

**ИНДУСТРИЯ 4.0 –ПОТЕНЦИАЛ И ПРОБЛЕМЫ ГОСУДАРСТВЕННОГО  
УПРАВЛЕНИЯ УЧРЕЖДЕНИЙ ВЫСШЕГО ОБРАЗОВАНИЯ ВЬЕТНАМА**

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**Аннотация.** Мир, в котором мы живем, переживает беспрецедентные изменения. Четвёртая промышленная революция – Индустрия 4.0 (СМСН 4.0) – создавала, создает и создаст сильные колебания, влияющие на все аспекты жизни в 21 веке. Изменения в структуре производства и людских ресурсов на будущем рынке труда создает много проблем для сектора образования в целом и государственного управления высшим образованием во Вьетнаме, в частности. В условиях растущих потребностей рынка труда деятельность учебных заведений должна быть связана с предприятием для преодоления разрыва между обучением, исследованиями и внедрением. Укрепление связи между учебными заведениями и предприятиями на основе социальной ответственности предприятий, позволяет эффективно использовать оборудование и технологии предприятий для формирования профессионального потенциала обучаемых в процессе их обучения и практики на предприятиях.

**Ключевые слова:** индустрия 4.0, государственное управление, высшее образование.

**Литература:**

1. Ha Phuong. The Impact of the Fourth Industrial Revolution on Society // Information Technology and Communication, No. 7, 2016, pp. 52-56 [In Vietnamese].
2. Do Van Quan, Nguyen Ngoc Lam. The Fourth Industrial Revolution and the Requirements for Strategic Leaders // Political Theory, No. 4, 2016, pp. 83-88 [In Vietnamese].
3. Schuster K., Groß K., Vossen R., Richert A., Jeschke S. Preparing for industry 4.0–collaborative virtual learning environments in engineering education. In Engineering Education 4.0, Springer, Cham, 2016, pp. 477-487.
4. Erol S., Jäger A., Hold P., Ott K., Sihm W. (2016). Tangible Industry 4.0: a scenario-based approach to learning for the future of production. Procedia CIRP, 54, pp. 13-18.
5. Baygin M., Yetis H., Karakose M., Akin E. An effect analysis of industry 4.0 to higher education. In Information Technology Based Higher Education and Training (ITHET), 2016. 15th International Conference on IEEE, 2016, pp. 1-4.
6. Benešová A., Tupa J. Requirements for Education and Qualification of People in Industry 4.0. Procedia Manufacturing, 11, 2017, pp. 2195-2202.

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**INDUSTRY 4.0 – POTENTIAL AND PROBLEMS OF PUBLIC ADMINISTRATION  
OF HIGHER EDUCATION INSTITUTIONS OF VIETNAM**

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**Abstract.** The world in which we live is undergoing unprecedented changes. The fourth industrial revolution – Industry 4.0 (CMCN 4.0) – created, creates and will create strong fluctuations that affect all aspects of life in the 21st century. Changes in the structure of production and human resources in the future labor market creates many problems for the education sector in general and for public administration of higher education in Vietnam in particular. In the conditions of growing needs of the labor market, the activity of educational institutions should be associated with an enterprise in order to bridge the gap between training, research and implementation. Strengthening the link between educational institutions and enterprises based on the social responsibility of enterprises makes it possible to effectively use the equipment and technologies of enterprises to build the professional potential of trainees in the process of their training and practice in enterprises.

**Keywords:** industry 4.0, public administration, higher education.

**Introduction**

The world is at the forefront of the fourth industrial revolution, which is the digital revolution through technologies such as Internet of Things (IoT), Artificial Intelligence (AI), Virtual Reality (VR), Augmented Reality (AR), social network, cloud computing, mobile, large data analysis (SMAQ) to transform the entire real world into a digital world.

