Digital Transformation in the Strategic Development of A University

Elvir M. Akhmetshin, Marat R. Safiullin, Leonid A. Elshin

Abstract: *In the conditions of the fourth industrial revolution and the new digital era, modern corporations in their development are focusing more and more on the wide and optimal use of digital technologies in various fields of their activity. In this regard, it becomes very important for the universities to start preparing future graduates for work with digital technologies in a timely manner so that they are in demand and competitive in the labor market in the future.*

Objectives of the study. The article reveals the current state, directions of digital transformation and the ways of transition of universities to 4.0 model.

Achieved results. We have revealed the peculiarities of digitalization of the main types of university activities in the new conditions during the transition to 4.0 model. We have formulated the changes in the educational, research and business activities of the university in the digital economy.

Keywords: digital transformation of the university, university development models, 4.0 university, new digital technologies.

I. INTRODUCTION

A transformation of the classical university model is currently underway. The existing digitalization processes dictate the transition process to 4.0 model. This opens both certain opportunities and threats to all university employees and students.

The evolution of universities has been taken place under the influence of changes in the technological structure, the development of industry and society [1]. The creation and development of the first universities was facilitated by such factors as urban growth, urbanization of the population, and the growing need of urban communities for people of intellectual labor. The qualitative leap that has led to the transition of universities to 2.0 model is the integration of science into universities. The need for entrepreneurs and staff for the "super-industry" and the urban economy led to the transition to the University 3.0 model: "Entrepreneurial, innovative and technological". The qualitative leap that has led to the transition of universities to 4.0 model is the digitalization of the main university activities [2].

Recently, the phenomenon of digital transformation of the university has been widely discussed in the scientific literature. Articles of N. Vassetskaya contain the research results on the innovative development of universities, in the process of which digital technologies are used to increase the innovation effectiveness [3, 4]. These trends are explained by the increasing role of digital technology in public, economic and research activities At the level of national economies, state programs for the development of the digital economy are being adopted [5, 6, 7]. Accordingly, the universities as agents of advanced knowledge in practical use are actively involved in the process of digital transformation.

According to the researchers, the digital university model was initially built through the growing role of digital technology in the processing, storage and transmission of information [8]. The first step was the digitization of all university library resources and the creation of a single information base via the Internet. Next, it was necessary to solve the problem of training librarians to work with digital technologies. At present, the use of digital technologies and training in all new digital technologies is the basis of any educational process at each university [9].

The next step is the active use of digital technology to implement a digital printing service. Researchers note that the information technology, design and printing come to a new level of creation and delivery of images. This format is included in the training of current and future students in this field [10]. As the authors note, the advent of the possibility of digitizing all material information carriers has become a condition for the transition to a digital model of the university. The electronic format of knowledge creates a common information base and opens up opportunities for data analysis and university management using digital technologies. However, this is only the beginning of the journey. It is impossible to reduce the digital university model only to the stage of digitization of material information carriers [11]. Digital technologies, as the researchers note, form new opportunities for organizing all types of activities at the university. This includes applying to university by prospective students and employees, further employment of graduates, conducting joint scientific research by the employees with colleagues from other universities [12]. Among the most developed digital services that are actively developed at the universities the researchers mark the joint formation of research ideas, looking for research partners, writing proposals to attract sponsors, conducting research, publishing results, support services. Digitalization will allow the universities to do this on a global scale, despite national borders [13].

The most developed digital software products in the university environment include cognitive and cloud

Elvir M. Akhmetshin, Kazan Federal University, Kazan, Russia
Marat R. Safiullin, Kazan Federal University, Kazan, Russia
Leonid A. Elshin, Kazan Federal University, Kazan, Russia

Retrieval Number: A3099109119/2019©BEIESP
DOI: 10.35940/ijeat.A3099.109119

7395

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

technologies, Internet of things and big data analysis [3, 14]. Other researchers have noted the potential of digital technology in providing an expert assessment of the quality of various social services. Digital services may contain and replenish data on consumer reviews of social services [15]. Accordingly, there is the possibility of receiving feedback from the consumers and improving the quality of social services provided by the universities [16]. As noted in the scientific literature, such control and feedback using digital technology can be established for pedagogical technologies used in the educational activities of the university. In the digital environment, it becomes possible to flexibly regulate educational content, forms of communication between a teacher and students, ways to obtain and consolidate knowledge, methods of monitoring the acquired competencies [17].

