

## MODEL OF THE RELATION “DIGITAL LEADERSHIP – DIGITAL ENTREPRENEURSHIP” IN THE REALITIES OF INDUSTRY 4.0

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**Abstract:** *The present article studies the relation between digital leadership and digital entrepreneurship under the conditions of a changed economic reality – the already started Fourth Industrial Revolution. On the basis of analysis of the main characteristics, the functions and the role of the concepts “digital leadership” and “digital entrepreneurship”, there is synthesizing of a model of their interrelation and interdependence achieved. The generated model has a flexible system architecture and it integrates the fundamentally new economic conditions determining the development of Industry 4.0.*

**Keywords:** *digital leadership, digital entrepreneurship, model, Industry 4.0.*

**ITHEA Keywords:** Please use keywords from [http://idr.ithea.org/tiki-browse\\_categories.php](http://idr.ithea.org/tiki-browse_categories.php).

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### Introduction

The turbulent development of technologies and innovations, the ever more persistent advance of artificial intelligence in people's everyday life and turning it now into an integral part of the economy, the creation of new “smart” materials, machines, technologies, systems, call for the need of a new type of specialists, a new type of managers, a new type of entrepreneurs, a new type of staff, who could not only manage the digital processes, but also integrate in that management the optimal coordination and efficiency of the human resources, who would work in the digital space from various geographical spatial dimensions. The complexity of the emerging processes, gradually evolving and passing from the ecosystem “human – machine” to a blockchain network, and from a blockchain network into cyber-physical systems, requires looking for a new type of leaders, as well as for a new type of entrepreneurs, who should have integrated knowledge and competences enabling them to work in a digital environment, running machines,

technologies, systems, processes, people, creating innovative products and/or organizations, and/or penetrating new markets. Thus, gradually, economic reality determines the search by the business organizations of digital leaders and digital entrepreneurs, who together in a relational unity should contribute to obtaining added value of a new type.

Object of study in the present article is the relation “digital leadership – digital entrepreneurship”.

Subject of analysis and synthesis in the research is defining the relationship between digital leadership and the digital forms of entrepreneurship under the conditions of Industry 4.0.

The objective of the research is generating a model of the relation “digital leadership – digital entrepreneurship” under the condition of the already started Fourth Industrial Revolution.

The tasks of the paper come down to:

- ✓ synthesis of definitions of the concepts “digital leadership” and “digital entrepreneurship”;
- ✓ studying the major characteristics of Industry 4.0;
- ✓ model of the relation “digital leadership – digital entrepreneurship” with the functioning of Industry 4.0.

The restrictions set out in the present article are:

- ✓ the model is not described from the perspective of its added value for the business organizations;
- ✓ the model does not reflect the specific characteristics of the separate business organizations.
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### **Nature of the problem**

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The major challenge nowadays in defining the concepts “digital leadership” and “digital entrepreneurship” is the lack of sufficient research work on these problematic issues.

The basis for defining the concept “digital leadership” should be the definition of the concept “digital environment”, which in literature is most often described as a virtual, simulated space, created by using one or more computers or mobile devices.

The aforementioned definition has two cumulatively present elements:

- ✓ virtual space;
- ✓ one computer or mobile device, or a network of computers or mobile devices.

Therefore, the analysis indicates that the digital leader should:

- ✓ operate in the virtual space, where the simulation of processes, phenomena, operations is a tool for forecasting, analysis and evaluation;
- ✓ plan, organize, coordinate and control the work of one or several computers or mobile devices;
- ✓ motivate the human resources, ensuring the work of those computers or mobile devices.

For the realization of those functions that the digital leader has, the latter should:

- ✓ know the principles of working in a digital environment;
- ✓ apply the technologies and tools, which are used for operating in a digital environment;
- ✓ have management skills and competence;
- ✓ integrate in a single and integral system the work of the people and the work of the machines;
- ✓ lead the team or the organization to achieving the strategic orientation targets;
- ✓ facilitate through his/her behaviour in a digital environment the registration of added value for the team or the organization.

Entrepreneurship is nowadays generally defined by theory as a process oriented towards permanent changes, where business alternatives emerge, moderate risk is undertaken and opportunities for implementing innovations and/or innovative products are sought in view of realizing the so-called by Schumpeter [Schumpeter, 1939] “entrepreneurial profit” and ensuring, in a more global aspect, the economic development of a certain macroeconomic system. The entrepreneurial activities can be focused on the introduction of a new product, technology or organization, on entering a new market or using new raw materials and consumables for the production.

Peter Drucker [Drucker, 1985] reached the conclusion that entrepreneurship is predominantly a socio-psychological process, and only to a lesser extent an economic phenomenon, since it is focused on permanent searching for business and innovation opportunities.

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### **Synthesis of definitions of the concepts “digital leadership” and “digital entrepreneurship”**

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In spite of the lack of sufficient research in the field of digital leadership and digital entrepreneurship, the present article is a specific attempt to upgrade and specify the existing definitions, clarifying the concepts “leadership” and “entrepreneurship”, and on this basis, to synthesize essentially new definitions of the concepts, object of the analysis.