So far the world has gone through four industrial revolutions which are respectively called Industry 1.0 to 4.0. Thus, in terms of information technology (IT), between Industry 1.0 to 2.0, there will be the version 1.1; 1.2... In other words, industrial revolution is a development that has both a leap and a sequential development, followed by the development of mechanical and semi-automatic industries. In order to meet the human resources of these industries, the world education and training, including technical and vocational education and training (TVET) has opened academic technical training and at the same time moved from academic training to practical training to meet for the mechanical industry despite of low level [3].

To the second industrial revolution at the end of the 19<sup>th</sup> century, with the development of the energy industry and the application of energy to production and life, the production in lines was developed. To meet this demand, in the TVET system, the training major in the field of electricity, electronics, mechanical-electronic have developed strongly; At the same time, there has been a revolution in teaching methods and a shift from chalkboards(traditional) to electromagnetic boards, circuit model boards (electrical, electronic, mechanical-electronic applications).

The third industrial revolution took place in the 60s of the 20<sup>th</sup> century, the world witnessed the development and strong application of electronics and IT to automate in production. It can be said that this is a "mutational" transformation of the world production, there was the interaction between human and machines through the development of robot technology and IT applications. In response to this highly automated production, the TVET system, on the one hand develops new training majors that combine electronic and mechanical automation such as CNC, CAT, CAM, on the other hand have changed "revolutionarily" the forms and teaching methods. That is the development of online learning, distance learning; It is digitizing, simulating lectures on computers. All of these changes have led to changes in management and administration of schools. Instead of yearly enrollment, it is the enrollment on demand; Instead of studying the subjects, it has been switched to modules, credits [3].

To date, the fourth industrial revolution is being formed (Industry 4.0) on the basis of the third industrial revolution (version 3.0). Actually, the digital revolution firstly appeared in the middle of the 20<sup>th</sup> century. This revolution has been and will have developing technologies that help to clear the boundaries between physics, digitization and biology in both life and production as well as in the field of education and training and vocational education.

Unlike the third industrial revolution, the fourth industrial revolution has a wide application and its fast speed of application has been changing all industries in every country. The width and depth of these changes make up the variability of the entire production, management and administration systems. We have witnessed the rapid development of smart mobile phones with various applications. We have also witnessed the application of IT in all aspects of social life from government administration; factory management to the management of the house, the kitchen of each family. In the new Industry 4.0, the education and training system will be impacted strongly and comprehensively. The industry and training majors will have to be adjusted and updated continuously as the boundaries between fields become very fragile [4].

These changes in production and human resources structure in the future labor market poses many problems for the education sector in general and the state management of higher education in Vietnam in particular.

### **1. The impact of the fourth industrial revolution on education in Vietnam**

Facing the increasing demands of the labor market to match the new production environment, training activities of the training institutions must be linked with the enterprise to bridge the gap between training, research and implement. Promote the development of training at enterprises and develop schools in enterprises in order to train human resources to be suitable with the technology and organization of enterprises. Strengthening the link between educational institutions and enterprises on the basis of social responsibility of enterprises, going towards enterprises is really an "extended arm" in training activities of educational institutions to effectively use equipment and technologies of enterprises in service of training and formation of professional capacity for trainees in the course of training and practicing at enterprises.

Thus, it can be seen that the impact of the fourth industrial revolution on state management of higher education in Vietnam is very big, it has created opportunities but also posed more and more challenges for educational institutions. Opportunities and challenges for state management of higher education in Viet Nam before the impact of the fourth industrial revolution are intertwined. Specifically:

