IMPROVING THE DIGITALIZATION CAPACITY OF MUNICIPALITIES OF HUNGARY THROUGH KNOWLEDGE MANAGEMENT TOOLS

Szilárd Malatyinszki

Kodolanyi Janos University, Székesfehérvár, Hungary

Henrietta Nagy

Milton Friedman University, Budapest, Hungary

Abstract. What does the digitization capability of local governments mean? What does it mean for a municipality to actively use digitization tools? How does the digital space affect the quality of life of the population and the attractiveness of businesses? Our goal is to present the digital tools that can be used to improve the quality of life of people living in settlements. Digitization is reflected in the way citizens and industries do business, helping them to access municipal functions and interact with the municipality on a daily basis. In addition, digitalization makes the management and operation of a settlement more sustainable. Last but not least, digitalization can make the everyday lives of those who live in it more livable and enjoyable. Our method is literature review, source analysis, and knowledge of economic and social processes. During our research, we explore the opportunities offered by digitization through examples, which we combine with knowledge management tools. We present models and tools for what needs to be done to improve urban life to the increasing satisfaction of residents. According to our results, municipalities do not use the toolbox of digitalization in the field of online administration, automated process management and marketing tools. Digitalization also provides opportunities for environmental awareness, administration, and support for companies and smart cities.

Key words: digitalization, digital technologies, digital competence, adult learning and education, teaching methods, entrepreneurship development, knowledge management.

ПОВЫШЕНИЕ ВОЗМОЖНОСТЕЙ ЦИФРОВИЗАЦИИ МУНИЦИПАЛИТЕТОВ ВЕНГРИИ С ПОМОЩЬЮ ИНСТРУМЕНТОВ УПРАВЛЕНИЯ ЗНАНИЯМИ

Силард Малатинский

Университет им. Яноша Кодолани, г. Секешфехервар, Венгрия

Генриетта Надь

Университет им. Милтона Фридмена, г. Будапешт, Венгрия

Аннотация. Что означает возможность цифровизации органов местного самоуправления? Что значит для муниципалитета активно использовать инструменты цифровизации? Как цифровое пространство влияет на качество жизни населения и привлекательность бизнеса? Наша цель — представить цифровые инструменты, которые можно использовать для улучшения качества жизни людей, проживающих в населенных пунктах. Цифровизация отражается на том, как граждане и предприятия ведут бизнес, помогая им получать доступ к работе муниципалитета и

ежедневно взаимодействовать с муниципалитетом. Кроме того, цифровизация делает управление и эксплуатацию населенного пункта более устойчивыми. И последнее, но не менее важное: цифровизация может сделать повседневную жизнь более комфортной и приятной. Мы использовали в качестве методов исследования анализ литературы, научных источников, а также знание экономических и социальных процессов. В ходе исследования были изучены возможности, предлагаемые цифровизацией, на примерах, которые объединены с инструментами управления знаниями. В статье представлены модели и инструменты того, что необходимо сделать для улучшения городской жизни для большей удовлетворенности жителей. Сделан вывод, что муниципалитеты не используют инструментарий цифровизации в области онлайн-администрирования, автоматизированного управления процессами и инструменты маркетинга, тогда как цифровизация предоставляет широкие возможности для экологической осведомленности, администрирования, поддержки компаний и умных городов.

Ключевые слова: цифровизация, цифровые технологии, цифровая компетентность, обучение и образование взрослых, методика обучения, развитие предпринимательства, управление знаниями.

Introduction

The responsibility for education and knowledge acquisition is crucial for the quality of life in municipalities. The quality of technology and its application is determined primarily by intellectual quality, the existence of knowledge, and responsibility. It is futile to operate a municipality with the highest level of technology and the lowest level of added energy unless the professionals can link up the systems and the population can access the services easily from home. Human attitudes, intellectual capital, and accumulated experience, combined with technology and available resources, can bring about livable areas and quality communities. In today's world, where the quantity and price of energy is a determining factor in the life of communities, regions, and countries, it is not negligible to have the knowledge and attention to run communities sustainably and cost-effectively.

