



## DIGITALIZATION OF THE RESTAURANT SECTOR AS A TOOL OF COMPETITIVE ADVANTAGE IN THE MARKET

Rebecca Neumannová<sup>1</sup>, Natália Stalmašeková<sup>2</sup>

**Abstract:** Digitalization represents a significant factor in the development of the restaurant sector, which came under severe pressure during the COVID-19 pandemic. The implementation of innovative technologies such as QR codes, digital ordering systems, and electronic menus has enabled businesses to increase the efficiency of operational processes and maintain competitiveness. The aim of this paper is to analyze the main approaches to digitalization in the restaurant sector and to identify its benefits and limitations based on available literature and conceptual models. The findings indicate that digital solutions can contribute not only to cost and error reduction but also to enhanced customer satisfaction and data collection for strategic decision-making. The article also emphasizes the need for continuous adaptation of restaurant enterprises to technological innovations, which represent a significant contribution to both theory and practice in the fields of services and business.

**Keywords:** digitalization, restaurant sector, QR codes, digital menus, competitiveness

### Introduction

Today, digitalization is a key process that shapes and transforms people's value orientations. This influence is particularly strong when an individual becomes part of a virtual community, where he or she is affected by presented values and their changing value orientations [1].

Companies are re-engineering their business processes through the adoption of digital technologies to improve efficiency, minimize costs, and innovate. Digital transformation also involves the practical use of the Internet as a data-driven management model in design, production, marketing, sales, and communication. In the context of the digital transformation of micro and small enterprises, much research effort has been devoted to this topic over the past two decades. Initially, companies focused on deploying internal management systems such as ERP or CRM to improve and optimize business processes, increase efficiency, and reduce costs. However, successful digital transformation requires not only the acquisition and deployment of technical resources but, perhaps more importantly, the resolution of managerial issues such as re-engineering business processes, training, investing in e-commerce, human resources, and organizational capabilities [2,3].

---

<sup>1</sup> Rebecca Neumannová, internal PhD. student, Department of Communications, Faculty of Operation and Economics of Transport and Communications, University of Žilina, Univerzitná 8215/1, 010 26 Žilina, e-mail: neumannova1@stud.uniza.sk

<sup>2</sup> Natália Stalmašeková, Department of Communications, Faculty of Operation and Economics of Transport and Communications, University of Žilina, Univerzitná 8215/1, 010 26 Žilina, e-mail: natalia.stalmasekova@fpedas.uniza.sk

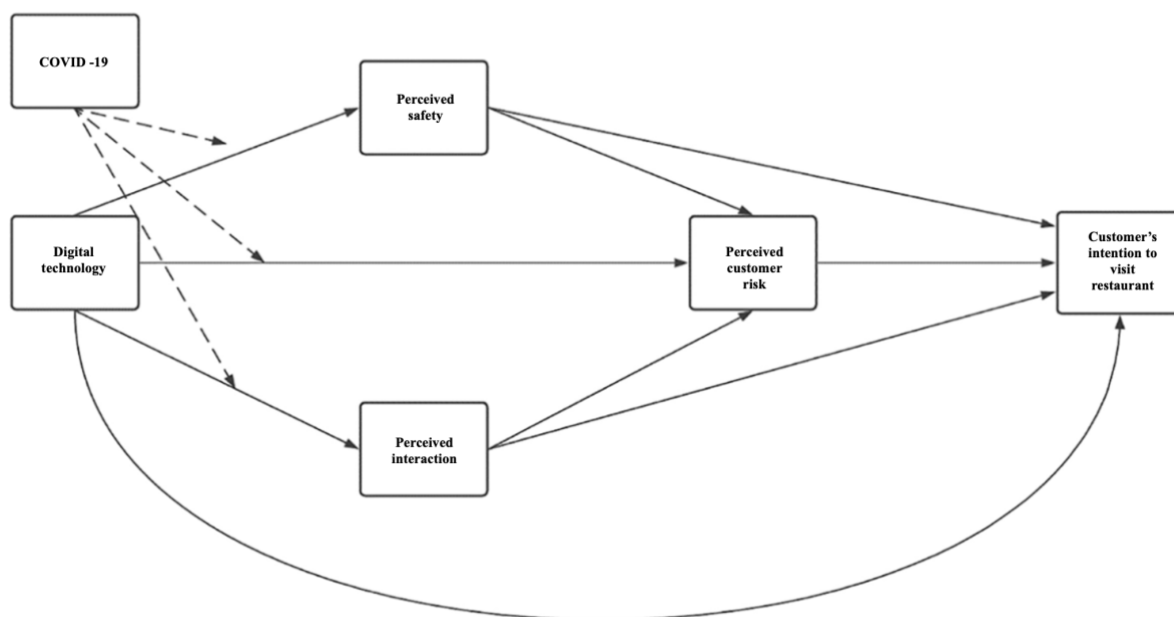
Therefore, the aim of this paper is to analyze the main approaches to digitalization in the restaurant sector and identify its benefits and limitations based on available literature and conceptual models, with an emphasis on assessing its impact on process efficiency, customer satisfaction, and the maintenance of business competitiveness.