*Firstly*, it has created a high demand for training institutions. In all fields of the industry, innovative steps in technology such as artificial intelligence, robots, internet, independent vehicles, 3D printing, nanotechnology, biotechnology, science of materials, energy storage and quantum informatics will have a stronger impact on social life [1]. In the fourth industrial revolution, education and training system will be impacted strongly and comprehensively, the industry and training majors will have to be adjusted and updated continuously as the boundaries between fields become very fragile. Accordingly, there will be a link between the fields of physics - biology; mechanics - electronics - biology fields, then a number of old careers will be lost and instead of them, it is an opportunity for the development of new training majors, especially those related to human and machine interaction. Domestic and international labor markets will have a strong divide between low-skilled and high-skilled workers. Researchers states that the fourth industrial revolution not only threatens the employment of low-skilled workers, but also middle-skill workers will suffer if they are not equipped with new knowledge - innovative skills for the economy 4.0. The fourth industrial revolution not only creates opportunities for training new entrants but also requires those who have gone to work, from workers to engineers to change and update knowledge at a higher level. According to the target of the Government, in 2020, our country will have about 1 million enterprises and it means that there is a need of a million IT staffs. However, today we have only 300,000 IT staffs, so the new training need of this sector to provide the society with a workforce of information technology is a great opportunity for training schools.

*Secondly*, it has changed all the activities in the training institutions. In order to meet the human resources needed for the innovative economy, it is necessary to change the training activities, especially the training majors, forms and training methods with the strong application of information technology. Accordingly, old teaching methods no longer fit the needs of society. With the application of the achievements of the fourth industrial revolution, learners from everywhere can access the library of the school for study by themselves. Thus, there cannot be only a traditional library model but schools must build electronic libraries. Or we will have new teaching models such as online training without classrooms, no classroom teacher, learners will be guided online. Virtual classrooms, virtual teachers, simulated virtual devices, lectures digitized and shared across platforms such as Facebook, YouTube, Grab, Uber, etc. will become a growing trend in vocational training in the coming time. At that time, knowledge cannot be narrowed and monopolized by one person or within an organization. The learner has many opportunities to approach, accumulate and refine new things, good things, has opportunities to become a global citizen - future workers capable of working in creative and competitive environment. The final award is no longer a paper diploma, but a degree in the broad sense, the exchange of knowledge, creativity and value of contributions to society. Because recruiting enterprises requires people to do the job well rather than those having a high degree. It is possible to quit the degree requirement or just see it as a prerequisite for recruiting workers. Therefore, educational institutions will have to dramatically transform into "what-the-market-needs" training model, the contents of the core subjects will have to be shortened and replaced with necessary content to meet the needs of enterprises, the economy in general and to ensure that learners achieve the motto of "lifelong learning." According to this new model, the link between education and training institutions and enterprises is an indispensable requirement to complement each other. At the same time, promote the formation of training institutions in the enterprises to divide the common human resources, making the resources be used in a more optimal way. This will affect the arrangement of managers, officials and teachers in professional educational institutions. At that time, at educational institutions, all learners' data from codes, scores, personal information are digitized at a storage location. In many cases, the instructor simply "throws" the material onto the "cloud", everyone will discuss on the cloud but still ensures privacy, efficiency and consistency. Before this fact, if the schools do not change then there will be no learner. What needs the enterprises has in particular and the market has in general, the learner will increasingly find a place to meet those needs. This is really a challenge because almost all schools are now only at the level of teachers teaching by projector, video, sharing material on the internet. Limited funding is also one of the main problems that has made science and technology applications less developed in schools [2].

## **2. Potentials and Challenges in State Management of Higher Education**

### **2.1. Potential**

Education is one of the fields affected by this impact even faster because education itself will create new versions of the next industrial revolutions. Industry 4.0 promises new breakthroughs in state management of higher education, changing training objectives, traditional training models by transferring and training absolute new knowledge. The development of information technology, digital tools, networking and metadata system will be good tools and means to change the organizing and teaching methods.

Traditional classes with disadvantages such as high organizational costs, limited service space, unfavorable for some objects will be replaced by online classes, virtual classrooms. The quality of online training will be easily managed by support tools, such as sensors and cyberspace connectors. Learning spaces will also be more diverse, instead of traditional labs or simulation rooms, learners can experience cyber-space learning, which can interact in real-world conditions through software and network systems.

Big data will be an endless source for analytical experience, trend identification or high-precision business forecasting. The digital learning resources in the condition of linking virtual and real space are extremely rich and the library space is no longer a located place, the library can be exploited

everywhere with some single operations. The curriculum will be also designed to be more diverse, more specific and more responsive to the needs of learners.

