

## The Relation “Digital Leadership – Swarm Management – Lean Organization” in the Digital Smart Organizations

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Received 29 September 2019; Accepted 27 February 2020

### Abstract

The present article integrates three innovative and contemporary concepts into a single and comprehensive new concept, called the concept of the digital smart organization. Generating this new concept is a result not only of a creative, critically oriented and problematic analysis, but also of the already outlined purely pragmatic lack of synthesized and adequate to the realities toolset for organizing the processes in the business entities, operating primarily in the global digital environment. Involving the nature, elements, toolset, methodology, functions and quality of the results of the concepts for digital leadership, for swarm management and for the lean organization with the cognitive characteristics of the digital smart organizations determines an essentially new, innovative conceptual system of interrelated and interdependent knowledge, views, approaches, methods and tools leading to essentially new results, which have a higher added value for the economic entities themselves. Integrating the added value from the conceptual frameworks of digital leadership, of swarm management and of the lean organization leads to a synergy of the new conceptual system. Thus, the article clearly emphasizes on the main requirements to a business structure in view of defining it as a digital smart organization, while the relationship of the three specified concepts with the core content-related, functional and quality characteristics of the modern digital smart organizational structures is regarded as fundamental with the synthesis of the concept for a digital smart organization.

*Keywords:* reengineering, smart management, efficiency, criteria.

### 1. Introduction

Today there is an unprecedented penetration of the digital sphere into the material sphere. This leads to new economic models, which gradually shift the focus from the linear consumption pattern to the circular economy model. This necessitates the replacement of the consistent linear principle of "buy - use - discard" with a new circular economic cycle that goes through the following stages: "design - production / processing - distribution - use / sharing / borrowing / reuse / repair - waste collection - recycling". Today, the economy is in the transition from an economic model based on "asset ownership" to an economic system conditioned by the "access to assets" principle. This restructuring of the economy is the result of the development of sensory technologies, mechatronics, artificial intelligence, additive manufacturing, the Internet of Things. Thus, there is a radical change in the economic reality outlining itself over the years to come, which could be defined by economic theory as a transformation of the economic system based on ownership into an economic system driven by resource sharing. In this new economic order, ever more evident will be the role of the digital organizations managing their processes through digital products integrating artificial intelligence [1].

The role of the digital smart organizations has not yet been studied in depth in the research literature. This provides

grounds to the author to propose a definition of the concept digital smart organization, namely – business unit, which through digital innovative technological solutions, develops and upgrades its production and management structure and intellectual resources, and on the basis of this reaches higher added value rate (economic and / or social) compared to traditional economic entities [2]. The surplus value of a digital smart organization stems from the options of cyber-physical systems to help achieve synergies with production and management processes along the entire value chain. This is achieved through the ability of cyber-physical systems to simultaneously achieve resource efficiency and resource productivity.

Typical for the digital smart economic entity is development with high speed and wide scale leading to a radical change in the business models and the traditional value chains. This raises particularly acutely the issue of searching for an innovative toolset insuring efficient and reliable management in the new realities of the digital economic entities.

Binding the three concepts together – on Digital leadership, on Swarm management and on Lean organization, creates a favourable conceptual, instrumental and functional basis for the development of the new type of business organizations – the digital ones.

In spite of the numerous studies in the field of leadership and its relation to management in the business organizations, currently, there is a substantial gap in scientific theory in

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respect to leadership in a digital environment. It was only in 2015, that the European Commission alarmed about the dramatic shortage of digital leaders and the deepening crisis in respect to their development as a system of knowledge, skills, competences and responsibilities [3]. Thus, within the project “Leadership in the Fourth Industrial Revolution”, funded by the University of Telecommunications and Posts, the concept of digital leadership is defined, namely:

- a concept of goal-oriented management, implemented through the application of a particular leadership style in a virtual environment and, as a result, a team interaction between people working via networked computers or mobile devices;
- integrated application of information and communication technologies, tools and human resources in the digital environment in order to achieve higher added value for the organizational system [2], [4].

