

CONVERGENCE OF GREEN IT TECHNOLOGIES AND MULTIDIMENSIONAL TRANSFORMATIONS OF INFORMATION AND ANALYTICAL SUPPORT IN THE DIGITAL MATURITY MANAGEMENT OF MARKETING SYSTEMS

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Abstract. The paper substantiates the importance of taking into account the consequences of management decisions for the development of societal ecosystems. The peculiarities and modern requirements for information and analytical support of management depending on the level of technological maturity are analyzed with the aim of convergent reduction of digital gaps. The evolutionary trend of models of technological readiness in the direction of the strategy of sustainable economic development, the holistic concept of marketing and Green IT was revealed. Emphasis is placed on the need for societal expansion of the interpretation of the IT for Green concept and strategic focus on the convergence of multidimensional digital transformations in management.

Keywords: multidimensional digital transformations, holistic marketing, societal ecosystem, Green IT, information and analytical support in management, models of technological maturity.

"Science and technology should make a person wiser, but in no way replace his mind. A person should have a network of information at his disposal, but not be a prisoner of it. Resources no longer limit decisions, but decisions create resources."

(F. Major, head of UNESCO).

The development of modern society is characterized by powerful digital transformations of economic systems, technological systems, macro- and micro-environment of economic entities. The role of modern technologies is fundamentally changing, and they become, on the one hand, the driver of the formation of a modern competitive economy, on the other hand, they require constant adaptation of information and analytical support for management and marketing to technological challenges and challenges associated with the formation and development of societal systems based on the concept IT for Green (Green IT/ Green Tech) [1, p. 148].

Digitization affects not only the productivity of production activities, the level of efficiency in the use of resources, the dynamism of the implementation of business models, but also forms new management mechanisms and tools to support the adoption of effective management decisions based on innovative technological platforms, such as mobility, virtualization, Big Data Management, Machine Learning, and innovative concepts of sustainable development and preservation of civilization and human values. Making managerial decisions in the activities of a modern enterprise is closely related to the accumulation and analytical processing of information regarding a certain managerial situation in order to find and develop the best option or scenario for the development of actions in this situation in the institutional and legal environment and the moral and value field at all levels of socio-economic systems and requires their strategic convergence in societal ecosystems. Decision-making process based on the identifying the problem, takes into account time and resource constraint, but it is extremely important to take into account the consequences of decisions made not only for individual economic entities of different levels, but for marketing societal systems as a whole.

P - the initial problem situation;

T - time to make a decision;

R - the resources needed for decision-making;

Pd - defined problem situation;

H = (H_i, ..., H_n) - assumptions (hypotheses) about the development of the situation in the future;

G = (G_i, ..., G_k) - the goals to be achieved by the decision based on the principles of sociotatality;

O = (O₁ ..., O₁) – restrictions (include institutional-legal and moral-principal);

A = (A₁, ..., A_m) - alternative solutions (at least - two);

K = (K₁, ..., K_r) - criteria for choosing the best solution;

f - multi-criteria function of the advantage, which includes both objective and subjective criteria with K, as well as the consequences of these decisions for the system as a whole;

A * the optimal solution, taking into account the principles of sustainable development of societal ecosystems and Green IT.

The requirements for modern adequate information and analytical support for management decision-making are formed depending on the following groups of factors associated with global digitization processes and formation of societal systems [2, p. 53].

First, under the influence of more important characteristics of modern management decisions, such as:

- a large number of parameters that must be taken into account when analyzing the problem; high complexity of solved problems;
- the uniqueness of the conditions and the absence of analogues in the past;
- initial uncertainty of problems;
- many conflicting criteria for choosing the appropriate solution alternative;
- the difficulty of finding a compromise between the personal and departmental interests of decision-makers;
- the difficulty of predicting the consequences of implementing possible alternatives;
- dynamism of decision-making.

Secondly, under the influence of technological management challenges, such as:

- information determinism of information from various sources;
- functional non-synchronization of management tools;

- lack of integration of process and project approaches in enterprise management.

Thirdly, under the influence of the formation of digital marketing systems, which are characterized by:

- omnichannel collaborative interactions based on open infrastructure,
- transition to a network model of value creation,
- neuro communication using artificial intelligence and IoT, IoE technologies,
- the evolution of a client-oriented approach from interaction marketing, relationship marketing, massively individualized, socially responsible to holistic marketing [3, p. 130];
- deepening of the personalized two-way communication of participants in the creation of data in digital channels.

In addition, there is an accumulation of the synergistic effect of the network model of value creation from:

- improving the efficiency of internal business processes and management decisions in the direction of increasing the quality and effectiveness of external communications;
- maximizing the value for consumers to the total value of the entire digital ecosystem;
- the evolution of the interpretation and practical implementation of the IT for Green concept from a focus on low consumption of energy and materials, reduction of emissions and pollution, environmental protection in the direction of the implementation of the strategy of sustainable economic development of society based on the formation of societal systems.