My research covers three areas. First, it describes how local governments can simplify their administration in the digital space. In this section, I present good practices to follow through technological tools, software, training, and staff development. Today, a minimal part of the administration is still face-to-face interactions. Automated processes and systems channel requests, software filters, and only their implementation emerges through process that are bound to people but also bound to technology [Cseh-Zelina, Czékmann, 2020; Hübscher, 2021; Ralević et al., 2017].

The second area of relevance is the promotion of digital assets of municipalities towards businesses. Here, tools that help to access tourist attractions, commercial and catering outlets, and businesses within the municipality are emerging. One of the supporting elements of the smart city is that smart tools for functions in the settlement provide information on services, parking, and quality of life.

A third prominent part of the challenge of developing the digital capacity of settlements is environmentally aware, efficient operation and management. This field also covers transport, lighting, cooling, and heating [Káposzta, Ritter, Nagy, 2020].

Material and method

To better understand the digitalization efforts of municipalities, we need to understand the concept of digitalization itself. Industry 4.0 has also changed the functioning of municipalities, and we no longer merely understand it as the processing of data by computers. Digital strategy is therefore not just a system for companies to access and work with, but also a system that no municipality can function without. For us, digital strategy is "building on the capabilities of breakthrough, readily available technologies to develop unique and integrated organizational capabilities that make the organization responsive to the ever-changing environment" [Sebastian et al., 2017: 3].

A municipality is a living organism, an evolving system. The municipalities' leadership decides which of the available technologies to choose according to its capabilities and which capabilities it will develop. These capabilities are visible in the quality of the human resources that run the city, in the quality of the technologies and their deployment. For example, it is possible to improve a parking system simply by physically increasing the number of parking spaces, taking space away from cities and increasing pollution, and supporting renewable energy systems in multi-storey car parks in appropriate zones. Cities

are much more likely to have tasks that can be optimized and managed through digital systems. By 2022, the global contribution of cities to GDP has increased to over 80%, accounting for 50% of the population, 75% of energy consumption and responsible for 80% of CO_2 emissions [Hajduk, 2016; World Bank, 2018].

Smart cities are about making traditional networks and services more efficient with digital solutions for the public and business users. "Cities using technological solutions to improve the management and efficiency of the urban environment" [EU, 2022]. A smart city is not just about using digital technologies to improve resource use and reduce emissions. It does not just modernize transport networks, water supply, and energy use in its systems. A smart city meets the needs of residents and businesses at a higher level, creates safer spaces for transport and public safety, and responds better and faster to demand.

Digitalization is an elusive concept for many. People understand that phones and computers are constantly changing and accept that they now have to manage processes through software, but it is more difficult to explain why this is happening. Digital transformation is a breakthrough, building on the capabilities of readily available technologies to develop unique and integrated organizational capabilities that make the organization receptive to continuous change of the environment (see: [Sebastian et al., 2017; Szeberényi, Lukács, Papp-Váry, 2022]). Digitalization means the conversion of digitizing content, processes and objects that were previously physical or analog concepts. Digital transformation is at a higher level, as it is a commitment to fundamentally transform the entire operation of an organization. Transformation is not about a company investing in new technology or developing and incorporating it. Digital transformation transforms the approach to value creation [Csedő, Zavarkó, Sára, 2019].

If a company wants to digitize its processes, it can target several levels. The first level is to move away from paper documents and capture them digitally, which has the advantage of being searchable and more secure (digitization). The second level is the digital mapping and tracking of processes, which allows for process optimization, an example of which is the Order-to-Cash process. The third level can come after the first two levels are in place - this is the automation or robotization of processes.

At this level, the human factor becomes a substitute, where algorithms can help to process structured data sets. Robotic process control (RPA) can now handle more complex tasks with uncertain outcomes. In the next step, software robots can work in the familiar user interface of IT applications, mimicking workers. For instance, it is possible that invoice processing (sorting, editing, and accounting) is fully automated and performed by a software robot. The fifth level is the application of learning systems. These systems already use artificial intelligence and have the potential for continuous improvement, preparing decisions and making forecasts [Marcziniak, Móricz, Baksa, 2020].

