МЕЖДУНАРОДНЫЙ ОПЫТ ИНТЕГРАЦИИ ОБРАЗОВАНИЯ / INTERNATIONAL EXPERIENCE IN THE INTEGRATION OF EDUCATION

Strategic University Management in the Context of Digitalization: The Experience of the World's Leading Universities

W. Strielkowski[a,b,c] ✉**, E. N. Korneeva**[d,e]**, A. A. Sherstobitova**[e]**, A. Yu. Platitzyn**[e]
[a] *University of California, Berkeley, United States*
[b] *Cambridge Institute for Advanced Studies, Cambridge, United Kingdom*
[c] *Czech University of Life Sciences Prague, Prague, Czech Republic*
[d] *Financial University under the Government of the Russian Federation, Moscow, Russian Federation*
[e] *Togliatti State University, Togliatti, Russian Federation*
✉ *strielkowski@cantab.net*

Abstract

Introduction. The research paper's aim is to study the ongoing digitalization in all spheres of economy, which inevitably impacted on the strategic university management. It explains how universities and higher educational institutions strategically positioned themselves and searched for the novel pathways for innovation and development, which was further reinforced by the COVID-19 pandemic and the digital surge it brought.

Materials and Methods. The authors analyzed the strategic university management in the context of digitalization using the literature review and their own analysis. They focus on the experience of the world's best universities for inspiring the institutions of higher education in other countries and regions, helping them to improve information and communication technologies and digital skills.

Results. Our results corroborate the ongoing digitalization in all spheres of economy and social life which was pushed further by the COVID-19 pandemic contributed to the transformation of the higher educational institutions challenging them to embark upon the path of in-depth transition, restructuring, and re-thinking their role and their mission with regard to the new challenges and novel technologies that are available on the market.

Discussion and Conclusion. The outcomes present interesting possibilities for their application in practice for some countries, most notably Russia. They can be of a special interest not only for the government officials responsible for fostering higher education and devising guidelines for the strategic management of universities and higher educational institutions, but also for the academic environment with its researchers and lecturers who seek to innovate based on the most recent and advanced trends in higher education (e.g. ministries and national authorities responsible for science, research, and education in different countries, such as the Ministry of Science and Higher Education, Ministry of National Education, Ministry for Research, as well as National Educational Authority or the World Bank, just to name a few).

Keywords: universities, digitalization, higher education, strategic management, information systems

Научная статья

Стратегическое управление университетом в контексте цифровизации: опыт ведущих университетов мира

В. Стриелковски [1,2,3] ✉, **Е. Н. Корнеева** [4,5],
А. А. Шерстобитова [5], **А. Ю. Платицын** [5]
[1] *Калифорнийский университет, г. Беркли, США*
[2] *Кембриджский институт перспективных исследований, г. Кембридж, Великобритания*
[3] *Чешский агротехнический университет, г. Прага, Чехия*
[4] *Финансовый университет при Правительстве Российской Федерации, г. Москва, Российская Федерация*
[5] *Тольяттинский государственный университет, г. Тольятти, Российская Федерация*
✉ *strielkowski@cantab.net*

Аннотация

Введение. Цель статьи – изучение происходящей цифровизации во всех сферах экономики, которая неизбежно повлияла на стратегическое управление университетом. Университеты и высшие учебные заведения занимают стратегическое положение и разрабатывают новые пути для инноваций и развития, что еще больше укрепилось в результате пандемии COVID-19 и вызванного ею цифрового всплеска.
Материалы и методы. Авторы проанализировали стратегическое управление университетом в условиях цифровизации, используя обзор литературы и собственный анализ. Они ориентируются на опыт лучших университетов мира, чтобы вдохновлять высшие учебные заведения других стран и регионов, помогая им совершенствовать информационно-коммуникационные технологии и цифровые навыки.
Результаты исследования. По результатам проведенного исследования было доказано, что цифровизация во всех сферах экономики и социальной жизни, получившая дальнейшее развитие в связи с пандемией COVID-19, способствовала трансформации вузов, поставила их перед необходимостью встать на путь глубокого перехода, реструктуризации и переосмысления своей роли и миссии с учетом новых задач и усовершенствованных технологий, доступных на рынке.
Обсуждение и заключение. Полученные результаты представляют интерес не только для государственных должностных лиц, ответственных за развитие высшего образования и разработку рекомендаций по стратегическому управлению университетами и высшими учебными заведениями, но и для академической среды с ее исследователями и преподавателями, стремящимися к инновациям на основе передовых тенденций в высшем образовании.

Ключевые слова: университет, цифровизация, высшее образование, стратегический менеджмент, информационная система

Introduction

Today, at the era of digitalization and digital transformation, many universities and other higher educational institutions (HEIs) face the necessity to rethink their role and mission as well as to adapt to the new conditions on the educational market [1–3]. Some universities and HEIs employ the

university-wide strategy plans that provide a detailed description of how campus-wide interviews, listening tours, and contributions to plan development can contribute to transparency and engagement. For example, the university of Bergen in Norway complements the general university strategy in its university-wide digital strategy in its decision-making and entrepreneurial needs, and defines digitalization as more than just digital tools, it is about changing our culture and how people and companies conduct business[1]. In the United Kingdom, the digital strategy of many leading universities (e.g. Russel Group universities, an association similar to the Ivy League in the United States) is a stand-alone strategy that complements the university's overall strategic plan. The digital strategy highlights the university's mission and highlights a list of other sectoral strategies that collectively deliver the university's vision. The strategy also includes a list of the key performance indicators that show how successful success is for all stakeholders within the university, from students to decision makers[2].

Our paper draws from the experiences of universities that have re-redefined the way they treat students and look at the latest technology available on the market and seeks how this experience can be implemented into the practice of the other countries (e.g. Russian Federation). It is clear that universities and college (by "college" here we, hereinafter in this paper, mean either a degree-awarding tertiary educational institution or a part of a collegiate or federal university as it perceived in the United States) administrators and leaders are recommended to make sure that their strategies concerning the digitalization of education are reflected in the perspectives of staff and students and are supported and corroborated by the data and available statistics. It can be shown that specially delegated persons who would act as the digital learning fellows might help universities and HEIs to advance their technological solutions aimed at doing research

as well as at vocational education and training [4–6]. Approaches such as this one might considerably improve vocational education and training and lay the path for their future development with an overall aim of improving results for students, providers and employers. Nowadays, as our globalizing world pours more and more young people who wish to enroll into the secondary and tertiary education and the urbanization of the developing and developed countries continues, the economic competitiveness calls for the novel complex and holistic policies aimed at reforming the whole system. Tertiary education is crucial for improving and inspiring primary and secondary education, as far as tertiary institutions are preparing teachers, administrators, executives, and other education experts to develop policies and personnel schools for young children [7].