That is why the mechanism for implementing procedures for supporting managerial decisions in the management and marketing of a modern enterprise requires special informational, analytical, legal, organizational and technical support. All the listed types of support are closely interrelated and together form a decision support system and require a number of technological competencies from the modern manager, which are related to the ability to receive adequate information from various sources in a timely manner, to visualize it in an understandable form, to be able to use it effectively in the modeling process and forecasting the development of performance indicators in order to find mechanisms for increasing the level of technological maturity and reducing digital gaps at all levels of societal systems.

At the macro-level of societal systems, in order to solve these issues, a number of international ratings are used to assess the level of information development and maturity of electronic state tools, such as.

1) Networked Readiness Index (NRI) - the rating developed by the World Economic Forum comprehensively analyzes the degree of readiness of the state's economy for a digital leap.

2) Knowledge Economy Index (KEI) – the rating of the knowledge economy from the World Bank, which characterizes the level of innovative development of the knowledge-oriented economy of countries.

3) ICT Development Index 2020 (IDI) - an updated index (Index of development of information and communication technologies) from the International Telecommunication Union (ITU), which today is the most adequate integral indicator for assessing the ICT potential of the countries of the world and an effective tool for monitoring digital progress, dynamics of the depth of digital gaps [4].

At the micro-level, the processes of global digitalization are reflected in the transformation of economic subjects of other levels in organizations of a fundamentally new (post-Taylorian) type, which are characterized by:

- the latest organizational structure, more flexible, mobile, with optimized elements of the system with multiple dynamic connections;
- informational transparency, operational management in real time, prognostic planning and flexible adaptability;
- client-oriented management for more complete creation of personalized value in the direction of implementing a holistic marketing model.

The place in the rating of information development of micro-level economic subjects is characterized by factor models for determining the level of organizational and technological maturity.

The technological maturity of the organization characterizes the level of readiness of economic subjects for effective management of activities and development of collaborative external interactions. Among the most representative should be indicated:

- 1) Software Engineering Institute (SEI), which determines the level of development of the company depending on the degree of use of management mechanisms by goals;
- 2) Company Project Management Maturity Model (CP3M). on the basis of the maturity of the implementation of the project approach;
- 3) Project Management Maturity Model (PMMM) - Harold Kerzner's maturity model, which assesses the degree of maturity in project management and is based on the analysis of risks and problems associated with the resistance of users and staff to the implementation of innovation of various types and directions;
- 4) The Berkeley model of company maturity is based on the assessment of the level of application of information systems and communication technologies in the organization's management;
- 5) International Project Management Association (IPMA) Delta Maturity Model, a multifactor analysis model (360-degree) of innovative activity of the enterprise and prospects for the development of organizational competence [5].
- 6) Open Digital Maturity Model (ODMM) - a digital maturity model for measuring the degree of digitization of the company from Huawei, which is characterized by marketing orientation, strategic customer-oriented pragmatic orientation, socio-ecological production, digital frugal culture, and is aimed at creating a viable plan for the digital transformation of enterprises and elimination of digital divides at the micro and macro levels [6].
- 7) Green IT Adoption Model (GITAM) – a model of readiness for Green IT that analyzes the technological, organizational and environmental contextual perspectives of the implementation of green IT and the economic, regulatory and ethical aspects of eliminating gaps between intentions and actions [7, p. 659].

Technological maturity of the organization characterizes the level of readiness of economic subjects for effective management of activities and development of joint external interactions. the level of application of information systems and communication technologies in the management of the organization. The driving mechanism for growth according to the stages of technological maturity is the constant analysis, modeling and automation of business processes with the aim of improving them, increasing flexibility, increasing efficiency, early detection of potential risks (both fundamental and market, conjunctural and operational) and finer tuning to the changing needs of customers, taking into account the consequences for the system.

Already at the "managed corporate" level, business processes (not only internal, but also in the direction of forming external relations) are modeled, measured no and standardized not only; costs and quality are predicted; there are regular and reliable clients; strategic plans are quantifiable [8].

At the "continuous improvement" level, a systematic and structured approach to planning and control is used; based on quantitative quality management criteria throughout the value chain, permanent analysis and optimization or reengineering of business processes. Regardless of the analysis model, the basis of this level is the constant improvement of environmental protection policies and mechanisms, ensuring informational and even physical security, energy saving and energy recovery, innovative solutions to global societal problems for sustainable societal development of civilization.

Growth by stages of technological maturity requires a multi-approach methodology based on a combination of simulation modeling tools (in particular, an agent-dynamic approach) for engineering, analysis and identification of bottlenecks, object-oriented for reverse engineering, IDEF0 for high-level description of business processes; ARIS for optimization and reengineering of business processes. The higher the stage of technological maturity, the more formalized are the marketing management procedures, more cross-functional and integrated teams, end-to-end information and

analytical support, measured and standardized assessment of the effectiveness of business processes, systematic multi-project planning and control digital risks, consequences and challenges.

The development of the digital transformation of the economy, management, marketing, and business should take place systematically and managed at the level of socio-economic systems. The mechanism of adaptation of information and analytical support should be based on relevant institutions, take into account the level of infrastructural maturity and the components of the digital ecosystem in order to eliminate digital distortions and digital gaps, ensure equal free access to information, economic and financial resources, coordinate with the needs of economic entities at different levels and in the direction of the holistic concept of marketing and the principles of sociality.

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