The advantage of robotization is that the robot can operate 24 hours a day with a lower error rate. The freed-up resources can give the employer more creative tasks, and the motivation to diversify the workload is much greater than monotonous work.

Changing market needs and the spread of new generations of consumers and online channels also require new customer experiences. The transformation of organizational processes (digitization, digitalization and digital switchover) inherently involves a change in the corporate culture. Not everyone is enthusiastic a when a previously analog process (such as moving a paper-based satisfaction survey to an online space) is implemented and triggering resistance from many employees, even residents if we look at municipalities, and negatively impacts the customer experience [KPMG, 2022]. Identifying relevant actors, and assessing needs is a core element of digital strategy making, and it is also advisable to "evolve" the organizational culture along with digital development. In many cases, resistance lies in fear of the new, in a lack of knowledge. In 2019, some 75 million jobs worldwide could disappear by 2022 owing to digitalization. Digitalization will not only eliminate jobs, but it will also create jobs, it will create jobs and could create 130 million jobs in those three years. The simpler an occupation, the easier it is to define, the more likely it is that it can become more automatized. According to Magyar Telekom's Deputy CEO for Human Resources, "If you can say in one sentence what you do at work, in two or three years, a robot will take over your job" [Wiedemann, 2019]. Another way of looking at it is that many of us would not be sad if the automatistic, calculating parts of our jobs were taken over by robots, because then we would have time for creative creation, art, and constructive thinking [Nagy et al., 2017].

The development of digitalization and atypical (non-traditional) forms of work has been accelerated by the COVID 19 epidemic, with the loss of face-to-face contact becoming a constraint. The labor market

has become more flexible as a result. Moreover, alternative forms of employment have emerged in addition to the former simplified employment, temporary work, and part-time work [Járdi, 2021]. The large number of teleworkers has also led the Hungarian legislator to reduce the administrative burden, make regulations more flexible and regulate the working environment with IT tools.

The virus situation has changed the basic functioning of the country, making many previously unthinkable solutions previously unthinkable permanent. Businesses had to reorganize and outsource work processes. Many have rethought their entire organizational functioning and it has become clear that in many cases personal presence is unnecessary in a process. The importance of teleworking has increased and instead of renting offices, they do not rent a permanent location, but work flexibly from the location available at the time, in smaller locations, in rotation, or even using the services of community offices [Kolonics, Pónusz, 2020].

Results

Digital governance and education. Digital access to public services is vital. The quality of life of businesses and residents is determined by how quickly and efficiently they can get things done at the local council or government offices and how bureaucratic the process is. In addition to central regulation, these processes often depend on the skills and, above all, the attitude of employees. Local systems in the municipality have their own set of rules.

It is the responsibility of the municipality to set up a system in which the backup ICT services (e-payment, e-identification, e-authentication) are available for e-government. Forms can now integrate into the digital space, and automatic filing systems can already exist. Of course, this process often requires new digital tools and improvements in staff knowledge – and possibly attitudes.

In many countries, it is now natural that most public services are available electronically [Wahl, 2009; Finnish Government, 2022]. Estonia, for example, is the world's first almost entirely digital state, where it takes about three minutes to file a tax return and roughly an hour to set up a company digitally. Unfortunately, innovation in post-socialist countries is not spreading at the same rate as in countries on the western side of the former Berlin Wall. The most advanced regions in this respect are Estonia and Finland.

In Hungary, the e-Administration Act entered into force on 1 January 2018, and from then on, state and local government bodies have provided the possibility of electronic administration. According to the Europe Strategy and Action Plan published by the European Commission in 2002, the Hungarian government has set a target for e-government at level 4 of the 5 levels of e-government (1. information, 2. one-way, 3. two-way, 4. full e-government, 5. personalized e-government). Here, customer identification, the signature of documents, and payment obligations are all conducted electronically. The transition to this system has not been uniform. There have been organizations at the forefront of digitization, some that have drifted and others that have tried to hold back the transition, citing technical, resource, or time challenges. Support for joining the ASP (Application Service Provider) system went to the municipalities, but meeting expectations depended strongly on the openness and attitude of local leaders and administrators. A complete digital switchover requires not just the digitization of internal and outgoing paperwork but also the electronic migration of internal processes [Sántha, 2018; Tóth, Pupos, Görög, 2009].