The leader’s qualities lead to synthesizing the main boundaries of digital leadership, namely: a single, integral, systematically running process in the virtual environment for analyzing a particular situation, establishing and coordinating relations between people, departments, organizations, planning and developing a vision, managing change, adding value. It can be synthesized on this basis, that digital leadership is a concept leading to a higher added value for the organizational system, as well as to integrated comprehensive use of information and communications technology, toolset and human resources in a digital environment in view of achieving the strategic orientation targets of a particular business system through a team interaction between people working through network connected computers or mobile devices, accomplished on the basis of applying a particular leadership style in a virtual environment.

Digital entrepreneurship is focused on generating innovative operative and production business models, whereby realizing higher surplus value. Digital entrepreneurship integrates in itself two major groups of skills:

- ✓ traditional – establishing and maintaining relations with clients, realizing sales, creating partnerships, managing projects, optimizing processes, analyzing the environment, processes and operations, financial management, applying flexible methodology;
- ✓ digital – analysis of large bulks of information, working in a blockchain network, virtualization, creating and developing mobile applications, creating and developing websites, creating and developing information technology architectures and platforms, observing cyber security, working with social media.

On the background of the presented above, it can be summarized that for the purposes of the present study digital entrepreneurship is the possibility to create new organizational forms, products or services, while undertaking a certain risk and by using team interaction and information technology systems.

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### **Studying the major characteristics of Industry 4.0**

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The research of the major characteristics determining the Fourth Industrial Revolution indicates there is still no single opinion in literature concerning the number, specificity and the particular effects of those factors. On the basis of the method of analysis and synthesis there can be drawn and defined the main characteristics driving the high technology economy 4.0:

- ✓ ecosystem “human – machine” – a hybrid type of ecosystem, created in view of fulfilling certain tasks under certain conditions, where most often interacting are the human factor and roboticized systems based on artificial intelligence and sensor technologies;
- ✓ artificial intelligence – a cyber-physical production system, which has the capacity to analyze the surrounding environment and undertake actions, which enhance the possibility to achieve certain goals, an innovative technology based on sensors, which through abstract symbols try to reproduce human thinking on a hierarchical, logical level, or which imitate human brain through neurons and neural networks, organized in layers, connected between themselves by simulated lines, while those neural networks have the capacity to upgrade the acquired knowledge by gathering experience and growing.
- ✓ virtual reality – a branch of the physical reality, representing an interactive graph in real time with three-dimensional models in a combination with a display, which enables the user to directly immerse in a modeled world;
- ✓ augmented reality - a system, integrating elements from the real and the virtual world, representing an improved version of reality, where certain objects or surroundings in it are enriched with virtual images, that are

overlaid on the real ones, thus improving contemporary perception of reality;

- ✓ 3D printing - additive manufacturing, creating actual public goods through digital printing from material in amorphous form of layer after layer on the basis of a digitalized 3D model, where the customization of the printed product is easily enabled – i.e., there is a possibility to fulfill specific customer requirements;
- ✓ 4D manufacturing - a process of creating a new generation of public goods, which are able to change themselves over time as well as in respect to the changes in the surrounding environment;
- ✓ large-size data - a bulk of data, which size exceeds the capacity of the typical data bases for information storage, management and analysis (Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., Byers, A., 2011);
- ✓ the Internet of things - a system, created on the basis of connected technologies and platforms via the interrelation and interaction between products, services, places, buildings and people;
- ✓ blockchain networks - specific block chains, combining powerful cryptographic algorithms with systematic decentralized computational capacity, representing a tool for transferring content (information).

These major characteristics produce a driving effect on the high technology economy 4.0, but at the same they prompt the need for a new generation of leaders and entrepreneurs having high technology knowledge, digital skills and competences, guaranteeing for them that they will cope with the global economic challenges, transforming both the real-life production into an additive one, and the linear traditional economy, based on the property over the assets, into a circular economy, based on asset sharing.

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#### **Model of the relation “digital leadership – digital entrepreneurship” in the realities of Industry 4.0**

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When taking into account the interrelation and interdependence between the concepts “digital leadership” and “digital entrepreneurship”, the model acts as a perfect tool supporting the

decisions with the process-oriented, planned and predispositioning strategic steps and actions of the business organizations, operating under the conditions of Industry 4.0. The dynamic processes are reproduced through the model in the business units, which are related and/or resulting from the developed forms of digital leadership and digital entrepreneurship therein. At the same time, the model as a tool produces a flexible system architecture, bearing realistic and adequate information about the structure, processes and functional areas of the studied objects. The model is a managerial building block, which makes it possible, in spite of its restricted conditions and resources, to analyze the essential and functional dependencies between the objects, their similarities and differences, their relational involvements, while observing the conditions of the environment, the input and output information and the goals and tasks of the study. Thus, in an abstract and simplified way, a picture is drawn of the actual relation in the business organizations between the studied concepts, which characteristics are described only through their main attributes having an impact on the specific relations in the economic entities.