Figure 1 that is depicted below demonstrates the place and the role of the University 4.0 in the era of digitalization and ICT. The Figure clearly explains how the modern-day university (which is being generally called "University 4.0") draws heavily from and depends upon traditional and renewable energy sources, how it cooperates with people and promotes innovative ideas and projects that might include smart technologies as well as various novel applications and devices.

The COVID-19 crisis (2020–2022) demonstrated that leaders in academia and education can derive the lessons learned from the recent events in order to increase the resilience of their respective institutions for the years to come. The data from the online learning and home office can be used for fine-tuning and improving online education tools and approaches for further use in order to test the future of higher education models [8]. University leaders must not overuse their time fighting fires now and forget about the long-term perspective.

For quite some time, managers and leaders in higher education are trying to master their skills in strategic management.

---

[1] United Nations, University of Bergen – SDG Bergen Initiative. 2021. Available at: https://sustainabledevelopment.un.org/partnership/?p=28818 (accessed 23.01.2022).

[2] JISC, University of Leicester. 2018. Available at: https://digitalcapability.jisc.ac.uk/case-studies/university-of-leicester (accessed 23.01.2022).
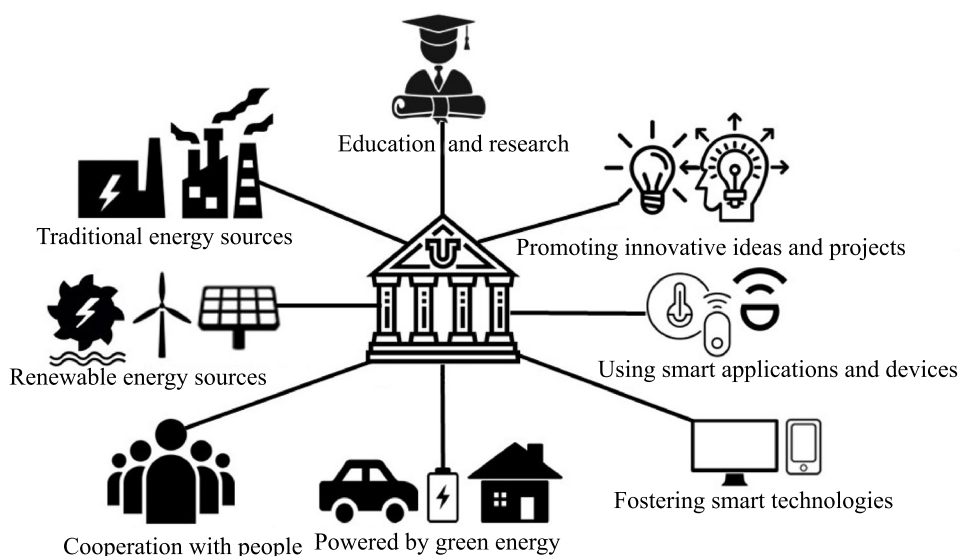
F i g. 1. University 4.0 in the era of digitalization and ICT: links and collaborations
Source: Own results.

Even though all managerial skills seem to be similar and uniform across all fields of economy for the majority of people, the complexity and nature of the problems that university managers face in their daily lives are quite different from those tackled by the business companies [9; 10]. There are many learning opportunities that go far beyond what the private sector has learned about university governance. To build sustainable and effective organizations, science and business leaders must look at the current landscape, question assumptions and think differently in order to build sustainable and effective organizations. The results of a powerful institutional strategy are alignment of resource allocation, facilitation of strategic objectives, clear and transparent decision-making, development of new programs, the growth of research capacities and infrastructure investment [11].

It appears that the Fourth Industrial Revolution had an overall profound impact on the digitalization of universities. The digital epoch in history created by the Fourth Industrial Revolution required a transformation of the university system in order to take advantage of the opportunities offered by the digital revolution [12]. One observation about the future that science-fiction writer William Gibson attributed to is that

the digital transformation (DX) itself is not evenly distributed [13]. The dominant style of leadership at universities is that the goals of behavior change, expression, freedom of speech, knowledge acquisition, distribution, exchange and reward should lead to trust building between academics and student. Academic learning and teaching leads to creativity, problem-solving and innovation and that staff have enough skills to enable the university to succeed in the era of the Fourth Industrial Revolution. Two widespread shifts in the workforce towards shared services and peer-to-peer approaches are changing the nature and the ways employees work and reducing the effective use of resources. Applications and services are to be redesigned taking into account the student experience. These changes need to be discussed and redefined in the context of the Top 10 educational issues of the post-pandemic era [14].

In general terms, institutions of higher education are trying to offer combined and interconnected solutions, such as various learning management systems (LMS) that can facilitate student connections and participation in academic life. Institutional leaders are building massive data repositories in real time to support the data needed for student success initiatives. This is how

relationship management is used to offer the students top-notch experience all throughout their university paths from the secondary school to graduation [15]. As the industry advances, the increasing specialization and complexity of the data science skills, tools and services prompts HEIs to offer training opportunities so that our community members can take full advantage of these new and emerging capabilities. While some universities offer credit courses on aspects of modern information technology to all of our registered students, these courses remain inaccessible to a large portion of our community. Increasing the efforts to provide the faculty, staff, and students with specialized IT training and general IT training opportunities as a form of continuing education in IT are the efforts higher education requires. This novel approach to education is revolutionizing student experience by providing marketing, enrollment and retention services for colleges (i.e. tertiary educational institutions), universities and other HEIs that are focused on the success of their students. HEIs might lag behind many of their counterparts in the effort to use institutional data to improve their educational outcomes and operational efficiencies [16; 17].

Thence, today universities and HEIs need to position themselves as leaders in supporting innovation by supporting the appropriate use of new data collection technologies. This change took longer than usual. For example, universities and HEIs need to foster their usage of online tuition and resources that might include online rating or psychological counselling. In general, there has been a huge increase in the workload in learning how to use new technologies and in processing student requests, expecting them to do the same thing that killed off research [18]. The summer semester of 2021, during which many HEIs were able to gather research results and had time to think about ways to improve their current offerings, should be dominated by the redesign of modules accessible for online teaching and assessment and completion of the formalities necessary to support change – not enough time to ensure a coherent and balanced approach throughout the course.