In 2017, it was already clear that many smaller municipalities and large energy service providers were not prepared to switch to full e-government, so the Hungarian government introduced the concept of "bodies obstructed through no fault of their own" by clarifying the law and amending the aforementioned e-government implementing regulation. The technical and attitudinal differences with the introduction of the ASP system are very different. While the Mayor's Office of the Capital of Budapest has seen a steady decrease in the number of postal items since the beginning of 2018 (by 35% in one year), smaller municipalities – and especially those that are more difficult to reach for the rural population – have almost the same 20–30 years of practice [Gerencsér, Tóth, 2017; Káposzta, Tóth, 2014].

Environmentally sustainable operation and management. We are not talking about the intellectual capacity of the population or the municipal administration. Developments have emerged – and are becoming increasingly popular – that automatically control municipal functions. A smart city is: "a municipality that prepares and implements its integrated urban development strategy based on a smart city methodology. Smart city methodology: a methodology for the development of a municipality or group of municipalities that improves its natural and built environment, its digital infrastructure, the

quality and economic efficiency of municipal services, using modern and innovative information technologies, in a sustainable way and with the increased involvement of the population" [Government of Hungary, 2022].

We all want to live in smart and intelligent settlements, where services and information are readily made accessible in a way that is as sustainable and environmentally friendly as possible. "A smart city aims to increase its attractiveness for citizens and businesses by improving and adding urban services. A smart city is a space where traditional networks and services can become more efficient through digital solutions, for the benefit of citizens and businesses" [Wade, 2016].

The Smart Cities Marketplace is the merger of the Smart Cities Information System (SCIS) and the European Information Partnership for Smart Cities and Communities (EIP-SCC), which aims to improve the quality of life of residents and the competitiveness of European cities and industries. It consists of three parts:

1. Explore – providing access to smart projects, getting informed, and collecting ideas. In Hungary, you can access these projects through the Lechner Knowledge Centre database.

2. Shape – SCM helps turn ideas into projects with the appropriate financial backing for public and private investors.

3. Deal – business relationships between project promoters and investors start to build. In a good case, financing is in place [Smart Cities Marketplace, 2020].

There are currently 210 smart city projects in Europe, of which 7 in Hungary, 1 in Slovakia, 1 in the Czech Republic and 3 in Poland, with the highest density in Belgium, Spain, Italy and the UK.

The smart cities' performance can be assessed on a variety of criteria and performance indicators. They are usually measured in different ways and with various indicators from region to region, and there are few international classifications across countries. The best-known city rankings are: Quality of Living Survey; Siemens Green City index; Livability Index of the Economist Intelligence Unit; UN City Prosperity index; Global Urban Competitiveness Report; Cities in Motion Index [Dusek, 2019; Nagy, Káposzta, 2017].

There is no uniformly accepted concept for measuring performance, the best-known performance measurement is R. Giffinger [Giffinger, 2007], who first broke down the areas to be measured and the related indicators into 6 subsystems. Later, this approach was further developed by the T. Nam, T. A. Pardo pair [Nam, Pardo, 2011] with 3 boundary conditions (technological, institutional, and human factors), and then further developed by P. Lombardi, S. Giordano et al. [Lombardi et al., 2011] within the framework of a "triple helix" model (see Figure).