## **2.2. Challenges**

*Firstly*, the foundation of the Industry 4.0 is the connection between the real world and the virtual one through information technology, digital and networking, so knowledge and skills in information technology and digital plays a very important role for suppliers and consumers. However, at present, state management of higher education lacks long-term strategic orientation and scientific planning for private sector development throughout the education system. Governmental authorities from central to local levels are not fully aware of the role and position of the fourth industrial revolution in state governance of higher education. This is a significant barrier to apply the potential of the fourth industrial revolution for state management of higher education.

*Secondly*, the current model of state management of higher education has been still underdeveloped, some aspects has not been close to social reality, not really encouraged investors to participate in this field, especially under the influence of the fourth industrial revolution. In the coming time, the state management model of higher education needs to be strongly reformed and the achievements of the fourth industrial revolution should be applied in order to further promote the effectiveness of state management over higher education [2].

*Thirdly*, it is the challenge of meeting the increasing demands of society and the economy for high-skilled human resources. The demand for socio-economic development not only requires a large number of human resources, but also high quality one. Society and learners will say no to substandard training, not meeting the needs of society and learners. Problem on quality training is a great challenge for state management of higher education in the face of the influence of the fourth industrial revolution.

*Fourthly*, under the impact of integration and globalization, high quality human resources are flowing from developing countries to industrialized developing countries. In the country, that trend is happening in the direction that universities located in the local have difficulty in entering into universities in big cities, into enterprises, especially for the educational management team. This is a great challenge for state management of higher education.

*Fifthly*, another great challenge for state management of higher education is the way to organize the content of the curriculum to the learners. The fourth industrial revolution requires changed modular training methods with the powerful application of information technology, digital technology and networking. Online training, virtual training, simulation, digitizing lectures will be the trend of vocational training in the future. This puts great pressure on the state management of higher education on resource preparation, teacher and learning space [2].

*Sixthly*, in order to meet the demand for high quality human resources and diversified industries and fields of the economy 4.0, the state management of higher education must be strongly reformed from training management activities to the administration of schools to create "products" - future workers who are capable of working in a creative and competitive environment. Students with the knowledge and skills taught in schools today even do not meet the requirements of the economy 3.0, may be completely useless with the economy 4.0 or may be easily replaced by robots in the near future.

*Seventhly*, it is the matter of management innovation at both the macro and the grassroots level for education and training. With the emergence in virtual classes, virtual trades, virtual programs and labor market requirements with new creative skills are required to have a common management to ensuring a "common" quality, on the other hand to meet the diverse needs of the creative and competitive economy. However, this is also a matter of management at both the macro and the grassroots levels, as the legal basis system is in the process of supplementing, improving on management. To unify the common quality, it is necessary to establish standards and organize the training in the direction of the standard output [6].

## **3. Solutions to improve state management of higher education under the influence of the fourth industrial revolution**

From the above mentioned issues, in order to improve the quality of vocational training, to meet the requirements of the fourth industrial revolution, in the state management of higher education, from our point of view, we have to implement the following solutions:

### ***3.1. Raising awareness of the fourth industrial revolution for the state management of higher education***

One of the reasons makes the management, application and development of the achievements of the fourth industrial revolution of the state management of higher education not been achieved is the lack of awareness and right appreciation of the role of the fourth industrial revolution. When the awareness is unclear or inconsistent, any effort in investment or policy effort can be impaired. Therefore, raising awareness is one of the most significant solutions in the management and process of accelerating the application and development of the fourth industrial revolution for the state management of higher education. To effectively implement this solution, it is necessary to focus on the following issues:

- propagandize, disseminate and educate in order to raise awareness about the potential and challenges of the fourth industrial revolution for all objects in society. Strengthen the introduction, propaganda and dissemination of management and development situation, experience in applying the achievements of the fourth industrial revolution of the domestics and foreign provinces and cities for managers to understand the gap in the application of the fourth industrial revolution of our country to other areas, thereby effort to strengthen the management, promote the application of the fourth industrial revolution in the state management of higher education;

- promote the education and training of new applications of the fourth industrial revolution on the basis of creating favorable conditions, encouraging the managerial cadres to study, raise their qualification and awareness of the fourth industrial revolution.

