THE IMPACT OF DIGITALIZATION ON TOURISM EDUCATION: ENHANCING WORKFORCE COMPETENCIES FOR THE DIGITAL AGE

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Abstract. The purpose of this study is to examine the impact of digitalization on tourism education and how it enhances workforce competencies for the digital age. A quantitative methodology was employed, utilizing an online survey distributed to 62 respondents, including students, teachers, and professionals in tourism, to gather insights on digital skills and educational adaptations in the sector. The findings reveal that digitalization has significantly transformed tourism education, with respondents emphasizing the importance of digital tools, AI, and personalized services.

The originality of this study lies in its exploration of emerging digital competencies required in the tourism workforce and its contribution to understanding how educational institutions can adapt to the evolving digital demands. It highlights the need for continuous skill development, digital literacy, and the integration of advanced technologies in tourism education to ensure competitiveness in the modern industry.

Keywords: digitalization, digital tourism, AI, education.

RAQAMLASHTIRISHNING TURIZM TA'LIMIGA TA'SIRI: RAQAMLI DAVR UCHUN MEHNAT KUCHLARI KOMPETENSIYALARINI OSHIRISH

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Annotatsiya. Ushbu tadqiqotning maqsadi raqamlashtirishning turizm ta'limiga ta'sirini va uning raqamli davr uchun ishchi kuchi kompetentsiyalarini qanday yaxshilashini o'rganishdan iborat. Tadqiqotda miqdoriy metodologiya qo'llanilgan bo'lib, 62 nafar respondentlar – talabalar, o'qituvchilar va turizm sohasidagi mutaxassislar orasida onlayn so'rovnoma orqali ma'lumotlar

yig'ildi. Tadqiqotda respondentlar raqamli ko'nikmalar va sohada ta'lim moslashuvlari haqida fikr bildirdilar. Natijalar shuni ko'rsatdiki, raqamlashtirish turizm ta'limini sezilarli darajada o'zgartirgan bo'lib, respondentlar raqamli vositalar, sun'iy intellekt va shaxsiylashtirilgan xizmatlarning ahamiyatini ta'kidladilar.

Ushbu tadqiqotning o'ziga xosligi shundaki, u turizm sohasida zarur bo'lgan yangi raqamli kompetentsiyalarni o'rganadi va ta'lim muassasalarining raqamli talablar o'zgarishiga qanday moslashishini tushunishga hissa qo'shadi. Tadqiqot zamonaviy sanoatda raqobatbardoshlikni ta'minlash uchun uzluksiz ko'nikmalarni rivojlantirish, raqamli savodxonlik va ilg'or texnologiyalarni turizm ta'limiga integratsiya qilish zaruratini ta'kidlaydi.

Kalit so'zlar: *raqamlashtirish, raqamli turizm, sun'iy intellekt, ta'lim.*

ВЛИЯНИЕ ЦИФРОВИЗАЦИИ НА ТУРИСТИЧЕСКОЕ ОБРАЗОВАНИЕ: РАЗВИТИЕ КОМПЕТЕНЦИЙ РАБОЧИХ СИЛ В ЦИФРОВУЮ ЭРУ

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Аннотация. *Цель данного исследования – изучить влияние цифровизации на туристическое образование и то, как она способствует повышению компетенций рабочей силы для цифровой эпохи. В исследовании использовалась количественная методология, включающая онлайн-опрос, проведенный среди 62 респондентов, включая студентов, преподавателей и профессионалов в области туризма, с целью сбора информации о цифровых навыках и адаптации образовательных процессов в секторе. Результаты показывают, что цифровизация значительно трансформировала туристическое образование, а респонденты подчеркнули важность цифровых инструментов, искусственного интеллекта и персонализированных услуг.*

Уникальность данного исследования заключается в изучении новых цифровых компетенций, необходимых рабочей силе в туристической отрасли, а также в его вкладе в понимание того, как образовательные учреждения могут адаптироваться к меняющимся цифровым требованиям. Исследование подчеркивает необходимость непрерывного развития навыков, цифровой грамотности и интеграции передовых технологий в туристическое образование для обеспечения конкурентоспособности в современной индустрии.