In Hungary, the Modern Cities Program is the most ambitious urban development program to date. The program aims to contribute to projects that can be flagships for rural development. Developments can create a homely, safe environment and improve living conditions. The Modern Cities Program (MVP) includes 270 projects and has a total budget of HUF 4000 billion (EUR 40 billion) [Government of Hungary, 2022]. Several development programs will include smart city elements within the MVP: Creation of knowledge centers, mainly to strengthen the
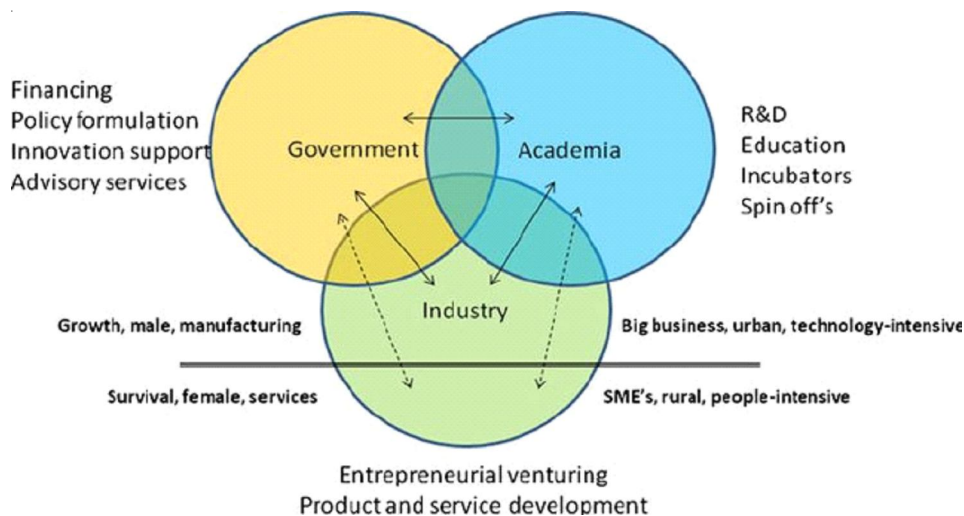

Figure. The partially blind Triple Helix model

Note. Source by: [Lindberg, Lindgren, Packendorf, 2014].

R&D&I activities of existing higher education institutions (Debrecen, Győr, Kecskemét, Veszprém); Creation of innovation centers (Szeged, Zalaegerszeg); Energy projects, mainly for sustainability and cost efficiency (Békéscsaba, Hódmezővásárhely, Salgótarján, Szeged); Smart city developments (Békéscsaba, Miskolc, Salgótarján).

The professional knowledge displayed in the settlement

The quantity and quality of services available in a settlement depend mainly on the number of people using it and the quality of the service they require. If local demand for a tailor is high, sooner or later a housewife – with the right skills – will think about training herself and making a living from it. If she starts a business and her knowledge and services are needed, she will get a growing number of orders and will have to upgrade either her equipment or her personnel if she wants to meet the demand. It is the responsibility – and opportunity – of the local authority to ask the population about their latent needs (not necessarily expressed so far) and to channel these needs to support the emergence of services and professions. If the municipality can support such a service, it can help it get started, and if more can do so, it can assist it with marketing and accessibility tools. The municipality or city can help the entrepreneur by renting premises at attractive rates, offering favorable tenders, placing orders, publicizing on its website, community platforms, etc. [Aboelnaga, Tóth, Neszmélyi, 2019; Tóth, 2002, 2019].

If the services needed by the population (such as a grocery shop, a shoemaker, or an ATM) are available, then a settlement or part of a settlement will become much more attractive, and residents and young people will be more willing to move there or stay there. Some ideas for young people's career choices are described below, which can help them to choose the right profession for them and to develop the expectations of their ideal future [Goda, Tóth, 2013; Káposzta, Nagy, Nagy, 2013].

The fourth industrial revolution is the IoT (Internet of Things), cyber-systems, and artificial intelligence, revolutionizing mental as well as physical work. Collaboration between humans and computers is also generating new processes, tools, ways of working, and consumption. We all see that our lives are increasingly going online, where we gather information, meet people, and order Christmas presents.

