be used to indicate free and occupied parking spaces. These IoT sensors can then transmit this data on the fly to a cloud computing platform for smart parking, which is integrated into the city's parking ticket. Drivers can follow this map via an app on their phone, which shows the nearest available parking spaces, saving time and money. In addition, this technology can be used to easily alert the manager when a car is parked illegally. In this way, city authorities can easily introduce dynamic parking prices.

Figure 7: Smart parking lot management

Source: CB Insights (2021).

- ✓ Energy efficiency: a wide range of IoT solutions can be used in cities to improve energy efficiency. Smart street lighting can reduce energy consumption by dimming the lights when there are no cars or people around, then turning the lights up when sensors detect someone approaching. Smart cities can promote renewable energy by allowing solar farm owners to sell to each other, or by managing microgrids that can generate energy on-site.
- ✓ Environmental monitoring: Using wireless sensor networks, a smart city can collect and analyze data related to environmental factors such as temperature, humidity and air quality in all designated areas of the city. This is especially important for reducing air pollution levels in densely populated areas.
- ✓ Waste Management: Smart waste management solutions can be used to improve waste disposal services, reduce operational costs and improve sustainability. This can be achieved with smart waste bins that are equipped with sensors that measure the filling level. When a bin is full, it can immediately send that information to a cloud application, which can then optimize the route of waste collection trucks, which can then prioritize locations with full bins and skip areas with empty ones.
- ✓ Water supply: Smart water management technologies can help improve the extraction, treatment and supply of this essential resource. By monitoring consumption patterns of businesses and households, cities can optimize and reduce wastewater and delivery costs. Sensors could automatically alert the city to water leaks so that they can be fixed as soon as possible. Smart water systems can also measure rainfall and provide real-time flood analysis for flood control.
- ✓ City services or municipal administrations: Public services are slow and inefficient in many cities, but can be streamlined in many innovative ways using digital technology. There are e.g. but mobile apps where local residents can take photos of the problem, from a large pothole that needs filling to damaged public property that needs fixing. Using an integrated geographic information system (GIS), the application immediately sends the location and complaint data to the relevant authority, and the work is assigned to the nearest provider who can solve the problem. When the problem is

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solved, the authorities confirm the work done and post a picture of the solved problem on the mobile application, so that citizens can see that the problem has been solved. Local residents can even rate public services based on how satisfied they are with the quality of work, so the administration can see where it can improve. This also reduces the average time it takes to resolve complaints without increasing the budget.

Smart villages

In the EU, 80% of the area is rural. 30% of the population lives in rural areas and villages, but many rural areas have changed and started to fall behind. On the other hand, urban centers are developing, allowing better access to public services and offering a wider range of opportunities. Each time this gap widens, rural communities begin to suffer as people of all ages migrate to wealthier, often urban, areas in search of a higher quality of life, where there are greater opportunities for education, employment, and health care. As rural populations and economies shrink, investment in public services and infrastructure begins to decline; and the gap between rural and urban areas is increasing (European Commission, 2021).

The term "smart village" is defined as a rural community that uses innovative solutions and digital technologies to improve economic, social or environmental challenges (ENRD, 2019).

A smart village is partly a mapping of smart city and municipality concepts, which solve challenges and problems in the countryside with the help of modern digital technologies. The village is the narrowest part of the municipality and as such, in my opinion, is crucial for the formation of a smart municipality. Understanding the needs of the narrowest parts of the municipality contributes to understanding the needs of the entire municipality.

Smart villages are primarily formed by people who take the initiative and mobilize local potential to solve rural challenges. Smart settlements connect with other communities and actors in rural and urban areas. Digital technologies are an important tool for the preservation and development of rural areas in the future (European Commission, 2021).

Examples of areas and activities that can be understood within the framework of the initiative "Rural villages of the future - smart villages" (European Commission, 2021):

- ✓ construction of infrastructure, preservation of agricultural and forest landscapes, preservation of rural architecture, rural natural and cultural heritage and customs;
- ✓ construction of the next generation broadband connection (most households with an access speed above 100 Mb/s);
- ✓ "smart agriculture" (automation, sensors, robotization, collections of large amounts of data (English: BigData), BC, AI, etc.);
- ✓ digital platforms that can replace basic services: e-learning, e-governance, social services, traffic, tourism, gastronomy, transport, traceability of food production, etc.);
- ✓ health care (home clinic, e-health);
- ✓ social innovations (services for the elderly, promoting social inclusion in rural areas, caring for the elderly and infirm, creating a friendly environment for people with disabilities, helping people with special needs, social agriculture projects that use agriculture as a basis for providing various types of health and educational therapy, legal protection and info points, etc.);
- ✓ cultural and social life in the countryside (arrangement of common spaces and activities for the elderly, young people, for women in the countryside, locations for rest and recreation, events, traveling library, integration into a common music school, theater);
- ✓ environmental protection, ecological awareness, circular economy (protection of waste, water and soil, reduction of fertilizers and phytopharmaceuticals);
- ✓ mobility in the rural environment (suppliers, free transport for the elderly, local passenger and suburban transport, rail traffic, integration of different modes of transport into an integrated hub, etc.);
- ✓ food self-sustainability and supply of nearby cities and densely populated settlements (direct sales of

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farmers - consumers, supply of tourist complexes);
- ✓ self-sufficiency in renewable energy sources (sustainable sources: biomass, wood, soil, sun, water, wind; connecting villages in energy cooperatives, intelligent networks for collection and distribution);
- ✓ tourism (dispersed hotels, boutique tourism, rural tourism, recreational tourism, cultural heritage and customs related to rural tourism);
- ✓ innovative entrepreneurship (jobs at home, revitalization of rural services, complementary activities on the farm, rural services, etc.), promotion of entrepreneurship for young people, women, older generations who have lost their jobs, for the disabled, for people with disabilities. special needs, opening of additional jobs, additional activities on agricultural farms, remote work centers;
- ✓ encouraging the sharing economy in rural areas (shared use of agricultural machinery, cars, services, etc.);
- ✓ transition to green economy in rural areas, circular economy, economy based on biological basis.

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