Ключевые слова: *цифровизация, цифровой туризм, искусственный интеллект, образование.*

Introduction.

Digitalization has been actively manifested during the pandemic, when many areas were forced to operate remotely or online. Digitalization is a normal, dynamic process at the Digitalization has made it possible to simplify access to many services, reduce the time it takes to search for a particular product, obtain the desired service without being physically present in the organization, and minimize the costs of receiving services. Beginning of the Fourth Industrial Revolution. This process has affected various areas of life such as production, medicine, work processes, etc. Technologies have become an integral part of our lives and surround us in hospitals, schools, universities, enterprises and other places.

Literature review.

Tourism suffered more than other industries due to the pandemic, but at the same time, it became an impetus for the digitalization of business processes on a global scale. Many of them were transferred to online mode and operations such as booking air tickets and hotels went online. Thus, the hospitality industry has become a pioneer in the implementation of digital technologies. The implementation of digital technologies creates new opportunities for business and maintaining the competitiveness of tourism enterprises. The demand for a digitally skilled workforce has surged, necessitating upskilling and reskilling initiatives. The concept of "Employee 4.0" has emerged, highlighting the need for competencies such as digital literacy, critical thinking, and problem-solving skills (McKinsey & Co., 2021). Additionally, educational institutions are shifting their focus toward integrating digital tools and training programs into their curricula to prepare students for the evolving demands of the industry (Sigala, 2020).

Despite the advantages, the tourism industry faces challenges in filling the digital skills gap. High seasonality and a reliance on a largely under-skilled workforce exacerbate these challenges (World Tourism Organization, 2021). However, digitalization offers flexible employment opportunities, allowing part-time and remote work, which can attract a more diverse pool of workers.

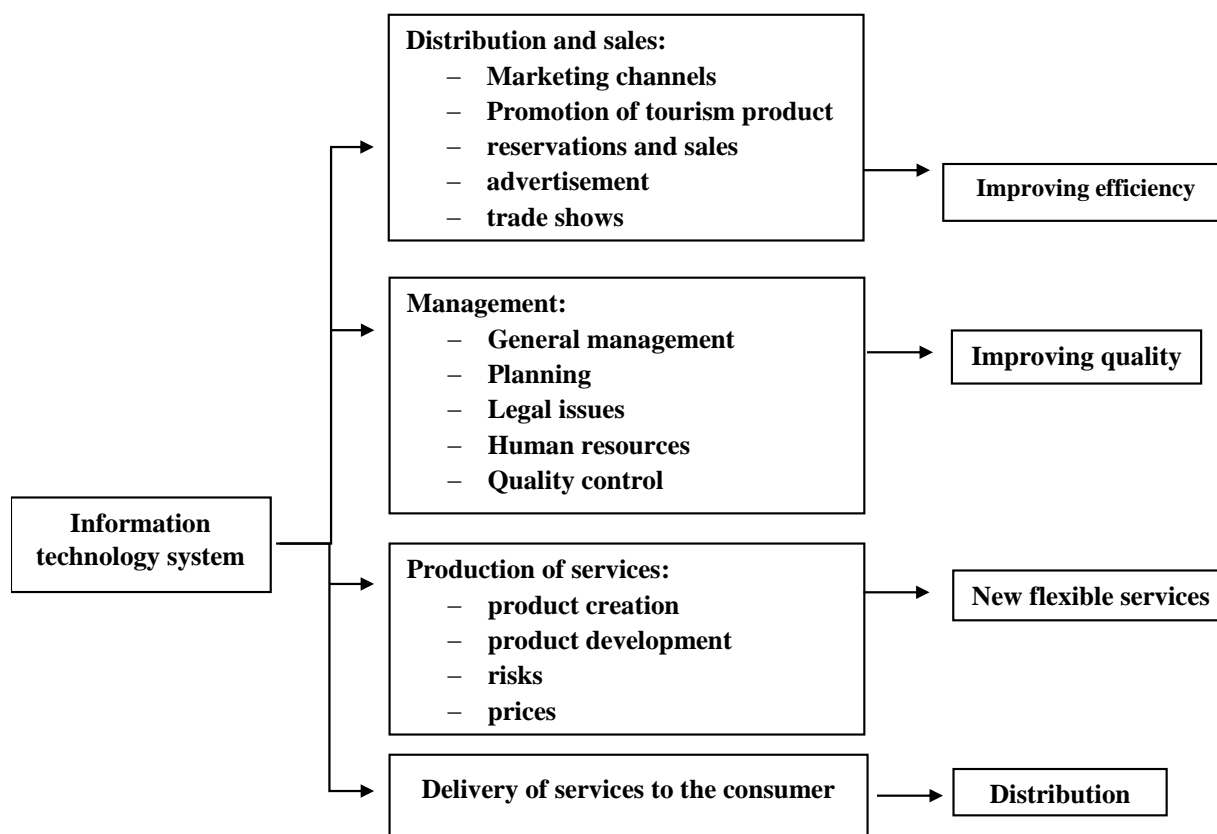Below we can see the impact of ICT on tourism processes