### Impact of COVID-19 on the Restaurant Sector

The emergence of the COVID-19 pandemic significantly affected the global economy, particularly the restaurant sector. The rapid spread of the virus led to restrictions in restaurants, resulting in job losses and, in some cases, permanent business closures. This sector, which has a significant impact on GDP, faced serious financial problems due to measures implemented to control the spread of the virus [7,8].

Changes in consumer habits and fear of infection led to a decline in dining out, with the number of people choosing to eat in restaurants decreasing globally by about 30% between 2019 and 2022 [8].

In response to the health and economic crisis caused by COVID-19, businesses were forced to adopt digitalization. Innovation and digital tools became key to profitability and resilience against market shocks. Figure 1 illustrates the impact of COVID-19 on the restaurant sector [7,8].



**Figure 1. Impact of COVID-19 on the restaurant sector**

Source: processed by the author according to [7]

Restaurants had to reorganize their operations in the context of the COVID-19 pandemic to ensure health safety and comply with government regulations. Although food itself is not a medium for transmitting COVID-19, restaurant operations were considered risky due to interpersonal interactions. This led to restrictive measures such as limited opening hours and reduced seating capacity. However, with the launch of vaccination campaigns, the intensity of these measures gradually decreased [7].

Service innovation proved to be a crucial way of coping with these challenges, with digital technologies such as contactless payments, advanced cleaning systems, digital menus accessible via QR codes, service robots, touchless elevators, and food delivery apps becoming tools of service innovation [7].

Innovative technologies make it possible to improve production and business management. Digital technologies essential for the operation of food service businesses ensure accuracy, efficiency, and speed in information processing and transmission. These technologies are increasingly implemented in the restaurant business, helping to improve service performance, customer comfort, and customer orientation. Digitalization reduces manual operations, paperwork, and errors, while increasing employee productivity. Maintaining outdated processes can lead to lagging behind competitors [11].

### QR Codes and the Restaurant Sector

QR codes, as an established standard for product identification, are gradually penetrating the restaurant industry. They enable rapid data processing and can store large amounts of information. They can be placed on various surfaces and are easily readable on modern mobile devices. They allow customers to access key information about the restaurant with a single tap and can be used to inform about promotions, news, loyalty programs, and to organize feedback [11,12].

According to studies, physical menus replaced by QR code-based technology are likely to continue even in the post-pandemic era. Research also confirms that the use and design of QR technology as a restaurant menu is preferable. QR codes can provide benefits in various ways, by as much as 10 % in operational efficiency and customer satisfaction improvement. Menus accessed through QR codes can help collect data on customer behavior and choices, which can then be used to improve customer satisfaction. In addition, they streamline order processing and payment and shorten waiting times. QR-coded menu offers became the most common option in U.S. restaurants during the COVID-19 period and have maintained their presence even in the post-pandemic period [12].