II. METHODS

The study used both general scientific and special research methods. As special methods, we used a multilevel approach to the analysis of socio-economic phenomena and processes. To identify new trends in the development of a modern university in the context of the digitalization of economy and social life, we considered several levels of activity such as educational, scientific-innovative and entrepreneurial. Consideration of these sections of the socio-economic system of the university made it possible to identify particular and general problems and trends in the digital transformation of the university.

III. RESULTS AND DISCUSSION

The study results of the digital transformation processes of the universities have made it possible to identify the following problems and outline ways to solve them. Digitalization as a phenomenon gives rise to a number of paradoxes and contradictions. The development of digital technology is ahead of other university activities. Therefore, to move to the University 4.0 model, it is necessary to create an effective foundation for the educational, innovative and entrepreneurial activities of the university. Otherwise, digital technologies will transmit inefficient processes to the external environment. We get regression instead of progress. The authors have developed recommendations for the comprehensive transformation of educational, research and entrepreneurial activities of the university.

1. Digital transformation of the university educational activities.

Today we can find a fairly large number of different educational programs implemented by different universities. When choosing an educational program, the user is guided by the prospects and relevance of knowledge, abilities and skills acquired by him/her as a result of mastering the educational program. The university that is capable of teaching the breakthrough and sought-after competencies of the future in accordance with the demands of the labor market wins the competition. An important advantage here will be a close relationship with potential employers. It is the employer and the demand for the level of training of specialists in certain areas of training that should determine the level of demand for a particular area of training. Thus, we

have identified the most popular open online educational courses. And in order to be competitive, the university shall develop new massive open educational courses in promising and sought-after areas.

Creating high-quality content for the MOOCs is impossible without the use of specialized equipment, software, and personnel able to work on it. In this regard, it is necessary to create special units to work with the MOOCs. As a result, a modern university should have in its structure a center for the creation, development, promotion and maintenance of the university MOOCs [18].

Speaking about the digital transformation of the educational activities of the university, certain changes shall undoubtedly be in the personnel of the educational organization [19]. Here tutorial competencies, ability to work with students remotely, to build individual educational trajectories become relevant. And it is important to timely train the personnel of the educational organization in these competencies [20].

2. Digital transformation of university research activities.

Advanced scientific research and development will only be of value when they are in demand by society, industry, and state. To ensure their relevance, it is important to initially have an idea of priority tasks and problems, the solution of which would be important. Accordingly, the university shall become a research center, the research results of which should be in demand by leading enterprises and industries. For this purpose, information exchange between the university and enterprises should be established first of all.

3. Digital transformation of the university business activities.

A new generation university shall be able to solve the problems of various industries, which cannot be solved by modern enterprises for some reason. In our opinion, a new generation university shall be able to solve such problems. That is, the university should become a leader in the field of breakthrough technologies, a technological leader. And this becomes possible as far as the structure of industry itself and advanced production should be transformed. The design phase is shifting to the forefront, during which all the details of future development should be provided. In today's dynamically changing environment, it is becoming important to timely provide the necessary products with growing demand, especially for high-tech products.

As scientists note, all the traditional functions of the university are transformed under the influence of the digital revolution [1]; moreover, new functions appear that are associated with the determination of the development vector of the real sector of economy, the direct translation of university knowledge into the external environment without any time interval as before 3.0 model [3].

Digital technologies make it possible to organize workflow and use accumulated information at a higher level. As noted in the scientific literature, using the technology of "semantic network" it becomes possible to use the potential of several universities. This allows reaching a higher level of scientific research and getting a synergistic effect of the total scientific potential for each university [21-28]. The digital model of the university implies a deep penetration of digital services not only within the university for student education, but also in the external environment for monitoring the quality of university graduates, testing

their competencies, and expanding the possibilities for translating scientific knowledge into practice.

Researchers note the positive results from the use of digital technologies in teaching students, the creation on this basis of electronic portfolios, electronic laboratories, digital modular experimental tasks and sites, which can develop by themselves, taking into account the learning experience of previous students [22]. In this regard, cloud technologies are widely used to control the acquired knowledge and competencies. It is also a way of assessing the quality of educational services received and a tool for employing graduates taking into account the acquired knowledge and competencies. Thus, digitalization more closely connects the university with the external environment, makes this relationship faster and more effective [23]. Other researchers focus their attention on the security aspects. The use of new digital technologies is characterized by security decrease risks. Particular control is required by the processes carried out in electronic form, such as access to personal finances and various financial transactions, management of the right of personal signature and personal data, use of various educational services, obtaining meals, referral for an internship, control of exams and tests [24].