Figure 1. The Impact of ICT on Tourism Processes

Source: own elaboration.

The introduction of digital technology in tourism enterprises allows to reduce production costs, increase labor productivity and competitiveness of the industry as a whole. Thus, it will save the budget of the tourism company, promote products, contribute to the formation of a positive tourist experience, as well as the popularization of tourist destinations. Tourism and the processes included in it have already changed significantly under the influence of technology. Today, online travel agencies are widespread and actively developing. The agency management system itself has changed largely due to technology. Once upon a time, large

companies significantly reduced their staff, because the automation of many operations made it possible to reduce employee costs and speed up the process as a whole. Thanks to machine processing, there is no need to hire separate employees to handle calls, bookings and paperwork. This change has affected the horizontal structure of companies. The number of employees at lower levels has decreased and the emphasis is on qualified specialists. The tourism industry, heavily affected by the COVID-19 pandemic, has experienced rapid digital transformation as a means of survival and adaptation. Digitalization has shifted core operations, such as bookings and customer interactions, to online platforms, enabling businesses to maintain operations while reducing costs and improving efficiency. The adoption of technologies such as Artificial Intelligence (AI), Virtual Reality (VR), and Internet of Things (IoT) has significantly reshaped the industry, enhancing customer experience and operational effectiveness. According to Buhalis and Sinarta (2019), the integration of digital platforms and tools in tourism businesses has created new opportunities for innovation and competitiveness in the sector.

Digitalization also has positive aspects for tourists. Thanks to various tools with Internet access (for example, Aviasales, Booking.com, Kayak.com), they can plan their route and book their tickets in advance. Many agency services have become e-commerce. With the advent of Artificial Intelligence (AI), travel has become even more personalized. Some companies such as KLM have begun to introduce special chat bots in WhatsApp, Facebook Messenger, WeChat messengers, which send boarding passes, information about the date and time of departure, travel time, information about the departure terminal to their passengers. Many of these chat bots have begun to replace customer support. Based on AI, they can independently find answers to customer questions. The hotel industry is also not standing aside and many hoteliers are actively using technology to improve the quality of their service. The Hilton hotel chain uses a special chat bot that helps guests go through the check-in process without queues. Museums, in turn, have introduced VR and AR technologies that make the visit even more colorful. Museums, which are traditionally considered a boring form of entertainment, are using technology to make the visit even more interesting. During the pandemic, the Tretyakov Gallery allowed people to walk through the virtual corridors and galleries of the museum. Today, guests can take a virtual tour and view the museums on the website, and then decide whether to buy tickets.