Literature Review

As the world changes because of COVID-19, we can benefit from resilience that not only reduces personal stress, but also helps us think differently. Uncertainty and change are inevitable and reinforce the need to adapt to competition [19] in these circumstances. This is why companies should view digital transformation less as a completed technology project than as a state of constant agility ready to adapt to customers' needs. In its essence, the digital transformation includes the integration of digital technologies into all aspects of cultural and organizational routines changing the way industries and organizations operate and communicate to each other, processes, competencies, and functional levels in a staged and strategic manner that can be considered a digital transformation strategy [20]. A dedicated strategy that focuses on digital and provides a deep understanding of what makes the digital possible, aligning it with priorities and strategic objectives, enable organizations to shape and secure their future in an uncertain world. While the technological aspect is important here, the complexity of the digital transformation and the links to all aspects are also relevant. It employs the technology to give all relevant stakeholders as well as customers what they desire most through new services and to help them to quickly adapt to the altering environment. Digital transformation can find its use for business purposes, but it can also have an impact on the organizations of the state administration that are dealing with such pressing issues of today as the climate change or overpopulation and that require novel tools and technologies in order to be effective in what they are doing [21; 22]. The technological capabilities that drive the implementation of the digital transformation, such as Internet of Things (IoT), Big Data, cloud computing, and mobile technologies require lots of computing power, data storage and information distribution in comparison with those of earlier technology-driven transformations. However, the rate and the speed of changes in higher education was slower than in other, more profit-oriented sectors, but thanks

to digital change business models and innovations are becoming more widely spread. The transformation of the market determines the speed of product development, market introduction and transfer of ecosystem innovations, presenting a network of agents exchanging the products and services [23]. As a result, the education landscape is going to experience significant changes in the years to come due to the new entrants who will alter the traditional approach to higher education and models of lifelong learning. There are innovations in the field of higher education that offer novel and breakthrough solutions that change the way higher education has been looked upon or perceived for many decades. The new approaches to using data and technology are employed to meet the changing expectations of learners. Innovative start-ups and companies stir the old-fashioned business models of traditional educational institutions. Thence, it becomes apparent that education models need to reflect the demand of lifelong learning and face the technological and social changes caused by the Fourth Industrial Revolution. The traditional experience on university campuses is unlikely to disappear as we become more accustomed to online education [24]. As in the other quickly evolving markets, where one can see who is ahead, it is difficult to deny that the digital transformation of education is accelerating. Some students using digital education are catching up in certain areas, while others are using them to gain a head start in pursuing careers consistent with what they are learning. Whether we are moving towards a linear, flexible, and recognized or hybrid higher education system, adaptation and change are already in place. Digital transformation model that would offer a link between the digital and physical realms can help to boost the transformation of higher education and to create new opportunities.

Figure 2 that follows sets a digital transformation pathway for universities and HEIs that can be done in five easy steps. For better clarity, this pathway represented in Figure 2 can be explained as follows: First, any university, HEI or college (a tertiary educational institution in the American perception of this term) needs to start with a smart and innovation-based campus that would encompass the support of start-ups and innovative ideas (a good example might be the University of Cambridge imposes this strategy and is often called an "entrepreneurial university"). Second, the first step should be reinforced with leadership and fostering the entrepreneurial approaches and ideas. Third, the above changes would inevitably lead to the modernization of organizational culture and the style of management applied both to the educational process and to the research. Fourth, the integration of teaching and research should be done in order to yield better and commercially applicable results. Finally, the fifth step which is the result of the four previous steps is the increase in the competitiveness and the improvement of user (students, lecturers, and researchers) experience with regard to teaching and research activities (see Figure 2).

With regard to the information presented in Figure 2, we argue that digital transformation should not be defined by technology alone as used in this article and should focus more on how the technology can help the education. Digital transition in higher education can lead to dramatic, low-tech, and transformative results. The institutional implementation of online learning tools and solutions is seen as a strategic issue and an area that needs to be further developed by the university management. Task forces have been set up to engage various stakeholders in university management, strategic planning, faculty departments, further education and teacher training conducted from the bottom up and based on the individual initiatives of the people.

Important preliminary work examined the current use of media by students and lecturers and their perception of the importance of the digital tools for teaching and tutoring in view of the imperative need to take institutional culture into account and the assumption that technology will support learning and implement digitization strategies [25], and the influence of the digital solutions used for teaching and learning. The overall goal is to control the teaching and learning process in real time so that the school can watch lessons in certain subjects and know whether the learners are learning independently or the teachers are teaching.
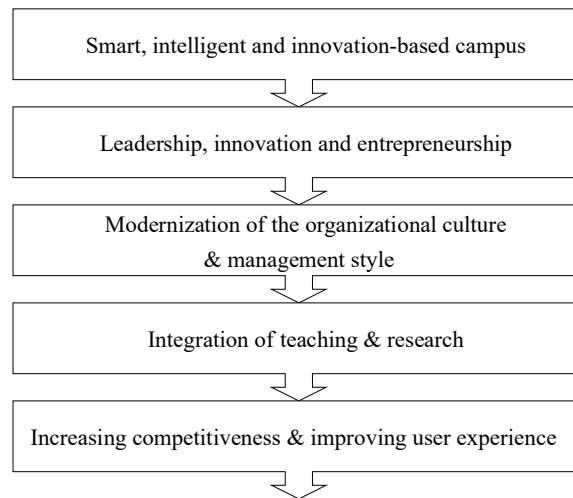
```
┌─────────────────────────────────────────────────────┐
│        Smart, intelligent and innovation-based campus  │
└─────────────────────────────────────────────────────┘
                          ▼
┌─────────────────────────────────────────────────────┐
│        Leadership, innovation and entrepreneurship     │
└─────────────────────────────────────────────────────┘
                          ▼
┌─────────────────────────────────────────────────────┐
│        Modernization of the organizational culture     │
│                  & management style                    │
└─────────────────────────────────────────────────────┘
                          ▼
┌─────────────────────────────────────────────────────┐
│           Integration of teaching & research           │
└─────────────────────────────────────────────────────┘
                          ▼
┌─────────────────────────────────────────────────────┐
│    Increasing competitiveness & improving user experience │
└─────────────────────────────────────────────────────┘
                          ▼
```

F i g. 2. Digital transformation pathway for universities and HEIs

Source: Own results.