### Digital Ordering Process via QR Codes

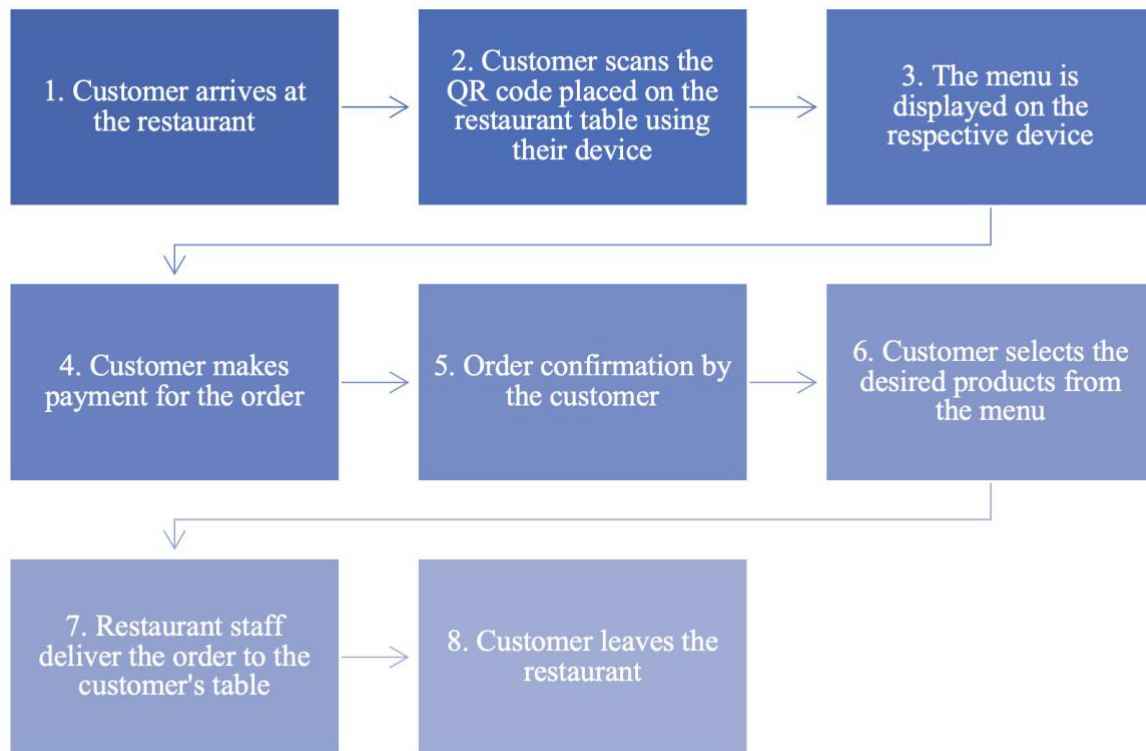
The digital ordering process in restaurants can be defined as placing an order through an online ordering system. This digitalized process aims to replace the traditional manual ordering method [13,14].

One of the digitalized ordering methods is ordering via a QR code. A generated QR code, created through the selected online ordering system, provides a link that customers can scan with their mobile device upon arrival at the restaurant [15,16].

The digital ordering process helps restaurants perform all functions more accurately and efficiently, reducing human effort and time. Providing such services enables restaurants to maintain their competitiveness in the market [15,17].

The basic conceptual model (Figure 2.) of the digital ordering process via QR code defines the fundamental structure that forms the framework of the project from the customer's perspective. It consists of the following eight steps:

- 1. customer arrival at the restaurant,**
- 2. customer scans the QR code** located on the restaurant table using their mobile device, thereby accessing the digital menu,
- 3. the menu is displayed** on the customer's device, giving full access to the digital version,
- 4. customer selects products** from the menu according to their needs and preferences,
- 5. customer confirms the order**, verifying the items chosen,
- 6. customer proceeds to payment**, completing the transaction,
- 7. restaurant staff deliver the order** to the customer's table,
- 8. customer leaves** the restaurant after receiving their order [14,17].