As a result of analysis of definitions on the leadership topic [5, 6], it can be synthesized that the digital leader should:

- simulate processes and phenomena for the purpose of forecasting, analysis and evaluation in the virtual space;
- plan, organize, coordinate and control the work of one or several computers or mobile devices;
- motivate the human resources, who ensure the functioning of those computers or mobile devices.

For the implementation of those functions, the digital leader should:

- know the nature and features of the digital environment;
- use innovative tools that are typical for working in a digital environment;
- possess managerial knowledge and competence;
- integrate the activities of humans and machines into a systematic interconnection and unity;
- lead the team or the organization to meeting its strategic targets;
- facilitate with his/her leadership style, in a digital environment to the added value of a team or organization.

Swarm Intelligence has established, over the last few years, itself in designing the cellular robotized systems. This systems have collective behaviour and are decentralized, self-organized natural or artificial systems. The term Swarm Intelligence was first introduced in 1989 by Gerardo Beni and Jing Wang [7]. The Swarm Intelligence concept is used in working on artificial intelligence.

At the same time, the principles of Swarm Intelligence are successfully multiplied in the business organizations as well, since they provide substantial advantage in respect to:

- the cost efficiency;
- the optimization on the basis of speed, trust and scalability;
- the team interaction subjected to a clearly defined achievable goal;
- the decentralization organized on the delegating of responsibilities;
- the application of hybrid approaches and tools.

The relation “Swarm Intelligence – business organization” requires also the generation of an essentially

new conceptual framework facilitating the management of an already changed business organization in the direction of a Business Swarm system. The philosophy of swarm management is fundamentally different from the philosophy of traditional management. The implementation of swarm management in a business organization in today's digitalized crypto-economy is a fundamentally new management model. It is based on networked organizational resources based on effective teamwork and communication. The traditional management tools that result from typical for the centralization and the control - power, hierarchy, and organizational structure have replaced by horizontally placed self-organizing team structures. They work in online organization architectures and human resources share the belonging to a team and organization as a core value. This also gives rise to a new type of corporate culture in the context of decentralized crypto-economy and communication [1], [8].

The concept for the lean organization includes a system of techniques for enhancing efficiency, developed by the major Japanese companies in the 1980s. This concept is based on a technique elaborated in view of minimizing the production waste and maximizing the value of the product or service for the client, without making a compromise with the quality, while, at the same time, the organizational structure is based on the team principle, where each team member is qualified enough to carry out alone all the tasks assigned to the team in general [9-11].

According to the concept for the lean organization, the separate elements and materials are delivered to the workplace of each team right on time, while each member can stop the working process if a defect has been found, and that is encouraged. That is also one of the most essential differences in comparison with the classical management approach, where stopping the process is very costly, and it is to be done only in an emergency situation. Therefore, the substantial difference between the lean organizations and the traditional business structures is that in the course of the working process the team members acquire additional skills and learn something more. This, undoubtedly, leads to enhancing the quality of the produced goods or services. The main value of the lean organization concept is the incessant two-way communication, where problems are resolved right away after identifying them, and the working processes are streamlined in the course of running them.

The theoretical review of the nature of the concepts for digital leadership, swarm management and lean organization enable the generation of the conceptual fundamentals of an essentially new management-and-economic doctrine, focused on synergic results in the business organizations, working in a digital environment and applying smart management.

Object of study in the article is the relation between the concepts for digital leadership, swarm management and lean organization in the digital smart organizations.

Subject of analysis is the concept for a digital smart organization, which integrates in itself the systematic interrelation between the nature of the concepts “digital leadership”, „swarm management”, „lean organization” and “digital smart organization”.

The goal of the study is synthesizing the added value for the organizational environment of the newly generated concept for a digital smart organization.