The unique system is expected to assess how many percent of standard lesson performance are achieved over time. The university is building a digital basis to evaluate learners using a combined methodology that systematizes all parts of the system and conducts operational process management, including the learning and teaching process, using a digital transformation approach. On the one hand, the educational tradition views the educational process as rather rigid and done by the books, while in reality it is a constantly changing and evolving endeavor. With the introduction of the novel technologies and conceptual changes into the traditional approach to the higher education, physical presence is no longer a necessary requirement. Studying and working online is easier for mature students, and there is the opportunity to study for graduate and postgraduate degrees. In digital transformation, technologies such as the cloud, Internet of Things (IoT), Blockchain (BC), AI (AI) and machine learning (ML) represent the majority of technologies adopted by organizations as part of their transformation efforts. Institutions for the coming academic year are switching to online mode with the exception of sessions that absolutely require physical presences (the best-known examples of this might be the University of Cambridge and the California State System in the United States (better known for its "flagship" university – the University of California, Berkeley). Synchronous teaching methods and asynchronous platforms such as EDX and Coursera are seeing an increase in enrolments [26; 27].

Materials and Methods

Digital transformation offers new opportunities and approaches that include entrepreneurship and innovation. This is its most relevant contribution to the systems and institutions of higher education. With all that, university leaders and managers seek for pathways for making the lifelong learning available on the greater scale for virtually everyone. Hence, universities and HEIs worldwide tend to employ digital technologies more often in order to boost their development and growth [28; 29]. Digital transformation influences and changes essential aspects of education, research, engagement and management at universities. The system of education as a whole is called upon to adapt and develop to use new technologies and tools, develop action strategies and take an active role in the digital transformation process. Successful transformation of higher education requires the development by the faculties of specific strategies to increase readiness for crisis management, strengthen institutional resilience and

address new challenges in the near future [30]. The transition to online learning has been pushed by many factors (including the recent COVID-19 pandemic and its lockdowns), so that the participants of the educational process represented by the students, professors and universities have encountered several obstacles to adapting to these new technologies. Universities must become engines of digital innovation, including the provision of the skills needed to navigate the changing paradigm. The rising number of students from all around the world who perceive the university education as a stairway to the better careers, social status and wealth poses demands on the tertiary education that needs to evolve with its clients and adapt to the new conditions that the world is offering [31]. Many universities around the world waste many hours a month on manual tasks and expense accounts. The benefits can be considerable by facilitating teaching strategies that cater for a wider group of learners, expanding research opportunities and data availability, and improving business practices. Many universities underpin this work with a commitment to improving employees' digital skills and measuring success. Strada Education reports that the interest in job-based and online education programs increased during the pandemic with a third of Americans reporting they needed additional training and education to find new jobs[3]. Students appreciate the sense of community they have gained on campus, and their expectations have evolved into more than just looking for learning choices. The whole industry of universities and HEIs is now at a pivotal moment and the digital strategies come in a time when universities start to fight for their students. These strategies can help more technologically advanced universities to win over their potential students by persuading them that they would offer the knowledge and skills that would be future-proof. It appears that one expectation in terms of teaching and learning is that students want a choice in the way classes are conducted, with many reluctant to return to large lecture halls after COVID-19. The higher education system is not mentioned in the plans outlined in the manifesto, but the overall objectives of the institutions of higher education apply, because they are part of the Italian public administration. The transformation of new and existing programs increased enrollment in the 16 months after the transition by 5% in the 16 months after it began, through a combination of increased enrollment and improved persistence of existing students[4]. Efforts to improve costs helped institutions limit the increase in tuition fees and offer additional financing options so that students could finish their education in times of uncertainty caused by COVID-19 crisis. Higher education institutions are under enormous pressure and time pressure as they work to keep their students, faculty and staff safe as they carry out their mission of educating, researching and contributing to their communities, society and the public good. The sector feels overwhelmed, and the prospect of sweeping change sounds overwhelming to the leaders and the communities that lead them. As the world starts its collective creep out of COVID-19, there is no denying that the pandemic is reshaping the higher education landscape and accelerating the tailwind that has been building for decades. Digital transformation has permeated the process of communicating formats, goals, teaching and learning as well as research in higher education. The pandemic has softened the ground for university administrators, faculty, staff, and students to experiment and adapt teaching, learning, and administrative courses [32]. Digital transformation strategy (DX) is a complex and continuous transition for many educational actors, learners, teachers, administrative staff, including IT departments, and the wider community. It can be a fundamentally new approach to managing workforce, technology and culture that would offer novel solutions

---

[3] Strada: Back to Class, 2021. Available at: https://cci.stradaeducation.org/pv-release-may-19-2021-back-to-class (accessed 20.01.2022).

[4] McKinsey & Company: COVID-19 and Education: The Lingering Effects of Unfinished Learning. 2021. Available at: https://www.mckinsey.com/industries/education/our-insights/covid-19-and-education-the-lingering-effects-of-unfinished-learning (accessed 21.01.2022).

for transforming, directing, and changing the existing (and sometimes quite obsolete) institutions. Many universities and HEIs are now embarking on a journey towards embracing the DX as a part of adjusting to the challenges posed by the modern globalized world[5]. One observation of Back to the Future attributed to science-fiction writer William Gibson is that digital transformation or DX itself is not evenly distributed. In the 2019–2020 IT editions, panelists discuss these shifts in the context of the top 10 education topics. Key topics will be highlighted and discussed in relation to the goals and signals of the university, the role of technologies in enabling academic and operational outcomes, and the final goal. The university-wide strategy plan of any university should include technology as one of its main themes. Typically, a university strategy plan includes a detailed description of how campus-wide interviews and listening tours contributed to the development of the plan and encouraged transparency and engagement. Their first goal is to provide an enhanced experience, where technology improves teaching and emphasizes the critical core of the university's mission of educating students.

Results

If the digitalization of higher education does not happen, we will lose students to non-traditional education providers. We can use DX to transform student educational trips and make the experience of students and faculty more seamless. If they are to succeed, institutions must combine technology strategies in all areas. In order to implement a successful digital transformation strategy, institutions need concrete goals to work toward. An integrated strategic planning approach that integrates stakeholder needs into the evaluation process is crucial.

Digital transformation offers the core business functions the opportunity to change how they work in order to grow the organization and be competitive longer term. In order to be successful in a time of constant change, companies must use new technologies and methods to renew, rethink and redesign processes in order to offer better customer experiences. Digital transformation in higher education involves automating manual processes that enable the students to register for their classes or solve various study-related or administration issues using apps on their smartphones or web-based tools [33].

The costs of digitalization of the entire university department or facility often seem to be very high but the benefits often surpass the costs and offer many unexpected bonuses. Digital transformation is a complex and continuous transition for many educational actors, learners, teachers, administrative staff (including IT departments) and the wider workplace community. These include the development of new infrastructure, the increased use of digital media and technologies for teaching and learning, research, support services, administration and communication, and the needs of students and staff to develop new digital skills for their current and future jobs. To meet the demands of the future, universities need to evolve to drive competition [34] and to focus strongly on students.