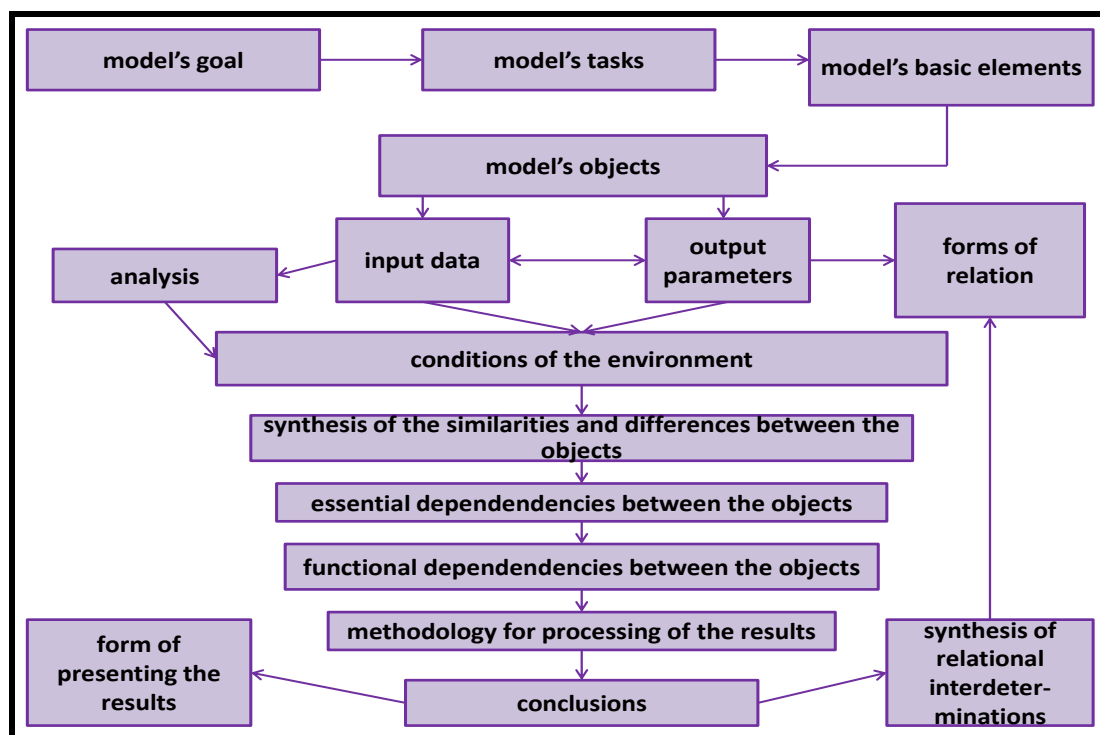


Figure 1. Model of the relation “digital leadership – digital entrepreneurship”

author's adaptation

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## Conclusion

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On the basis of the generated model of the relation “digital leadership - digital entrepreneurship”, there are concepts defined, which determine to a large extent the two studied objects. Those concepts are:

- ✓ digital economy – a combination of related digital technological solutions facilitating the development of automation, integration and real time data exchange in the production processes, which generates times higher added value rate (economic and/or social) compared to the traditional economic system;
- ✓ digital business organization – an enterprise from any sector of the economy, which on the basis of digital technological solutions improves its business and production processes and intellectual resources, and as a result of that generates times higher added value rate (economic and/or social) compared to the traditional economic entities.

On the background of the presented major characteristics of the digital economy and the digital business organization there can be synthesized the main dependencies, interrelations and inter-determinations between digital leadership and digital entrepreneurship:

- ✓ the digital leader and the digital entrepreneur should have competence in the field of the computer systems and technologies, mechatronics, robotics and artificial intelligence;
- ✓ the digital leader and the digital entrepreneur should have business knowledge, insight and potential.

A main difference between the digital leader and the digital entrepreneur is the circumstance that the digital leader knows and applies the mechanisms of the strategic business leadership and the leadership in an organizational environment.

Therefore, it can be summarized that the digital leader represents a system of integrated interdisciplinary comprehensive knowledge, skills and competences, which can generally be differentiated in two main groups:

- ✓ social, economic, legal and management knowledge, skills and competences in the field of:

- leadership in a business organization – achieving certain organizational goals through a team interaction, which is planned, organized, coordinated, motivated and controlled on the basis of trust, by a particular person, who has specific distinguishing personal and organizational characteristics – a leader;
  - strategic business leadership – achieving leadership by a particular business system (economy, sector, organization, team) in a particular environment, according to a certain criterion or a system of criteria;
  - management – goal setting, administering, maintaining and developing the systems and structure of a certain economic entity on the basis of permanent monitoring and control;
  - entrepreneurship – the readiness to take risks, adapting to the novelties, making use of the opportunities of the environment (both internal and external);
  - digital entrepreneurship – the possibility to create new organizational forms, products or services, while undertaking a certain risk, and by using team collaboration and information technology systems.
- ✓ engineering-and-technical knowledge, skills and competencies in the field of:
- computer science;
  - physics;
  - robotics;
  - mechatronics.

The aforementioned interdisciplinary knowledge, skills and competences prompt the summarization that digital leadership represents a single and integral concept, based on the integrated comprehensive use of the information and communications technology and human resources, an intrinsic part of which is digital entrepreneurship.

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