**Figure 2. Conceptual model of the digital ordering process through a QR code**

Source: processed by the author according to [14]

## Digital Menu

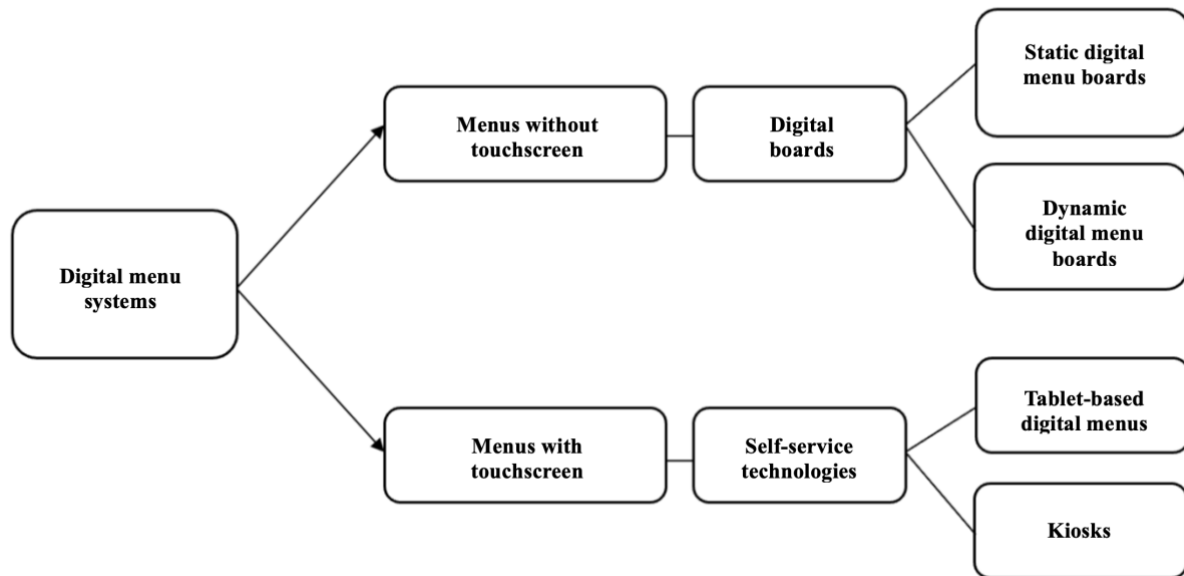
A restaurant menu is an important communication tool influencing customer behavior during meal selection. The menu design complements the establishment's décor, service, food quality, and price range. It is also one of the most significant strategic tools in the food service industry, providing cost control in connection with marketing and sales activities [18,19].

The interior design of the menu allows customers to make an initial assessment of the restaurant along with other factors, such as product descriptions and layout, use of images, typography, and price display. Therefore, it is crucial that both the external and internal design of the menu meet customer expectations and create a positive impression [18,20].

An increasingly competitive environment forces businesses to innovate in ways that can meet customer demands and expectations while creating a competitive advantage. One such innovation is the digital menu [19,21].

The term "digital" is defined as "the electronic display of data on a screen". In this context, digital menus are not printed but are displayed electronically. Tablets, kiosks, digital boards, and smartphone applications are common examples of digital menus in use today [18,22].

Digital tablet menus are also referred to by other names, such as electronic menus, e-menus, or tablet menus. These are examples of self-service technologies (SSTs), defined as technological user interfaces that allow customers to independently perform services without employee assistance [18].



**Figure 3. Classification of digital menu systems**

Source: processed by the author according to [18]

### Non-Touchscreen Digital Menu Systems

These systems represent digital boards that provide visual information about the business's products. They require staff interaction for the customer to place an order and can be used both indoors and outdoors [18,20].

They include:

- **Digital boards** (LCD, LED, OLED, or plasma displays) used for product promotion via private network connections. Such digital menus are mostly used in fast-food restaurants. Non-touch digital menu boards are divided into two types: *static* and *dynamic* [18,20].
- **Static digital menu boards**, which are large screens presenting menu products with appealing visuals and price information, located in visible places to aid customer decision-making. The displayed images are static or alternate between a few fixed images [18].
- **Dynamic digital menu boards**, which use plasma, LED, or LCD screens to combine static menu text with high-quality images, videos, presentations, animations, and live updates [18].