The interaction between man and robot also means that there is a great future for professional skills in process management and the development of logistics systems. South Korea plans to automate 57 percent of its workforce in the next 20 years, putting 18 million jobs at risk. Hungary is only part of this change, and we will have to think very carefully about what kind of profession and what kind of job we choose for ourselves and our children in the future. EU projections show that by 2030, the highest paid workers will be those with tertiary education, advanced interpersonal and interpretive (explaining, presenting) skills and a minimum basic knowledge of ICT trends. The need for digital literacy, communication, collaboration, planning, and teamwork skills is becoming increasingly important.

Besides digitalization and robotization, the most notable trend is the growth of the third sector, the service sector. The service sector includes those working in health, social and cultural services, public services, and traditional manual services (hairdressers, beauticians, carpenters, tilers, etc.) and entertainment (theatre, television, radio, internet, etc.). These are areas where good professionals are in great demand and are typically well paid. Today, it is also apparent that a good painter or tiler can take home much better conditions and better pay than a university graduate. We must also remember that there will be a continuing demand for people in the health and social sectors because of our aging society and because of the non-automatable nature of the work.

These trends are not exclusively specific to Hungary but are international. Here in Hungary, the trends unfold slightly differently and a little later, but it is worth paying attention. Good quality farmland, peaceful life in the countryside, and a pollution-free environment can be of enormous value and economic benefit if we use them properly. The Hungarian grey matter, creative thinking, and good communication skills can all help in a globalizing world, and these need to be combined in systems that are sustainable, economically efficient, and humanly acceptable.

Scope of results

Industry 4.0 and the development and digitalization of businesses cannot happen on their own if municipalities do not create the right technical background. The tools offered by digitalization cannot do without a properly developed system of technical conditions. The successful introduction of self-driving cars requires 5G technology, a network of suitably

painted pavement markings, and many other important innovations and systems. For companies to be innovative and effective, they need an increasingly highly skilled, knowledgeable, collaborative, and productive workforce.

For the digitization of municipalities, it is essential to create a four-sided educational structure to promote digitization. These four sides are the development and awareness-raising of business leaders, the training of municipal and government leaders, the training and awareness-raising of municipal and government employees, and the training of the population in the direction of digitalization. This digitalization training should include up-to-date technical elements of digital technologies, the theoretical and logical steps of digitalization, and practical activities that can be implemented in their areas. Digitization is not limited to the use of computers and systems but requires a proactive approach, whereby each employee is able and capable of proposing in their own field areas that can be automated and digitized and is aware of the process that leads to the improvement and facilitation of their work area. Thus, they will develop the ability to prioritize creative, constructive areas that improve the thinking process [Káposzta, Nagy, 2013].

The training of business leaders is a priority issue in Hungary today. Enterprises, mainly created after the regime change, deal with technological and attitudinal processes of that time. Those technologies, management and marketing methods, and sales processes are now obsolete. Most of them are still suitable for meeting local, regional, and sometimes national needs, but multinational companies have already taken a significant share of their markets with their methods, technologies, and operating principles. Their production and service systems can be renewed and refreshed through automation processes and digitalization systems, and they can identify those activities that are internationally marketable and efficient.

We cannot escape the training of government and local government leaders and employees and the shaping of their attitudes. The Hungarian state has placed great emphasis on the creation and operation of a service state (reference) and the efficiency of administration in recent years. More and more municipalities have government offices, which have become more efficient and user-friendly through one-stop shops. However, the functioning of municipalities is very heterogeneous. In many areas, municipal administration falls short of being flexible and customer-friendly, and in more than one area, paper-based and slow administration still predominate.

The reasons for this are – in many places – still inadequate technological background, modest professional skills to facilitate the digital transition, and a non-entrepreneurial approach. In many municipalities, leaders do not know what is needed to support quick entrepreneurial decisions, and what information is needed to make an investment decision. Because of this inflexibility, entrepreneurs lose markets, time, and resources to the slow pace of municipal decisions and pointless bureaucracy. There is a need for a team of experts in the management of municipalities with management skills and knowledge of the digitalization process, who are able and capable to develop the administrative community both technically and mentally. The first step is to ensure rapid decision-making and decisiveness, the second step is to support business investors' decisions, and the third step is to coordinate the demand for services from the public, human resources skills and knowledge, and business activities. If there is no quick decision-making and no data from the municipalities on the human resources, service, and productive needs of the local area. It is not reasonable to expect that investors will risk their or someone else's resources and help the specific area to operate [Tóth, 2019].