Institutions of all sizes and styles are turning to technology to transform their services and operations. For many institutions the answer is to focus on their biggest strategic, competitive and financial needs through technological solutions – encouraging better enrollment and retention and improving student experience. Digital transformation refers to the development of an organization's basic business practices through the use of technology and data. It is revolutionizing the way companies approach their operations, product and service offerings, marketing efforts, and other facets of their organizations. Higher education, as one of the largest industries, is uniquely positioned to reap significant benefits from the digital transformation. Digital transformation has become a buzzword that includes the migration of manual and paper-based processes to digitization

---

[5] EDUCASE: How Colleges and Universities Are Driving to Digital Transformation Today. 2020. Available at: https://er.educause.edu/articles/2020/1/how-colleges-and-universities-are-driving-to-digital-transformation-today (accessed 20.01.2022).

through information automation and data analysis. To make a long story short, this is all about automatizing and simplifying the existing routines and processes in the higher education and academia (as well as in any other industry). Therefore, the digital transformation actually means implementing the digital tools and technologies into all operations and processes intended to enhance the user experience and satisfaction. The COVID-19 pandemic has driven the digitization of processes across industries, but it has hit universities the hardest. The process of digitization is the collective use of technology for specific operational purposes, from research and administration functions to payroll and procurement to online provision of courses. For colleges (tertiary educational institutions) and universities, digital transformation (DX) starts with electronic text-class registration systems and online lessons and continues with enrollment management, student file maintenance and student evaluation. The current COVID-19 pandemic has changed the way work and life are interrelated on a global scale. Many of our customers are going through digitization in their departments, offering encouraging green shoots of progress. Focusing on education, we attempted to show how the universities and HEIs undergo radical changes pushed by the necessity to digitize the higher education rapidly and efficiently. In addition, we need to remark that the practice shows how many academics tend to lack necessary digital skills and approaches and fear online teaching for a number of reasons. Universities and HEIs worldwide need to overcome these issues and to introduce technological innovations everywhere where it is possible and impossible attempting to change the attitudes even of the most hard-core traditionalist academics. To achieve this aim, one needs to realize and take into account all the obstacles and challenges that universities and HEIs might and probably will face, the technological resources and methods that they will use in the existing current scenario to introduce the groundbreaking challenges to the higher education in the face of the COVID-19 crisis. Many voices in higher education have seized on Joseph Bower and Clayton Christensen's concept of disruptive innovation in recent weeks to explain the current situation and impose turbulent times on the status quo at universities. At the institutional level, during the COVID-19 pandemic, which brings a complete disruption of the current status quo, universities rely on distance learning in emergencies [35]. It is wise to be cautious about abandoning the traditional model of personal socialization of universities and introducing disruptive technologies that will force many to question their knowledge and make this phase of change more difficult for higher education. In the context of the transformation of higher education, academic organizations can reduce costs and eliminate offerings that do not differentiate by investing in areas that reposition central teaching and research in a way that creates competitive advantages in a changing landscape. Transformation A is a conscious choice by universities to address the failure to choose between costly mediocrity and nothing. Transformation B means developing the ability to respond to emerging opportunities and societal demands. By moving to a sustainable model of online learning universities can use technology to reinvent teaching processes, transform evaluation activities, change the use and role of traditional teachers and schools, provide specific training, focus on reinventing values and self-renewing of service models. Transformation B, by contrast, sees each as a clear opportunity to focus on new models that separate students from the market. Examples of innovations in Transformation B might also include online learning, distance learning, and other forms of better access for students.

Conclusion and Discussion

Overall, we can note that higher education the digital transformation in the higher education is inevitable. The recent COVID-19 pandemic demonstrated how important it can be not only in the times of crisis but also for the rapid and effective transformation of the human society. The experience of the world's leading universities (such as the University of Cambridge or the University of California, Berkeley) demonstrated just that with clarity.

It becomes clear that digitalized higher education is becoming a new normal that requires a clear strategic vision led by senior management. The digital strategy has moved to the top of the list of priorities as institutions seek to remain relevant in an environment where they have a digital strategy and the opportunity to excel and grow. Policies and investments that appeal to this group of students are likely to have wider benefits. These students fear being excluded from higher education by institutions that are less willing to acknowledge and respond to their needs, thereby enhancing their reputation. They fear not being able to access all aspects of higher education, not being able to take part in face-to-face courses, not being able to access essential content, sharing areas such as libraries and networking with peers. Higher education institutions must build a culture of student success and retention that makes all stakeholders accountable. Universities and HEIs must keep pace with their constituents' evolving digital needs. This means solutions that use modern technologies to ensure performance, agility, business continuity, security and privacy requirements in a rapidly changing higher education environment. A common challenge in the digital transformation of education is that its broad spectrum includes the experiences of students, staff, and parents, making an effective digital transformation more effective than ever. Effective digital transformation must address the lecture room and learning environment, because it will affect people, processes, and technologies in schools. Digital transformation in higher education involves automating manual processes. For example, the most successful technologies take the data points created by students and schools, analyze them in individualized factors, and use them to make the students aware of the problems real people and commercial companies tend to face in their everyday business. Beyond marketing and enrollment goals, the digital transformation of higher education should not remove people from the picture, but rather offer the right students right professors with visions and ambitions which is what students need. For example, digital strategies of the world's leading universities complement their overall strategic plans. They emphasize the mission of the universities and highlight a list of other areas that together make the universities' vision a reality. The university-wide strategy plan of the world's leading universities today includes embracing novel and breakthrough technologies. Independent digital strategies focus on universities' vision of transforming the organization through digital tools and technologies. They tend to be shorter and develop faster than general university strategic plans. The biggest disadvantage of the standalone format is strategy fatigue, which is a problem when institutions pursue multiple (or at worst contradictory) strategies. Given the usual pattern of institutional-wide strategic plans, the digital component suffers from a creeping scale and lack of concrete next steps. Concrete goals and steps are required in order to push forward the successful digital transformation strategy. One needs a true effort and absolute commitment without knowing for sure whether her or his hard work would pay off at the end. Hence, one needs to look at her or his inefficiencies, disparate systems, campus technologies, methods, and the skills se or he needs to achieve her or his goals.