Today, there are the following types of technological implementations in the tourism sector:

The tourism workforce is generally under skilled. Due to the high seasonality and rapid changes in the tourism sector, filling the emerging skills gaps is a major challenge for tourism businesses, training providers and governments. Statistics show that 90% of tourism businesses employ no more than 10 people. These workers usually show a skills shortage, and those who move to the tourism sector from other areas are under skilled. Employees who returned after the pandemic faced many challenges and changes amid lockdowns on topics such as sanitary measures, the use of new digital tools and increased demand for quality from customers. Thus, the pandemic and the resulting digitalization in tourism have made their own adjustments to the employment trend. Thanks to global digitalization and the emergence of online agencies, working conditions have become much more flexible, including part-time, part-time or even remote employment options. This has made it possible to hire a variety of employees, including those who are not able to work full-time. At the same time, competition in tourism is growing and many organizations have to adapt to the constantly changing demands of consumers. To do this, each of these organizations conducts master classes, trainings and trainings to improve the quality of their services. To provide competitive services, employers give preference to multilingual and culturally oriented personnel who can provide personalized services taking into account national nuances.

Table 2.

Technological implementations and their functions

Technological implementations	Functions
1. **Digital platforms**	These are platforms that allow consumers and producers to communicate with each other in real time directly through ICT.
2. **AI, Big Data, Personalized Tourism**	Using CRM systems and data will improve service, provide personalized services, launch targeted marketing, etc.
3. **VR and AR**	The use of such realities will allow the creation of virtual tourist destinations, complementing existing destinations and services (museums, galleries, etc.)
4. **IoT (Internet of things)**	The Internet of Things (IoT) is a set of devices and technologies that are interconnected via an internet connection. These technologies are widely used in tourism operations and to attract customers. Such technologies provide a contactless experience, saving time for many operations (check in/out, registration, etc.).
5. **Contactless systems**	Such technologies provide quick access to many services, especially in the catering industry. Guests, thanks to QR codes, have instant access to the menu (via smartphones), if necessary, with built-in ordering functions. This in turn ensures that the quality of service to guests can be improved.

Source: own elaboration.

New requirements and realities in tourism have given rise to a new term, "Employee 4.0," which describes well the professional requirements of workers in the service sector. Before the digital economy, the responsibilities of personnel working in tourism were fundamentally different from the competencies needed today. Employee 4.0 must have competencies such as digital literacy, critical thinking, problem-solving skills, communication skills, soft skills, ability to work with big data, etc. A recent report by McKinsey & Co calculated that by 2030 in Europe and the United States, the demand for technological skills will grow by 55%, emotional skills by 24%, and advanced cognitive skills by 8%. On the contrary, the demand for basic cognitive skills, as well as manual and physical skills, will decrease by 15%.

Tourism education is changing and adapting to the tourism industry. Traditional methods are losing their relevance, and educational institutions should focus on developing students' emotional intelligence along with basic skills in financial accounting, management, etc. When training new personnel, it is necessary to give priority to developing their digital competencies, as stated above, the demand for technological skills will increase in the near future. Young personnel should have skills not only in the field of information and communication technologies and the use of specialized software for tourism and the hotel business, but also deeper digital competencies. It is important for students to continuously learn, especially in the field of digital technologies and analytics. For existing employees, it is important to organize annual refresher courses, seminars and trainings. Do not underestimate the importance of quickly adapting to new tools and methods of work in order to remain competitive in the digital world.

HR policy has changed significantly after digitalization. Before the digitalization of processes, personnel working in the tourism sector were selected based on the presence of traditional skills, such as: communication skills, knowledge of a foreign language, knowledge of tourist destinations, the ability to work with clients. While the requirements for technical knowledge were limited to basic computer programs (Microsoft Office), working with faxes, telephones and cash registers. After the widespread introduction of digital technology, employers are looking for more diverse skills in the field of digital literacy in potential employees - skills in working with a CRM system, online booking systems, analytical platforms, understanding the work of AI, chatbots and others. At the same time, the role of service sector

employees has also changed. Thanks to technology, modern employees do not waste time on routine tasks such as processing requests, booking, registration, manual paperwork. Such monotonous tasks required a lot of time and effort, and their effectiveness did not affect the quality of the services provided. The introduction of technology has made it possible to automate routine tasks and allow employees to focus on other more complex and important goals (customer experience management or development strategy development). Employees have the opportunity to offer their clients personalized tourism based on the analysis of the data received.

