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**CREATING A CHANGE MANAGEMENT MODEL FOR SMALL
AND MEDIUM ENTERPRISES THROUGH THE CHALLENGES
OF INDUSTRIALIZATION 4.0**

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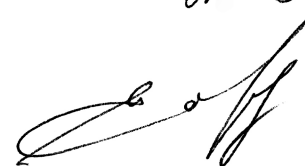
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LIST OF ABBREVIATIONS

4IR	The Fourth Industrial Revolution
AR	Augmented reality
BANI	Brittle, Anxious, Nonlinear, Incomprehensible
DQ	Decency Quotient
EU	European Union
EQ	Emotional Quotient
FC	Final coefficient
FOAC4.0	Formula of Organizational Alignment with the Challenges of Industry 4.0
GDP	Gross Domestic Product
HRM	Human Resources Management (system)
ICT	Information and Communication Technologies
IoT	Internet of Things
IT	Information Technologies
IQ	Intelligence Quotient
LOAC4.0	Level of Organizational Alignment with the Challenges of Industry 4.0
MDED	Ministry of Economic Development and Digitalization of the Republic of Moldova
MVP	Minimum Viable Product
NRI	Networked Readiness Index
ODA	Organization for Entrepreneurship Development
ODIMM	Organization for the Development of Small and Medium Enterprises
RM	Republic of Moldova
SMEs	Small and Medium Enterprises
SPOD	Steady, Predictable, Ordinary, Definite
STDM	Strategia de transformare digitală a Republicii Moldova (Digital Transformation Strategy of the Republic of Moldova)
VUKA	Volatility, Uncertainty, Complexity, Ambiguity
VR	Virtual Reality

CONCEPTUAL FOUNDATIONS OF THE RESEARCH

Relevance and Importance of the Chosen Topic. The current trends in the spread of new technologies in business, the economy, society, and the personal lives of individuals leave no doubt about the relevance of the chosen topic. The extreme complexity and simultaneous necessity of adapting to ongoing changes place a tremendous responsibility on management for the survival and future of companies in the near term. It has become clear that there is a need to rethink the entire business model: the rules of existence and interaction, systems and principles, technologies and tools, which until recently yielded favorable results and were adequate for existing conditions. The complexity of this transition lies in the nature of changes that fundamentally differ from previous development trends, which were linear and, consequently, more controllable, predictable, and plannable.

The current business environment is so complex and dynamic that, recently, the processes occurring within it have begun to be compared to a new industrial revolution. At the same time, scientists characterize the Fourth Industrial Revolution (4IR) as a phenomenon entirely unlike previous revolutions, with the nature of changes and types of innovations significantly differing from those before. Moreover, the speed of changes is becoming exponential, making it evident that managing these processes—and even more so, predicting them—has become extremely challenging. Such shifts in the external environment push for organizational transformations based on the selection of a management model suited for the future, capable of enduring and successfully evolving, generating and implementing innovations, finding ways to engage each employee, skillfully distributing roles within teams, selecting the right approach to leadership, setting necessary priorities, working for the benefit of the client and society as a whole, and caring for personnel.

The asymptotic (rapid) pace of development, which is practically unpredictable, dismisses the successful business models of the past, elevating the very principle of organizational existence to a new level. The latest technologies, which have served as a catalyst for such radical changes and, collectively, led to the phenomenon known as the Fourth Industrial Revolution (4IR) or Industry 4.0, naturally suggest changes in transition models toward a new state, or models of organizational change management. Thus, the relevance of this topic is intensified, considering the need to develop both the future business model of the company and the model for transitioning to the required state.

Another factor characterizing *the relevance of this study* lies in its subject: small and medium enterprises (SMEs) in the Republic of Moldova are a foundational component of the economy, representing, according to the latest statistical data, 99.2% of the total number of enterprises in the country. The challenging economic situation affecting many businesses in this sector is the result of numerous factors that, in their interaction, amplify the negative impact. At the same time, the dynamics of changes related to Industry 4.0 processes offer significant opportunities for these enterprises, with potentially fatal consequences if these opportunities are not utilized.