While higher education policymakers are trying to accelerate the pace of digital change, there are role models they should follow. For IT executives and others in the higher education ecosystem, accelerating change is a permanent prerequisite for universities and HEIs, not only in 2022, two years into the COVID-19 pandemic, but in the foreseeable (and hopefully less restrictive and more socially plausible) future. The examples of the institutions using modern technologies to drive digital transformation for the benefit of students, teachers, administrators and IT teams can be well used here to illustrate that. And now there are some cloud-based applications are designed for students and allow them to take exams online. Thanks to these types of programs, students from different backgrounds have better access to teaching and educational opportunities. Students who require courses offer increased flexibility while students who do not live near the university that offers the program they want, or who for various reasons are unable to attend

classes in person, can experience the benefits of cloud-based learning growth.

Indeed, bringing together the right team of technology, data, and processing professionals who can work together with a strong leader capable of driving change can be the single most important step a company planning a digital transformation can take. Today's powerful and interconnected technologies, including cloud computing and artificial intelligence, mean that any business on its way to digital transformation will have lucrative opportunities, but also face serious threats. This wave of revolutionary change, fueled by technology, has already changed many industries and has only just begun. The researchers provide a new perspective on how universities should implement standardization mechanisms to integrate impact change into the development of competitive advantage, particularly through the use of digital transformation strategies that reflect the competitiveness of organizational performance. Digital transformation strategies are not only changing the educational delivery model of universities, but also redefining students who need a global education. For example, a dedicated IT cloud infrastructure as a part of a national plan to help universities to build their digital strategy for Improving the delivery of virtual education, including shared storage, shared data management, and application services.

All in all, our results demonstrate that the ongoing digitalization in education systems in general and in the higher education in particular is irreversible both in Russia and all around the world. However, these digitalization efforts need further fostering and support. The COVID-19 pandemic demonstrated that even the most profound changes in this field can be done literally overnight without further delay. This has set the path for the future development of this sector and showed how the decisive changes can and should be implemented in order to further strategically develop the system of higher education for the years and decades to come.

This paper summarizes how today universities can leverages evolutionary learning, information technology and digital transformation opportunities to create

sustainable competitive advantage in the post-COVID era. Here are benefits of using digital technologies to support core learning and improvement efforts. Today, more than ever, higher education institutions are exploring digital tools for critical campus processes, and for good reason as universities and HEIs are undergoing digital transformation or developing a digital strategy and researching the possibilities of digital transformation. Technology and services are being redesigned to provide a consistent experience that connects, educates and connects students and offers lifelong learning. As support staff and students in a wider range of geographic areas with a broader set of needs, the demand for digital solutions is only increasing. The possibilities of new products, services and business models promise to have a significant impact on almost all sectors of the economy, even those where digital technologies have already made a major difference.

Modern universities, both in Russia and worldwide, need to create executive plans aimed at exploring how new and existing business strategies can be improved through the adoption of digital technologies and systems. This particular approach to business strategy is structured as an attempt to find a balance between traditional approaches and new ways universities and HEIs can use technology to improve their best practices. Ultimately, the goal is to unlock opportunities to better meet the needs of citizens by applying innovation, design and digital technologies to existing services and creating new ways of delivering them. Various governmental institutions and agencies such as ministries (e.g. Ministry of Science and Higher Education, Ministry of National Education, Ministry for Research, as they are called in different countries), as well as National Educational Authorities should take the lead in this process. In addition, international institutions such as the World Bank can also be drawn into this process. The World Bank is supporting and transforming countries seeking to enhance, expand, and transform existing educational practices and methods through the use of new technologies. To implement this strategy, the World Bank is supporting countries through lending operations,

partnership networks and the development of digital global public goods to support the World Bank's global approach to education. The World Bank supports education technology communities in all countries to discover new innovations, build the evidence base, and help transform education Ministries into learning organizations. The use of technology by lecturers and educators enables them to tap into a range of resources to provide students with a more targeted and personalized learning experience. Technology can and should be used to easily collect data from educational institutions, analyze this data and support decision-making. The technology is currently available to measure achievement, track student progress, manage student retention, track book distribution, manage teacher recruitment, track education system spending, and more. Policies must be comprehensive, taking into account teacher skills and incentives, adequate digital learning resources relevant to the curriculum, and formative assessments that capture learning. Digital solutions can also ensure that processes such as curriculum reviews, grade assessments, curriculum assessments and lecturers' assessments are consistently conducted in accordance with established school practices.

Digital solutions can also provide tips and reminders, minimizing the need to make phone calls or emails to check progress or shorten deadlines. It becomes apparent that Chancellors, Vice-Chancellors and CEOs (as well as other governing body members) of the universities and HEIs worldwide need to be more explicit about the role of digital technologies in implementing institutional strategies. In turn, the success of the strategic plan will depend on a strong and well-resourced infrastructure, with each agency having a different entry point that determines the speed and scope of digital transformation required. Taken together, all these elements (a long-term vision for students, researchers and staff, the four themes of leadership, employees, business model and investment, and a clear vision for the necessary infrastructure) should provide leaders with a foundation for digital, solid, and transformative long-term strategy centered on technology. The answers to each question will vary from institution to institution, but we hope that this research generated some novel insights and strategies that put digital at the forefront of thinking about how to realize a shared long-term vision and strategy for the universities and HEIs in Russia and all over the world.

REFERENCES

1. Saykili A. Higher Education in the Digital Age: The Impact of Digital Connective Technologies. *Journal of Educational Technology and Online Learning.* 2019;2(1):1-15. doi: https://doi.org/10.31681/jetol.516971

2. Rodríguez-Abitia G., Bribiesca-Correa G. Assessing Digital Transformation in Universities. *Future Internet.* 2021;13(2):52. doi: https://doi.org/10.3390/fi13020052

3. Strielkowski W., Volchik V., Maskaev A., Savko P. Leadership and Effective Institutional Economics Design in the Context of Education Reforms. *Economies.* 2020;8(2):27. doi: https://doi.org/10.3390/economies8020027

4. Miller P. 'Culture', 'Context', School Leadership and Entrepreneurialism: Evidence from Sixteen Countries. *Education Sciences.* 2018;8(2):76. doi: https://doi.org/10.3390/educsci8020076

5. Rafiq M., Batool S.H., Ali A.F., Ullah M. University Libraries Response to COVID-19 Pandemic: A Developing Country Perspective. *The Journal of Academic Librarianship.* 2021;47(1):102280. doi: https://doi.org/10.1016/j.acalib.2020.102280

6. Mirata V., Hirt F., Bergamin P., Van der Westhuizen C. Challenges and Contexts in Establishing Adaptive Learning in Higher Education: Findings from a Delphi Study. *International Journal of Educational Technology in Higher Education.* 2020;17:32. doi: https://doi.org/10.1186/s41239-020-00209-y