### Touchscreen Digital Menu Systems

These systems offer customers a self-service option. Self-service technologies allow customers to complete a purchase without the need for staff. The most common SSTs used in restaurants include tablets, tabletop touchscreens, PDAs, and mobile applications. The two most frequent self-service methods used in restaurants are kiosks and tablet-based digital menus [18,20].

They include:

- **Kiosks**, a form of self-service menu technology used in restaurants for promotion, sales, and marketing activities, also found in airports, banks, and shopping centers. These are free-standing devices with touchscreens typically located at restaurant entrances or indoors. Customers can use them to choose products, place orders, and make payments [18].
- **Tablet-based digital menus**, which display and process restaurant menus via tablet computers. These systems positively influence service quality by allowing customers

to actively participate in the ordering process. The perceived value includes perceived usefulness, ease of use, control, enjoyment, and novelty [18].

## Discussion

Digitalization in the restaurant sector has been ongoing for several years, but the COVID-19 pandemic significantly accelerated this process. The pandemic led to changes in consumer behavior and increased demand for contactless services. Restaurants had to adapt by implementing technologies such as QR codes, which enabled customers to browse menus and place orders without direct contact with staff. This step not only reduced the risk of infection transmission but also improved the efficiency of the ordering process.

The importance of digitalization has also been demonstrated in the increased ability to collect and analyze customer preference data, allowing restaurants to tailor their offers and improve services. However, the challenge remains the need for continuous innovation and investment in new technologies to maintain competitiveness. Insufficient adaptation to digital trends can result in falling behind competitors.

## Conclusion

Digitalization represents a key tool for the restaurant sector to survive and thrive in a dynamic and competitive environment, especially in the post-COVID-19 period. Technologies such as QR codes and digital ordering systems have streamlined operational processes, reduced errors, and enhanced customer satisfaction.

From a scientific perspective, digitalization opens new research avenues in the fields of digital service transformation, consumer behavior, and innovation management. In practice, it provides concrete solutions that improve efficiency, service quality, and the ability of businesses to respond to crisis situations.

In the future, the success of restaurants will depend on their ability to connect technology with customer needs and to develop digital strategies that support both growth and sustainability.

## References

- [1] ATOYAN, Varda; OHANYAN, Sofya; MOVSISYAN, Nane; HOVYAN, Vahram. Digitalization as a sociocultural characteristic of the globalization era. In *Saudi Journal of Humanities and Social Sciences*. [online]. 2023, roč. 8, č. 9. [cit. 2023-05-08]. Available online at: <[https://www.researchgate.net/publication/374169750\\_Digitalization\\_as\\_a\\_Sociocultural\\_Characteristic\\_of\\_the\\_Globalization\\_Era](https://www.researchgate.net/publication/374169750_Digitalization_as_a_Sociocultural_Characteristic_of_the_Globalization_Era)>. ISSN 2415-6256. (s. 296- 299)
- [2] BAI, Chunguang; QUAYSON, Matthew; SARKIS, Joseph. COVID-19 pandemic digitization lessons for sustainable development of micro-and small- enterprises. In *Sustainable production and consumption*. [online]. 2021, č. 27. [cit. 2023-05-08]. Available online at: <<https://www.sciencedirect.com/science/article/pii/S2352550921001482>>. (s. 1989-2001)
- [3] SUCHÁNEK, Petr. E-commerce, elektronické podnikání a koncepce elektronického obchodování. 1. Vyd. Praha: Ekopress, s.r.o., 2012. 144 s. ISBN 978-80-86929-84-2. (s. 64- 66)
- [4] TIWARI, Sumit. An Introduction To QR Code Technology. In *International Conference on Information Technology (ICIT)*. [online]. 2016. [cit. 2023-05-10]. Available online at: <[https://www.researchgate.net/publication/318125149\\_An\\_Introduction\\_to\\_QR\\_Code\\_Technology](https://www.researchgate.net/publication/318125149_An_Introduction_to_QR_Code_Technology)>. ISBN 978-1-5090-3584-7. (s. 39-44)