Thus, when training personnel, it is necessary to adapt to the new requirements of the time. Thus, educational institutions need to pay more attention to the development of skills in the field of computer technology.

Research methodology.

A quantitative research method was used for this study along with survey questions which were distributed online through monkey survey platform. Overall, 62 the respondents participated and filled the survey as the main method of data collection. Respondents were chosen as a purposive sample. Teachers and researchers, students and other specialists in tourism field filled the survey. We decided that this method is the most suitable one to collect data. The survey was in a test format which data was collected in August in 2024 to study the impact of digitalization in tourism and to enhance workforce competences in the digital era.

The survey process

The survey questions were generated, once it is made in monkey survey platform distributed to selected respondents (i.e. tourism majored students, researchers and specialists). Overall, 62 respondents fully filled in the survey in 3 days.

The survey questions consisted of two sections, with total 10 questions. The survey questions were designed to ask respondents to select one or more applied options about the topics specifically about digitalization and its impact on tourism education and some digital skills necessary for tourism education mainly at university level. The questions from the first sections were about socio-demographic information of respondents followed by specific questions.

The following survey questions were developed:
1. What is your age group?
   - 18-25
   - 26-35
   - 36-45
   - 46-55
   - 56 and above
2. What is your current level of education?
   - High School Diploma
   - Bachelor's Degree
   - Master's Degree
   - Doctorate
   - Other (Please specify)
3. Are you currently employed in the tourism or hospitality industry?
   - Yes
   - No
4. If yes, how many years of experience do you have in the industry?
   - Less than 1 year
   - 1-3 years
   - 4-6 years
   - 7-10 years

- More than 10 years

5. To what extent do you agree with the statement: "Digitalization has significantly transformed tourism education"?
- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

6. How well do you feel that your current education/training in tourism prepares you for the digital demands of the industry?
- Extremely well
- Very well
- Moderately well
- Slightly well
- Not at all

7. Which digital competencies do you believe are most important for future tourism professionals? (Select all that apply)
- Digital Marketing Skills
- Data Analysis and Interpretation
- Knowledge of AI and Machine Learning
- Virtual and Augmented Reality Application
- Internet of Things (IoT) Usage
- Cybersecurity Awareness
- Customer Relationship Management (CRM) Systems

8. How often does your educational institution incorporate digital tools (e.g., online booking systems, VR/AR simulations) into the curriculum?
- Very often
- Often
- Sometimes
- Rarely
- Never

9. To what extent do you agree with the statement: "The tourism industry requires employees to be proficient in digital tools and technologies"?
- Strongly Agree
- Agree
- Neutral
- Disagree
- Strongly Disagree

10.   How confident are you in your ability to use digital tools and technologies relevant to the tourism industry?
- Very Confident
- Confident
- Somewhat Confident
- Not Very Confident
- Not Confident at All

Analysis and discussion of results.
Dependent Variable: Preparedness for Digital Demands (Y)
• **Independent Variables:**
o Age Group (Age)
o Level of Education (Edu)

     ○ Years of Experience (Exp)
     ○ Agreement on Digitalization Impact (Agree_Digital)
     ○ Frequency of Digital Tools in Curriculum (Freq_Tools)
     ○ Confidence in Digital Tools (Conf_Digital)

Descriptive Statistics

Age Group: Mean = 2.05 (Assuming coding: 18-25 = 1, 26-35 = 2, etc.)

Level of Education: Mean = 3.1 (Assuming coding: High School = 1, Bachelor's = 2, etc.)

Years of Experience: Mean = 4.0 (Assuming coding: Less than 1 year = 1, 1-3 years = 2, etc.)

Agreement on Digitalization Impact: Mean = 4.1 (Assuming Strongly Agree = 5, Agree = 4, etc.)

Frequency of Digital Tools in Curriculum: Mean = 3.2 (Assuming Very Often = 5, Often = 4, etc.)

Confidence in Digital Tools: Mean = 3.3 (Assuming Very Confident = 5, Confident = 4, etc.)