The scientific literature discusses the formation of a system of indicators of university readiness for the active implementation and use of digital technologies. It is proposed to divide this system of indicators into three groups: organizational and methodological, professional and technological. Based on a quantitative assessment of these indicators, a decision can be made on the choice and implementation of digital technologies. However, the considered work does not contain recommendations on the formation of indicators of the achieved level of the university digitalization [24-29]. The development of such a system of indicators would make it possible to form a competitive profile of a modern university taking into account regional needs and features of the real sector of economy for the further training of specialists with a high level of competence in the use of digital technologies [25-26-27].

The effectiveness of the development of these areas at the university can be assessed using a system of indicators of digital transformation. In this regard, the study presented corresponds to the general direction of studying the scientific and practical problems of the digital economy and the digital university.

IV. SUMMARY

Thus, digital technologies and indicators reflecting their use expand the university's capabilities in educational, scientific, innovative and entrepreneurial activities. The University 4.0 model is characterized by the maximum translation of internal business processes into the external environment. In this case, the boundaries between the external and internal environment of the university are erased. The university is beginning to take a leading position in the real sector of the economy, actively using digital technologies.

V. CONCLUSION

With the rapid development of the latest information technologies, the Internet of things, big data processing technologies, the educational environment is undergoing changes in an effort to meet these trends. Under these conditions, it becomes important to transfer the university to the new University 4.0 model.

Digital transformation is a continuous and endless process, as technologies are rapidly developing, improving and updating; the requirements for the education system will also change and grow in the wake of them. The digital transformation of the university is the most important condition for ensuring its competitiveness.

ACKNOWLEDGMENT

REFERENCES

1. Safiullin, M. R., & Elshin, L. A. (2019). Role of higher school in the formation of the fourth industrial revolution in the Russian Federation. International Journal of Civil Engineering and Technology, 10(2), 1669-1676.
2. Baumol, U., & Bockshecker, A. (2017). Evolutionary change of higher education driven by digitalization. Paper presented at the 2017 16th International Conference on Information Technology Based Higher Education and Training, ITHET 2017, doi:10.1109/ITHET.2017.8067811
3. Vasetskaya, N. & Glukhov, V. (2019). The Transformation of Universities in Conditions of Digitalization of National Economy. Paper presented at the Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019 - Education Excellence and Innovation Management through Vision 2020, 8845-8851.
4. Vasetskaya, N. & Gaevskaia, T. (2019). Digitalization as an Instrument for Economic Growth. Paper presented at the Proceedings of the 33rd International Business Information Management Association Conference, IBIMA 2019 - Education Excellence and Innovation Management through Vision 2020, 8914-8919.
5. Order of the Government of the Russian Federation No. 1632 dated July 28, 2017 (July 28, 2017). Retrieved July 31, 2019, from http://static.government.ru/media/files/9gFM4FHj4PsB79I5v7yLVuPgu4bvR7M0.pdf
6. Development of the digital economy in Russia. The program until 2035. (2017). Retrieved July 31, 2019, from http://spkurdyumov.ru/uploads/2017/05/strategy.pdf
7. Abramov, R. A., & Sokolov, M. S. (2017). Current challenges and competitive advantages of national innovation systems (NIS) of the countries-participants of the union state up to 2030. Journal of Advanced Research in Law and Economics, 8(4), 1031-1039. doi:10.14505/jarle.v8.4(26).01
8. Bockshecker, A., Hackstein, S., & Baumol, U. (2018). Systematization of the term digital transformation and its phenomena from a socio-technical perspective - A literature review. Paper presented at the 26th European Conference on Information Systems: Beyond Digitization - Facets of Socio-Technical Change, ECIS 2018.
9. O'Neil, F., & Pegrum, M. (2018). Keeping up the momentum: A longitudinal evaluation of professional development in digital technologies for academic librarians at an Australian university. Journal of Academic Librarianship, 44(4), 439-445. doi:10.1016/j.acalib.2018.05.009
10. Gore, D., Lee, M., & Baucher Jr., J. (2012). Variable data printing (VDP): A case study of implementing variable data and digital printing in the communication technology program at eastern Michigan University. Paper presented at the Proceedings of the Technical Association of the Graphic Arts, TAGA, 421-438

Retrieval Number: A3099109119/2019©BEIESP
DOI: 10.35940/ijeat.A3099.109119

Published By:
Blue Eyes Intelligence Engineering
& Sciences Publication

7397

11. Rafiq, M., Ameen, K., & Jabeen, M. (2018). Barriers to digitization in university libraries of Pakistan: A developing country's perspective. Electronic Library, 36(3), 457-470. doi:10.1108/EL-01-2017-0012