## 2. The digital smart organization concept

The concept, proposed in the present article, is a new one,

which has not been published to date, while its fundamental basis is the research work of the author so far in the field of digital leadership, digital economy, digital business structures and swarm management. On this basis, the new conceptual framework steps on the nature, elements, toolset, methodology, functions and quality of the concepts for digital leadership, swarm management and lean organization (Figure 1).



Fig 1. Fundamental basis of the concept for a digital business organization

The nature of the new conceptual doctrine is a systematic and comprehensive in respect to all the activities carried out in the digital smart organization. The concept maintains its intrinsic link with management. It should be digital, automated and integrating artificial and computer intelligence [12]. It is built on the basis of a unity in respect to those parts of the concepts for digital leadership, swarm management and lean organization, which are overlapping pursuant to certain qualitative, quantitative, functional and content-related aspects.

The fundamental theoretical basis of the Concept for a Digital Smart Organization is formed on two main building elements, each of them with equal weight and importance within the overall conceptual framework – methodology and methodics. The elements of the methodological and methodical part are presented on figure 2.

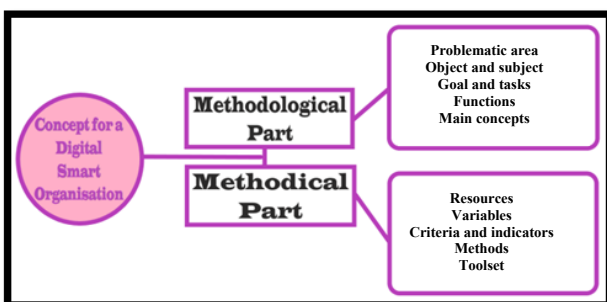


Fig 2. Main elements of the Concept for a Digital Smart Organization

The Concept for a Digital Smart Organization leads to achieving synergy in the long run, which is strategically set as a goal, since the economic entities:

- define clearly their strategic goals in a long-term aspect;
- work efficiently for achieving them on the basis of turning “learning along the entire working process cycle” into a key competence;
- are led by digital leaders who have engineering and technological literacy, business knowledge, apply of

strategic business leadership and organizational leadership mechanisms;

- create a high level of operational and team organization through self-organization, flexibility, adaptability, sustainability, scalability, decentralization, modularity, speed and parallelism;
- dynamicize their communication, production, management and business processes;
- build in a spatial and temporal aspect digital highly technological structures and systems maintained by computer and artificial intelligence.

### 3. Results and discussion

The research and analysis of the relation “Digital Leadership - Swarm Management - Lean Organization” binds together the qualitative, quantitative, functional and content-related aspects of the three concepts, and upgrades this link to an innovative Concept for a Digital Smart Organization. At the funfament of this concept are the main features of the systematic approach, and the aim is to achieve goals of the organization, information-analytical and methodological provision of the its management. At the same time, economic subjects should base their activities in the digital environment of management functions: goal setting, planning, organizing, regulating, motivating, controlling, reporting and making decisions. On this basis, the concept takes into account the systematic link and interaction between:

- leadership;
- team spirit;
- upgrading the skills and experience;
- management functions;
- information provision;
- analytical activity;
- toolset;
- processes.

The relation “Digital Leadership - Swarm Management - Lean Organization” is a constitutive part and starting point of the Concept for a Digital Smart Organization. Therefore, in a quantitative aspect, the three concepts have a narrower meaning and they are integrated into the cognitive nature of the concept “digital smart organization”.

In respect to its qualitative characteristics, the relation “Digital Leadership - Swarm Management - Lean Organization” indicates the intrinsic link with digital management, and hence, with the business organization, operating in a digital environment. It could be summarized that the interrelation between the three concepts leads to a specific navigation of the digital management, applied in the digital smart economic entities.

The functionality of the studied relation forms a specific integrated system of management functions, which add value and synergy to the results of the digital smart organizations.

In a content-related aspect, the relation “Digital Leadership - Swarm Management - Lean Organization” provides the link between the main management functions, defines tolerances between plan and report and generates measures to overcome incoming and / or already occurring, as a result of these deviations, changes in the internal organizational environment and in strategic organizational orientations.