7. Tarasova A., Korneeva E., Krayneva R., Gudkova S. Pitfalls and Drawbacks in Engineering Education in Russia. *Journal of Applied Engineering Science.* 2019;17(1):43–51. doi: http://dx.doi.org/10.5937/jaes17-19097

8. Azorín C. Beyond COVID-19 Supernova, Is Another Education Coming? *Journal of Professional Capital and Community.* 2020;5(3/4):381–390. doi: https://doi.org/10.1108/JPCC-05-2020-0019

9. Klofsten M., Fayolle A., Guerrero M., Mian S., Urbano D., Wright M. The Entrepreneurial University as Driver for Economic Growth and Social Change-Key Strategic Challenges. *Technological Forecasting and Social Change.* 2019;141:149–158. doi: https://doi.org/10.1016/j.techfore.2018.12.004

10. Succi C., Canovi M. Soft Skills to Enhance Graduate Employability: Comparing Students and Employers' Perceptions. *Studies in Higher Education.* 2020;45(9):1834–1847. doi: https://doi.org/10.1080/03075079.2019.1585420

11. Miotto G., Del-Castillo-Feito C., Blanco-González A. Reputation and Legitimacy: Key Factors for Higher Education Institutions' Sustained Competitive Advantage. *Journal of Business Research.* 2020;112:342–353. doi: http://dx.doi.org/10.1016/j.jbusres.2019.11.076

12. Schiølin K. Revolutionary Dreams: Future Essentialism and the Sociotechnical Imaginary of the Fourth Industrial Revolution in Denmark. *Social Studies of Science.* 2020;50(4):542–566. doi: https://doi.org/10.1177/0306312719867768

13. Grajek S. Digital Transformation and the Post-COVID-19 Institution. *Change: The Magazine of Higher Learning.* 2021;53(4):29–33. doi: https://doi.org/10.1080/00091383.2021.1930979

14. Rapanta C., Botturi L., Goodyear P., Guàrdia L., Koole M. Balancing Technology, Pedagogy and the New Normal: Post-Pandemic Challenges for Higher Education. *Postdigital Science and Education.* 2021;3:715–742. doi: https://doi.org/10.1007/s42438-021-00249-1

15. Bauman A., Lucy C. Enhancing Entrepreneurial Education: Developing Competencies for Success. *The International Journal of Management Education.* 2021;19(1):100293. doi: https://doi.org/10.1016/j.ijme.2019.03.005

16. Johnson N., Veletsianos G., Seaman J. US Faculty and Administrators' Experiences and Approaches in the Early Weeks of the COVID-19 Pandemic. *Online Learning.* 2020;24(2):6–21. doi: http://dx.doi.org/10.24059/olj.v24i2.2285

17. Leal Filho W., Raath S., Lazzarini B., Vargas V.R., De Souza L., Anholon R., et al. The Role of Transformation in Learning and Education for Sustainability. *Journal of Cleaner Production.* 2018;199:286–295. doi: https://doi.org/10.1016/j.jclepro.2018.07.017

18. Polly D., Martin F., Guilbaud T.C. Examining Barriers and Desired Supports to Increase Faculty Members' Use of Digital Technologies: Perspectives of Faculty, Staff and Administrators. *Journal of Computing in Higher Education.* 2021;33:135–156. doi: https://doi.org/10.1007/s12528-020-09259-7

19. Hynes W., Trump B., Love P., Linkov I. Bouncing Forward: A Resilience Approach to Dealing with COVID-19 and Future Systemic Shocks. *Environment Systems and Decisions.* 2020;40(2):174–184. Available at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7247742/ (accessed 20.01.2022).

20. Komninos N., Kakderi C., Collado A., Papadaki I., Panori A. Digital Transformation of City Ecosystems: Platforms Shaping Engagement and Externalities across Vertical Markets. *Journal of Urban Technology.* 2021;28(1-2):93–114. doi: https://doi.org/10.1080/10630732.2020.1805712

21. George G., Howard-Grenville J., Joshi A., Tihanyi L. Understanding and Tackling Societal Grand Challenges Through Management Research. *Academy of Management Journal.* 2016;59(6):1880–1895. doi: https://doi.org/10.5465/amj.2016.4007

22. Lu J., Ren L., Qiao J., Yao S., Strielkowski W., Streimikis J. Corporate Social Responsibility and Corruption: Implications for the Sustainable Energy Sector. *Sustainability.* 2019;11(15):4128. doi: https://doi.org/10.3390/su11154128

23. Banerjee S., Bhardwaj P. Aligning Marketing and Sales in Multi-Channel Marketing: Compensation Design for Online Lead Generation and Offline Sales Conversion. *Journal of Business Research.* 2019;105:293–305. doi: https://doi.org/10.1016/j.jbusres.2019.06.016

24. Caruso L. Digital Innovation and the Fourth Industrial Revolution: Epochal Social Changes? *AI & Society.* 2018;33:379–392. doi: https://doi.org/10.1007/s00146-017-0736-1

25. Henderson M., Selwyn N., Aston R. What Works and Why? Student Perceptions of 'Useful' Digital Technology in University Teaching and Learning. *Studies in Higher Education.* 2017;42(8):1567–1579. Available at: https://www.tandfonline.com/doi/abs/10.1080/03075079.2015.1007946 (accessed 20.01.2022).

26. Sadeghi M. A Shift from Classroom to Distance Learning: Advantages and Limitations. *International Journal of Research in English Education.* 2019;4(1):80–88. doi: http://dx.doi.org/10.29252/ijree.4.1.80

27. Impey C., Formanek M. MOOCS and 100 Days of COVID: Enrollment Surges in Massive Open Online Astronomy Classes during the Coronavirus Pandemic. *Social Sciences & Humanities Open.* 2021;4(1):100177. doi: https://doi.org/10.1016/j.ssaho.2021.100177

28. García-Peñalvo F.J. Avoiding the Dark Side of Digital Transformation in Teaching. An Institutional Reference Framework for Elearning in Higher Education. *Sustainability.* 2021;13(4):2023. doi: https://doi.org/10.3390/su13042023

29. Burton-Jones A., Akhlaghpour S., Ayre S., Barde P., Staib A., Sullivan C. Changing the Conversation on Evaluating Digital Transformation in Healthcare: Insights from an Institutional Analysis. *Information and Organization.* 2020;30(1):100255. doi: https://doi.org/10.1016/j.infoandorg.2019.100255