### ***3.2. Completing the policy mechanism to develop the achievements of the fourth industrial revolution in the state management of higher education***

Policy mechanism is considered to be the most essential issue for every organization that wants to be born and operated into life. Every organization and agency has its own rules and regulations that are appropriate to the nature of its activities, functions and roles. Thus, completing the policy mechanism of the fourth industrial revolution is considered as an important breakthrough to help the fourth industrial revolution to implement its role in the state management process of higher education.

It is necessary to formulate mechanisms and policies to encourage investment attraction and support the application of the fourth industrial revolution in the state management of higher education. At the same time, it is necessary to develop regulations and rules on the application of the achievements of the fourth industrial revolution in the activities of the system of state management agencies; to formulate mechanisms and policies to encourage the investment in development of infrastructure serving for the participation and integration into the fourth industrial revolution.

On the basis of the Party's and State's undertakings and policies on the application of the achievements of the fourth industrial revolution, the state management agencies of higher education should devise appropriate measures with its practicality to promote the application of the achievements of the fourth industrial revolution into the development and improvement of training quality in higher education institutions. Cooperate with relevant units to study and implement the Party's and the State's undertakings and policies on the applications of the fourth industrial revolution in order to renovate and improve the work efficiency and quality of educational management agencies.

Focus on the Central's undertakings and policies, study the experiences of other countries in the world on the application of the achievements of the fourth industrial revolution in the state management of higher education. On those bases, the functional departments need to institutionalize the views, solutions and policies of the Central to practice in the local; Complete and implement programs, plans and projects applying the achievements of the fourth industrial revolution in the state management of higher education.

### ***3.3. Strengthening the capacity and effectiveness of applying the achievements of the fourth industrial revolution in state management of higher education***

Applying the achievements of the fourth industrial revolution in state management of higher education is a great turning point, marking the change in information management method. However, nowadays, to the officials of education management agencies, the application of the fourth industrial revolution is quite new, even some officials afraid to change and do not want to have access to the fourth industrial revolution. This not only does not promote the role and benefit of the fourth industrial revolution but it also causes waste. Therefore, further enhancing the awareness and responsibility of leaders and managers in applying the achievements of the fourth industrial revolution in order to change working style and contribute in reforming leadership style, enhancing the leadership capacity of educational management agencies in the new situation is an urgent task.

The capacity and effectiveness of applying the achievements of the fourth industrial revolution in state management of higher education are assessed through the ability to create positive changes in the quality of education at higher education institutions. In order to strengthen the capacity and effectiveness of applying the achievements of the fourth industrial revolution in the state management of higher education, three specific solutions should be implemented.

*The first.* Research, formulate regulations which require officials to use the achievements of the fourth industrial revolution as a means of operation. Accordingly, it is necessary to have a specific regulation stipulating that the officials, cadres and civil servants must apply the achievements of the fourth industrial revolution in state management of the education sector. To do this well, education management authorities should firstly conduct the research on barriers to the application of the achievements of the fourth industrial revolution in this group, continuously improve computer skills, state management skills, widely propagandize to raise awareness of the goals of applying the achievements of the fourth industrial revolution, take measures to overcome the barriers to develop the achievements of the fourth industrial revolution.

*The second.* Organize the information network having full content, updated quickly and accurately, ensure the exchange and electronic information sharing among units. The issue of information and information sharing plays a very important role in achieving the goals of exploiting and applying effectively the achievements of the fourth industrial revolution. The information provided must be accurate, timely and really value to the exploiters and there should be a mechanism for dealing with the wrong information which causes damage to others.