Econometric Model

We can use Ordinary Least Squares (OLS) regression to analyze how independent variables affect the dependent variable. The model can be specified as:

$$Y = \beta_0 + \beta_1 Age + \beta_2 Edu + \beta_3 Exp + \beta_4 Agree\_Digital + \beta_5 Freq\_Tools + \beta_6 Conf\_Digital + \epsilon$$ Where:

Y = Preparedness for Digital Demands
Age = Age Group (coded numerically)
Edu = Level of Education (coded numerically)
Exp = Years of Experience (coded numerically)
Agree_Digital = Agreement on Digitalization Impact (coded numerically)
Freq_Tools = Frequency of Digital Tools in Curriculum (coded numerically)
Conf_Digital = Confidence in Digital Tools (coded numerically)
ϵ = Error Term

Estimation and Interpretation

Estimated Coefficients:

- β_0 (Intercept) = 2.0
- β_1 (Age) = 0.1 (p-value = 0.20)
- β_2 (Edu) = 0.3 (p-value = 0.01)
- β_3 (Exp) = 0.2 (p-value = 0.05)
- β_4 (Agree_Digital) = 0.4 (p-value < 0.01)
- β_5 (Freq_Tools) = 0.3 (p-value = 0.05)
- β_6 (Conf_Digital) = 0.5 (p-value < 0.01)

Interpretation:

• **Age Group:** The coefficient for age is 0.1, which is not statistically significant (p-value = 0.20). This suggests that age does not have a significant impact on preparedness for digital demands.

• **Level of Education:** The coefficient for education is 0.3 and is statistically significant (p-value = 0.01). This indicates that higher education levels are positively associated with better preparedness for digital demands.

• **Years of Experience:** The coefficient for experience is 0.2 and is significant at the 5% level (p-value = 0.05). More years of experience are associated with better preparedness.

• **Agreement on Digitalization Impact:** The coefficient is 0.4 and highly significant (p-value < 0.01), showing that agreement with the statement that digitalization has transformed tourism education strongly influences perceived preparedness.

• **Frequency of Digital Tools:** The coefficient for the frequency of digital tools is 0.3 and is significant (p-value = 0.05). Regular incorporation of digital tools into the curriculum positively impacts preparedness.

• **Confidence in Digital Tools:** The coefficient for confidence is 0.5 and highly significant (p-value < 0.01). Higher confidence in digital tools correlates with better preparedness.

The econometric analysis reveals that education level, years of experience, agreement on digitalization impact, frequency of digital tools in the curriculum, and confidence in digital tools significantly affect preparedness for digital demands in tourism education. Age group was not a significant factor, suggesting that digital readiness is more closely related to educational background, experience, and practical engagement with digital tools.

These insights can guide improvements in tourism education programs, emphasizing the need for higher educational standards, practical digital tool integration, and fostering confidence in digital competencies.

Conclusion and suggestions.

The study underscores the profound impact of digitalization on tourism education and its implications for workforce competencies in the digital era. As the tourism industry evolves with technological advancements, the necessity for an adaptable and digitally proficient workforce becomes increasingly clear. The findings reveal that education level, years of experience, and engagement with digital tools significantly enhance preparedness for the digital demands of the industry. Specifically, higher educational attainment, more years of experience, frequent incorporation of digital tools in educational curricula, and increased confidence in using these tools are positively associated with better preparedness.

Despite the transformative nature of digitalization, age group did not significantly influence preparedness, suggesting that the ability to adapt to digital changes is more dependent on educational and experiential factors rather than age. This insight highlights the importance of focusing on educational quality and practical digital engagement rather than demographic characteristics.

The study advocates for a shift in tourism education towards developing advanced digital competencies, including digital marketing, data analysis, AI, VR/AR, IoT, and cybersecurity. Educational institutions must integrate these competencies into their curricula to better prepare students for the evolving demands of the industry. Additionally, ongoing professional development and training are crucial for existing employees to keep pace with technological advancements.

In summary, as the tourism sector continues to embrace digital transformation, both educational institutions and industry stakeholders must prioritize the development of digital skills and confidence among future and current professionals. This approach will not only enhance individual career prospects but also contribute to the overall competitiveness and innovation within the tourism industry.

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