- [5] YUAN, Tailing; WANG, Yili; XU, Kun; MARTIN, Ralph; HU, Shi-Min. Two-Layer QR codes. In IEEE transactions on image processing. [online]. 2019, roč. 9, č. 28. [cit. 2023-05-10]. Available online at: <<https://www.webofscience.com/wos/woscc/full-record/WOS:000473641100018>>. ISSN 1941-0042. (s. 4413- 4428)
- [6] CHOU, Kuo-Chien; WANG, Ran-Zan. The nested QR code. In IEEE Signal processing letters. [online]. 2022, č. 27. [cit. 2023-05-10]. Available online at: <<https://www.webofscience.com/wos/woscc/full-record/WOS:000552964700003>>. ISSN 1558-2361. (s. 1230-1234)
- [7] ESPOSITO, Benedetta; SESSA, Maria Rosaria; SICA, Daniela; MALANDRINO, Ornella. Service innovation in the restaurant sector during COVID-19: digital technologies to reduce customers' risk perception. In TQM Journal. [online]. 2022, roč. 34, č. 7. [cit. 2023-05-15]. Available online at: <<https://www.webofscience.com/wos/woscc/full-record/WOS:001120734200001>>. ISSN 1754-2731 (s. 134-164)109
- [8] COMES, Conceicao; MALHEIROS, Cátia; CAMPROS, Filipa; SANTOS, Luís Lima. COVID-19s Impact on the restaurant industry. In Journal sustainability. [online.] 2022, roč. 18, č. 14. [cit. 2023-05-15]. Available online at: <<https://www.webofscience.com/wos/woscc/full-record/WOS:000856671000001>>. ISSN 2071-1050.
- [9] MORALES, Mónica González; RUBIO, José Antonio Cavero. Impact of Digitalization of Sales on the Profitability of the Restaurant Industry during COVID-19. In Journal Citation Reports 2022. [online]. 2023, roč. 11, č. 283. [cit. 2023-05-15]. Available online at: <<https://www.webofscience.com/wos/woscc/full-record/WOS:001120734200001>>. eISSN 2227-7099 (s. 1-16)
- [10] SHANIMON, Simon; AELYAMMA, Pavla; VINCE, Thomas; KOTTOOR, Nimmy. COVID-19 and its impact on the restaurant business. In Journal Society of Research Administrations International. [online]. 2023, roč. 5, č. 2. [cit. 2023-05-15]. Available online at: <[https://www.researchgate.net/publication/375915608\\_COVID-19\\_AND\\_ITS\\_IMPACT\\_ON\\_THE\\_RESTAURANT\\_BUSINESS](https://www.researchgate.net/publication/375915608_COVID-19_AND_ITS_IMPACT_ON_THE_RESTAURANT_BUSINESS)>. eISSN 2573-7104 (s. 3882-3894)
- [11] MOROKHOVYCH, Vasyl; MOROKHOVYCH, Bohdan. Digital Technologies as an Important Factor of the Restaurant Business Development. In Restaurant and Hotel Consulting Innovations. [online]. 2023, roč. 6, č. 1. [cit. 2023-05-15]. Available online at: <[https://www.researchgate.net/publication/370930804\\_Digital\\_Technologies\\_as\\_an\\_Important\\_Factor\\_of\\_the\\_Restaurant\\_Business\\_Development](https://www.researchgate.net/publication/370930804_Digital_Technologies_as_an_Important_Factor_of_the_Restaurant_Business_Development)>. (s. 27-36)
- [12] ISKENDER, Ali. Restaurant menus and COVID-19: implications for technology adoption in the post-pandemic era. In Cosumer Behavior in Tourism and Hospitality. [online]. 2023, roč. 18, č. 6. [cit. 2023-05-15]. Available online at: <[https://www.researchgate.net/publication/373043271\\_Restaurant\\_menus\\_and\\_COVID-19\\_implications\\_for\\_technology\\_adoption\\_in\\_the\\_post-pandemic\\_era](https://www.researchgate.net/publication/373043271_Restaurant_menus_and_COVID-19_implications_for_technology_adoption_in_the_post-pandemic_era)>. ISSN 2752-6666 (s. 1-19)
- [13] MOHIUDDIN, Mohiuddin; RIDDY, Jannatul Fertheous; PAL, Prokash; HASHEM, Mohammed Abul; HASAN, MD Mahedi; RAJEE, Alimul. Online food ordering system. 2022. [online]. [cit. 2023-05-15]. Available online at: <[https://www.researchgate.net/publication/367179633\\_ONLINE\\_FOOD\\_ORDERING\\_SYSTEM](https://www.researchgate.net/publication/367179633_ONLINE_FOOD_ORDERING_SYSTEM)>. (s. 1-31)
- [14] NIKOSE, Archana; HATWAR, Aayush; NIKOSE, Akshata; ADIKANE, Dhananjay; GAHARWAR, Khushi. Cafeteria food ordering system using QR code. In International Journal of Scientific Research in Science, Engineering and Technology. [online]. 2023, roč. 10, č. 2. [cit. 2023-05-15]. Available online at:

- <[https://www.researchgate.net/publication/370486655\\_Cafeteria\\_Food\\_Ordering\\_System\\_using\\_QR\\_Code](https://www.researchgate.net/publication/370486655_Cafeteria_Food_Ordering_System_using_QR_Code)>. eISSN 2394-4099 (s. 157-163)
- [15] WONG, Chee Chun; CHONG, Lee-Ying; CHONG, Siew Chin; LAW, Checj-Yee. QR food ordering system with data analytics. In Journal of informatics and web engineering. [online]. 2023, roč. 2, č. 2. [cit. 2023-05-15]. Available online at: <[https://www.researchgate.net/publication/373896215\\_QR\\_Food\\_Ordering\\_System\\_with\\_Data\\_Analytics](https://www.researchgate.net/publication/373896215_QR_Food_Ordering_System_with_Data_Analytics)>. eISSN 2821-370X (s. 249-272)
- [16] SURYANTARI, Putu Anggi; WIJANARKO, Rendi Panca; WATI, Seftin Fitri Ana; ARIFIYANTI, Amalia Anjani; WULANSARI, Anita; DEVIYANTI, I Gusti Ayu. Application of augmented reality in food ordering system. In International Journal of Electrical Engineering and Information Technology. [online]. 2023, roč. 6, č. 1. [cit. 2023-05-18]. Available online at: <[https://www.researchgate.net/publication/369727552\\_Application\\_of\\_Augmented\\_Reality\\_in\\_Food\\_Ordering\\_System](https://www.researchgate.net/publication/369727552_Application_of_Augmented_Reality_in_Food_Ordering_System)>. eISSN 2615-2096 (s. 27-36)
- [17] DHIMAN, Karan; PHANSIKAR, Mayuresh. Online food ordering management system. In International Journal for Research in Applied Science and Engineering Technology. [online]. 2021, roč. 9, č. 7. [cit. 2023-05-18]. Available online at: <[https://www.researchgate.net/publication/353403841\\_Online\\_Food\\_Ordering\\_Management\\_System](https://www.researchgate.net/publication/353403841_Online_Food_Ordering_Management_System)>. ISSN 2321-9653 (s. 2096-2107)
- [18] SAHIN, Esra. An evalution of digital menu types and their advantages. In Journal of tourism and gastronomy studies. [online]. 2020, roč. 8, č. 4. [cit. 2023-05-18]. Available online at: <[https://www.researchgate.net/publication/348084076\\_An\\_Evaluation\\_of\\_Digital\\_Menu\\_Types\\_and\\_Their\\_Advantages](https://www.researchgate.net/publication/348084076_An_Evaluation_of_Digital_Menu_Types_and_Their_Advantages)>. ISSN 2147-8775. (s. 2374-2386)
- [19] NEUMANNOVÁ, R. Návrh digitalizácie objednávacieho procesu vo vybranom podniku. Diploma Thesis. Tutor: Natália Stalmašeková, Žilinská univerzita v Žiline. Žilina, 2024. 138 s.