30. García-Morales V.J., Garrido-Moreno A., Martín-Rojas R. The Transformation of Higher Education after the COVID Disruption: Emerging Challenges in an Online Learning Scenario. *Frontiers in Psychology.* 2021;12:616059. doi: https://doi.org/10.3389/fpsyg.2021.616059

31. Ali W. Online and Remote Learning in Higher Education Institutes: A Necessity in Light of COVID-19 Pandemic. *Higher Education Studies.* 2020;10(3):16–25. doi: https://doi.org/10.5539/hes.v10n3p16

32. Idnani D. Pandemic, Policy, and Pedagogy: Analyzing the Tripartite Role of COVID 19 Pandemic, National Education Policy 2020, and Pedagogical Innovations Vis-A-Vis Educational Implications. *International Journal of Humanities and Innovation* (*IJHI*). 2021;4(3):123–128. doi: https://doi.org/10.33750/ijhi.v4i3.121

33. Rof A., Bikfalvi A., Marquès P. Digital Transformation for Business Model Innovation in Higher Education: Overcoming the Tensions. *Sustainability.* 2020;12(12):4980. doi: https://doi.org/10.3390/su12124980

34. Pucciarelli F., Kaplan A. Competition and Strategy in Higher Education: Managing Complexity and Uncertainty. *Business Horizons.* 2016;59(3):311–320. doi: https://doi.org/10.1016/j.bushor.2016.01.003

35. Ellis V., Steadman S., Mao Q. 'Come to a Screeching Halt': Can Change in Teacher Education during the COVID-19 Pandemic Be Seen as Innovation? *European Journal of Teacher Education.* 2020;43(4):559–572. Available at: https://research.monash.edu/en/publications/come-to-a-screeching-halt-can-change-in-teacher-education-during- (accessed 20.01.2022).

About the authors:

Wadim Strielkowski, Visiting Professor, University of California (303 Giannini Hall, Berkeley 94720, United States), Senior Researcher, Cambridge Institute for Advanced Studies (23 King St., Cambridge CB11AH, United Kingdom), Senior Researcher, Czech University of Life Sciences Prague (129 Kamýcká, Prague 16500, Czech Republic), Ph.D. (Econ.), Professor, **ORCID: https://orcid.org/0000-0001-6113-3841**, **Scopus ID: 36620065300**, **Researcher ID: J-6112-2017**, strielkowski@cantab.net

Elena N. Korneeva, Associate Professor of the Department of Mass Communications and Media Business, Financial University under the Government of the Russian Federation (49 Leningradskiy Prospekt, Moscow 125993, Russian Federation), Associate Professor of the Department of Master's Degree (Business Programs), Togliatti State University (14 Belorusskaya St., Togliatti 445667, Russian Federation), Cand.Sci. (Econ.), Associate Professor, **ORCID: https://orcid.org/0000-0002-2735-6299**, **Scopus ID: 57190658874**, ENKorneeva@fa.ru

Anna A. Sherstobitova, Head of the Department of Master's Degree (Business Programs), Togliatti State University (14 Belorusskaya St., Togliatti 445667, Russian Federation), Cand.Sci. (Econ.), Associate Professor, **ORCID: https://orcid.org/0000-0001-8040-0386**, **Scopus ID: 56644656600**, a.sherstobitova@tltsu.ru

Alexandr Yu. Platitzyn, Ph.D. Candidate of the Department of Master's Degree (Business Programs), Togliatti State University (14 Belorusskaya St., Togliatti 445667, Russian Federation), **ORCID: https://orcid.org/0000-0002-5086-7302**, lils.alexander@yandex.ru

Contribution of the authors:

W. Strielkowski – scientific management; development of methodology; critical analysis and revision of the text; the presentation of data in the text.

E. N. Korneeva – literature review; critical analysis; data analysis; visualization; preparation of the initial text; computer works.

A. A. Sherstobitova – data visualization; selection of statistical information; critical analysis of the sources; working on revisions; improving the paper; drawing implications and conclusions.

A. Platitzyn – literature review; assistance in developing of the methodology; visualization; presentation of findings and outcomes within the text.

All authors have read and approved the final manuscript.

Об авторах:

Стриелковски Вадим, приглашенный профессор Калифорнийского университета (94720, США, г. Беркли, Джаннини-холл, д. 303), старший научный сотрудник Кембриджского института перспективных

исследований (CB11AH, Великобритания, г. Кембридж, Кинг-стрит, д. 23), старший научный сотрудник Чешского агротехнического университета (16500, Чехия, г. Прага, ул. Камицкая, д. 129), доктор экономических наук, профессор, **ORCID: https://orcid.org/0000-0001-6113-3841**, **Scopus ID: 36620065300**, **Researcher ID: J-6112-2017**, strielkowski@cantab.net

Корнеева Елена Николаевна, доцент департамента массовых коммуникаций и медиабизнеса Финансового университета при Правительстве Российской Федерации (125993, Российская Федерация, г. Москва, Ленинградский пр-т, д. 49), доцент департамента магистратуры (бизнес-программ) Тольяттинского государственного университета (445667, Российская Федерация, г. Тольятти, ул. Белорусская, д. 14), кандидат экономических наук, доцент, **ORCID: https://orcid.org/0000-0002-2735-6299**, **Scopus ID: 57190658874**, ENKorneeva@fa.ru

Шерстобитова Анна Анатольевна, руководитель департамента магистратуры (бизнес-программ) Тольяттинского государственного университета (445667, Российская Федерация, г. Тольятти, ул. Белорусская, д. 14), кандидат экономических наук, доцент, **ORCID: https://orcid.org/0000-0001-8040-0386**, **Scopus ID: 56644656600**, a.sherstobitova@tltsu.ru

Платицын Александр Юрьевич, аспирант департамента магистратуры (бизнес-программ) Тольяттинского государственного университета (445667, Российская Федерация, г. Тольятти, ул. Белорусская, д. 14), **ORCID: https://orcid.org/0000-0002-5086-7302**, lils.alexander@yandex.ru

Заявленный вклад авторов:

В. Стриелковски – научное руководство; разработка методологии; критический анализ и переработка текста; представление данных в тексте.

Е. Н. Корнеева – обзор литературы; критический анализ; анализ данных; визуализация; подготовка исходного текста; компьютерные работы.

А. А. Шерстобитова – визуализация данных; подбор статистической информации; критический анализ источников; работа над пересмотром; улучшение статьи; выведение следствий и выводов.

А. Ю. Платицын – обзор литературы; помощь в разработке методологии; визуализация; представление выводов и результатов в тексте.

Все авторы прочитали и одобрили окончательный вариант рукописи.