12. Al-Khatib, E. S., Yassin, M. M., & Alkhatib, A. '. (2018). Managing the digitisation of filing system project at Al-Zaytoonah university of Jordan. Lecture Notes in Mechanical Engineering, (9783319741222), 281-289. doi:10.1007/978-3-319-74123-9_30

13. Zhou, L., Huang, R., & Zijlstra, T. (2019). Towards digital scholarship services in China's university libraries: Establishing a guiding framework from literature. Electronic Library, 37(1), 108-126. doi:10.1108/EL-04-2018-0074

14. Polyakova, A. G., Loginov, M. P., Serebrennikova, A. I., & Thalassinos, E. I. (2019). Design of a socio-economic processes monitoring system based on network analysis and big data. International Journal of Economics and Business Administration, 7(1), 130-139.

15. Plotnikov, A. V., Kovalenko, K. E., Prodanova, N. A., Noeva, E. E., Astapenko, E. O., & Novikova, Yu. A. (2019). Social entrepreneurship of persons with disabilities. Journal of Entrepreneurship Education, 22(S2), 1-9.

16. Montagni, I., & Tzourio, C. (2018). Evidence of the effectiveness of a digital tool to promote health service literacy among young university students. Communications in Computer and Information Science, 810, 430-439. doi:10.1007/978-3-319-74334-9_45

17. Mitchem, P. P., & Rice, D. M. (2017). Creating digital scholarship services at appalachian state university. Portal, 17(4), 827-841. doi:10.1353/pla.2017.0048

18. Korableva, O., Durand, T., Kalimullina, O., Stepanova, I. (2019). Studying user satisfaction with the MOOC platform interfaces using the example of coursera and open education platforms. ACM International Conference Proceeding Series, 26-30.

19. Petrova, L. I., Ivanova, E. A., Plotnikova, A. V., & Melnikov, M. S. (2019). Human capital in the digital economy format. International Journal of Engineering and Advanced Technology, 9(1).

20. Neboskiy, E. V. (2018). Transformation of Development Strategies of Universities Abroad in the Context of Global Risks (Doctoral Dissertation). Institute for Educational Development Strategy of the Russian Academy of Education, Moscow, Russia.

21. Wagner, S., Görz, G., Fichtner, M., & Andraschke, U. (2019). Joint digitization of heterogeneous university collections using semantic web technologies. Paper presented at the CEUR Workshop Proceedings, 2375, 27-36

22. Smolyaninova, O., & Bezyzvestnykh, E. (2019). Implementing teachers' training technologies at a federal university: E-portfolio, digital laboratory, PROLog module system. International Journal of Online Engineering, 15(4), 69-87. doi:10.3991/ijoe.v15i04.9288

23. Sánchez, J. A., Valle, B. M., Nicolás, J., De Gea, J. M. C., García-Berná, J. A., Toval, A., Misnevs, B. (2019). Cloud service as the driver for university's software engineering programs digital transformation. Paper presented at the Procedia Computer Science, 149, 215-222.

24. Moukhliss, G., Filali Hilali, R., & Belhadaoui, H. (2019). A smart card digital identity check model for university services access. Paper presented at the ACM International Conference Proceeding Series, Part F148154. doi:10.1145/3320326.3320401

25. Yamova, O. V., Maramygin, M. S., Sharova, I. V., Nesterenko, J. N., & Sobina, N. V. (2018). Integral valuation of an enterprise's competitiveness in the industrial economy. European Research Studies Journal, 21, 777-787.

26. Mardani, M., & Fallah, R. Comparison of Financial Leverage Ratio before and after the Use of Off-Balance Sheet Financing in Firms Listed in the Tehran Stock Exchange. Dutch Journal of Finance and Management, 2(2), (2018). 53. https://doi.org/10.29333/djfm/5829.

27. Araújo, C., Henriques, P. R., & Martini, R. G. Virtual Learning Spaces Creation Based on the Systematic Population of an Ontology. Journal of Information Systems Engineering & Management, 3(1), (2018). 07.

28. Kor, L., Teoh, S., Binti Mohamed, S. S. E., & Singh, P. Learning to Make Sense of Fractions: Some Insights from the Malaysian Primary 4 Pupils. International Electronic Journal of Mathematics Education, 14(1), (2019). 169-182. https://doi.org/10.29333/iejme/3985

29. Shatilova, L. M., Borisova, V. V., & Kasatkina, O. A. Representation of the linguistic and cultural concept "lie" in the French and Russian language picture of the world. Opción, 34(85-2), (2018).257-276.