It is becoming ever more urgent for companies to develop skills because they cannot stay in the market with professionals who have been learning the trades for 20–30 years and are not competent to operate machines and systems with modern technology. Today, in Hungary, the production and service sectors are increasingly forcing skilled professionals out of the education system, who would be hired immediately, but the output is inadequate in terms of both knowledge and numbers. What are our tasks? First of all, we need to raise people's awareness of the need for continuous training and learning. With a rigid mindset, no worker will be marketable. Secondly, we must pass on to employees the practice of meeting the needs of the employee, operating, and having a marketable attitude.

Thirdly, we need to create today a vocational training system that represents a genuine competency-based system and is constantly adapting to the professional needs of the 21st century. This requires continuous improvement of teachers, heads of training institutions and education management and, not least, constant communication with production and service companies about what they need. Fourth – and perhaps most important – is openness to digitalization and automation. Everyone should be aware of the technologies and digitization opportunities available in their profession and make suggestions to

management to modernize, simplify, and cost-effectively. It is not by chance that Japanese companies are constantly studied, where employees make weekly suggestions on how to reduce the time of a workflow, the path of a workpiece, or improve quality [Horngren, 1989].

Conclusion

Developing human resources at the right level is essential to improving the digitalization capacity of municipalities. Digitalization lies fundamentally in the quality of knowledge and skills. Knowledge about digitalization is specific and requires identifying the key sectors that are useful and necessary for the functioning of municipalities. It is then a matter of gathering the knowledge needed for effective development in the 21st century and the professionals who can effectively transfer it to the target population. After the knowledge elements of the sectors develop, it is necessary to improve the efficiency of the public administration and the municipal system, so that the business sector can apply the enhanced and modern schemes flexibly in the market.

From setting up a business establishment to licensing, marketing, trade, and HR, the speed and flexibility of the public sector are crucial in many issues affecting operations and efficiency. Digitalization, modernity, and efficiency are essential without an inclusive public. First, it must demand rapid public service delivery, and transparent and efficient operations, and second, it must be able and capable of proactively engaging as an employee in production and service processes.

Finally, but not least, without innovative and constructive business and municipal management, a digitally enabled municipality cannot become a reality. Managers need to know for each workflow whether it is possible to digitize, automate, or not and what the next step of digitization will be in the life of their organization, in addition to efficiency and safe operation. In this respect, municipal and business management go hand in hand. The processes and systems can be separated and digitized in the same way; it is just the areas that are different. If all of the above is in place, the result will be a more efficient, modernized, cheaper and easier to run, more livable, and enjoyable municipality.

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Information About the Authors

Szilárd Malatyinszki, PhD in Earth Sciences, Associate Professor, Kodolányi Janos University, Furdo St, 1, H-8000 Székesfehérvár, Hungary, mszilard@kodolanyi.hu, https://orcid.org/0000-0002-1624-4902

Henrietta Nagy, PhD in Management and Business Administration, Habilitated Doctor, Associate Professor, Milton Friedman University, Kelta St, 2, H-1039 Budapest, Hungary, nagy.henrietta@uni-milton.hu, https://orcid.org/0000-0001-9732-9926

Информация об авторах

Силард Малатинский, доктор наук (в области наук о земле), доцент, Университет им. Яноша Кодолани, ул. Фурдо, 1, H-8000 г. Секешфехервар, Венгрия, mszilard@kodolanyi.hu, https://orcid.org/0000-0002-1624-4902

Генриетта Надь, кандидат наук (управление и деловое администрирование), хабилитированный доктор, доцент, Университет им. Милтона Фридмена, ул. Келта, 2, H-1039 г. Будапешт, Венгрия, nagy.henrietta@uni-milton.hu, https://orcid.org/0000-0001-9732-9926