The added value from the integration of the studied relation “Digital Leadership - Swarm Management - Lean Organization” into the Concept for a Digital Smart Organization is expressed in:

- digital planning, organizing, coordinating, motivating and control, focused on balancing the loading on the entire organizational structure;
- self-organized, decentralized large-scale team interaction in a digital environment (pooling the efforts of human resources with different knowledge, skills and competencies, positioned at different geographical points and delegating certain power and authority in a digital environment);
- modular parallelism determined by the independence and parallelity in the activities of each of the members of the self-organizing, decentralized, large-scale positioned teams, and by the leadership, demonstrated in a digital environment and with digital communication;
- flexibility enabling the response of the digital smart organization to internal disturbances and external challenges;
- adaptability to quickly adapt the digital smart organization to the changing environment;
- speed involved with the promptness of the relations in a digital environment;
- routing based on the principle that each digital management platform, and, hence, the entire business structure and its human resources utilize the useful information, experience and conclusions, gathered from previous periods and/or situations, and on the basis of artificial and/or computer intelligence upgrade the decisions at a certain present moment;
- optimization related to finding the best solution for a specific situation;
- sustainability of the result, issuing from the fulfillment of the tasks, even in case of a failure of any team member.

The research presented in this article has the following restrictive conditions:

- no other concepts directly related to the development of digital smart organizations in the global economic environment have been studied;
- object of analysis are only the concepts forming the studied relation, and not the other elements of the Concept for a Digital Smart Organization;
- the factors and conditions of the environment leading to the binding of the three studied concepts in a relational dependence have not been described or analyzed;
- the added value of the other elements of the Concept for a Digital Smart Organization has not been taken into account;
- the main features of the Digital Smart Organization Concept are not related to the specifics of the economic operators and their life cycle; the survey does not cover the technical characteristics of digital business organizations;
- the results from the approbation of the Concept for a Digital Smart Organization, based on the relation “Digital Leadership - Swarm Management - Lean Organization” are not presented.

#### 4. Conclusions

It could be summarized, in conclusion, that the relation “Digital Leadership - Swarm Management - Lean Organization” is radically changing the basic business management principles since it multiplies the fundamental rules of three concepts (the concepts for Digital Leadership, Swarm Management and Lean Organization) in a single, new, innovative conceptual framework, regulating the digital smart economic entities. In that sense, the digital smart organizations comply with the following principles:

- the principle of technological innovativeness – the digital smart economic entities base their activities on systems and networks of digital devices, which integrate computer and/or artificial intelligence and manage their overall process cycle;
- the leadership principle – the digital environment, where the business organizations function, requires new skills and competences from the leader enabling the latter to motivate the human resources in various geographical points for the high quality performance of a common task;
- the team spirit principle – belonging to a team and organization is perceived as a fundamental value by the self-organized team architectures, working in an online network;
- the principle of learning along the entire working process cycle – the quality in a business organization is maintained on the basis of permanent improving of the processes therein, and of its human resources, where this principle is also accomplished through the knowledge and experience accumulated by digital platforms and systems using computer and/or artificial intelligence;
- the quality principle – the digital environment suggests developing the qualitative parameters of the products and/or services, meeting the individual customer requirements and needs, focusing on narrow product lists;
- the principle of resource provision – resources should not be concentrated in a narrow region;
- the speed principle – the typical for the digital environment cyber-physical systems, networks of computers or mobile devices create conditions for a quick exchange of large bulks of data, quick analyses, quick generation of alternatives and quick decision making;
- the stability principle – the change in the global environment should not lead to fundamental disturbance in the internal one;
- the adaptability principle – the digital smart organization has sufficient resources for ensuring the flexibility of its strategy and processes;
- the efficiency principle – integrating three different concepts in a single and comprehensive system leads to achieving resource efficiency and resource productivity.

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