*The third.* Develop and implement long-term and annual plans on applying the achievements of the fourth industrial revolution as a priority component of the state management plan for higher education institutions. The application of the achievements of the fourth industrial revolution gets high efficiency only when educational management agencies can formulate a long-term plan for applying the achievements of the fourth industrial revolution and see it as a in priority development plans of educational institutions. On that basic, educational management agencies will formulate a long-term plan and prioritize investments in human and financial resources to implement this plan.

### ***3.4. Developing and training human resources in state management for higher educational institutions***

One of the factors that made the fourth industrial revolution not really promote its role in the state management of higher education institutions is the limited ability in exploiting services and benefits that the fourth industrial revolution can bring. The asynchronous use of the achievements of the fourth industrial revolution among state management agencies may also be a constraint in governance work, even lead to delay in working process. Therefore, in addition to investing in facilities, the development and training of skilled human resources in the fourth industrial revolution is considered an urgent task in applying the achievements of the fourth industrial revolution in state management for higher education institutions.

Continue to raise the qualification and capacity of applying the achievements of the fourth industrial revolution into the professional work and activities of the officials and civil servants of state management agencies in charge of education to meet the requirements, objectives of the Central Party Committee and the state management agencies in education, especially to meet the application of the achievements of the fourth industrial revolution in professional operations.

Leading officials are those who need to exchange and process information in order to make decisions on the management, administration and direction of activities in the state management agencies in charge of education. Leading officials need to be trained in the management and operation of the information system to effectively use software applying the achievements of the fourth industrial revolution into leadership and exploitation. To leading officials, short-term and centralized training may be applied. The training program should be short and appropriate in order to achieve the general knowledge of the achievements of the fourth industrial revolution and to use this knowledge in the process of state leadership and management of education and training activities [2].

### **Conclusion**

The application of the achievements of the fourth industrial revolution in state management for higher education institutions is now very important to contribute to the development of a modern electronic administration system from the central to local; To perfect the information system to create a wide working electronic environment in order to raise the efficiency and effectiveness of job settlement; To reduce time and costs of operation of state agencies, to meet the requirements of organizations and citizens in the best way, contributing to the cause of socio-economic development of the country.

To higher education, the application of the achievements of the fourth industrial revolution is a powerful tool supporting for teaching, learning and management innovation, contributing to improve efficiency and quality of education. However, how can the achievements of the fourth industrial revolution be applied with the most effectiveness in state management for higher education institutions is an particular concern to the education sector. Qualification, awareness of educational administrators and lecturers are a reason directly effecting the application of the achievements of the fourth industrial revolution in state management of higher education, the management of higher education in the direction of autonomy and social responsibility, which requires that all activities must be scientific, effective, public and transparent.

### **References:**

1. Ha Phuong “The Impact of the Fourth Industrial Revolution on Society”, Journal of Information Technology and Communication, No. 7, 2016, pp. 52-56 [In Vietnamese].
2. Do Van Quan, Nguyen Ngoc Lam, “The Fourth Industrial Revolution and the Requirements for Strategic Leaders”, Journal of Political Theory, No. 4, 2016, pp. 83-88 [In Vietnamese].
3. Schuster, K., Groß, K., Vossen, R., Richert, A., & Jeschke, S. Preparing for industry 4.0—collaborative virtual learning environments in engineering education. In Engineering Education 4.0, Springer, Cham, 2016, pp. 477-487.
4. Erol, S., Jäger, A., Hold, P., Ott, K., & Sihm, W. (2016). Tangible Industry 4.0: a scenario-based approach to learning for the future of production. *Procedia CIRP*, 54, pp. 13-18.
5. Baygin, M., Yetis, H., Karakose, M., & Akin, E. An effect analysis of industry 4.0 to higher education. In Information Technology Based Higher Education and Training (ITHET), 2016. 15th International Conference on IEEE, 2016, pp. 1-4.
6. Benešová, A., & Tupa, J. Requirements for Education and Qualification of People in Industry 4.0. *Procedia Manufacturing*, 11, 2017, pp. 2195-2202.

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