The advantages and challenges of this transition are evident. In the latest available EU report for 2021–2022, "SMEs and Resilience of the External Environment" [6], two key issues are highlighted: first, given the limited capacities of SMEs, the need to create ready-made digital solutions, and second, the alignment of these solutions with the business processes and business models of companies. Based on these directions, it is important to note that such alignment is achieved through an adequate and comprehensive approach to change management. Thus, the choice of research topic was driven by the need to justify a change management model for enterprises in this sector, considering the specific features of their operations and the challenging conditions dictated by Industry 4.0.

The Degree of Study of the Chosen Topic by National and International Researchers. Many Moldovan and international scholars who have thoroughly studied and continue to study the topics of innovation, change, the current business environment, and business modeling have conducted a vast number of scientific and practical studies. At the same time, the topic remains inexhaustible and not fully explored, both globally and nationally, especially considering the interplay between organizational change modeling and the operational specifics of SMEs in the Republic of Moldova under the unique conditions of Industry 4.0.

Research on the characteristics of the environment associated with the disruptive changes of the Fourth Industrial Revolution (4IR), identifying patterns, and considering the impact of Industry 4.0 technologies on modern enterprises includes scientific works by international scholars such as Klaus Schwab, T. Blemmaert, Moore J., Bogdanova M., Weill P., Warner S., Stefan van den Broek, Thomas Siebel, Ray Kurzweil, Andrew McAfee, Kevin Roose, Erik Brynjolfsson, Yuval Noah Harari, Hammer M., Champy J., Sima E., Taleb N., Gilchrist A., Kaplan R., Norton D., as well as Moldovan researchers such as Perciun R., Amarfii-Railean N., Cotelnic A., Bilaş L., Emelian V.

The issues of innovation and innovative development were dealt with by foreign scientists: Drucker P., Timbal K., Crowpley A.J., Crowpley D.H., O'Reilly, R. Martin, Christensen K., Pisano G., Reece E., Weil P., Warner St., Moore J., Raynor M., Kaufman S., Shikh V., B.D. Robertson, Vishnyakov Ya, Kirsanov K., Kiseleva S., Medynsky V., Surin A., Molchanova O., Fathutdinov R., Ildemenov S. and Moldovan researchers: Hriscev E., Belostecinic Gr., Bugaian L., Stratan A., Solcan A., Suslenko A., Platon N., Sendrea M., Litvin A., Levitscaia A., Ianioglo N., and others.

Numerous studies in the field of change management, in particular, the development of models and processes, forms and techniques of change are associated with the names of: Levin K., Kotter J., Cohen D.S., Senge P., O'Reilly T., Weil P., Warner St., Wolf N., Laloux F., C. Linz, G. Muller-Stevens, A. Zimmerman, S. Hayward, Y. Apello, M. Loeffler, L. Adkins L., E. Cameron, M. Greene, A. Androniceanu, C. Rusu, and C. Erhan, And Moldovan researchers: Cotelnic A., Bilas L., Bugaian L., Georgita M., Sendrea M., Covas L., Calugareanu I., Dorogaia I., and others.

The peculiarities of entrepreneurship and the specificity of SME activity in the world context and in the context of the economy of RM have been studied by the following scientists: R. Cantillon, J.B. Say, D. McKelnd, P. Drucker, A. Shapiro, G. Pinchot, R. Hizrich, F.A. Hayek, Marshall A., Pigou A., Schumpeter J., North D., McMillan K., Aldrich G., Shane S., Ageev A.I., Blinov A.O., Extensive research in the field of the peculiarities of functioning of SMEs of RM is carried out by Moldovan scientists: Aculai E., Babii L., Bugaian L., Burlacu N., Vinogradova N., Georgita M., Doga V., Catan P., Paladi I., Popa A., Solcan A., Stratan A., Sirbu I., Savga L., Certan S.

At the international level, diverse research is being conducted on the impact of the Fourth Industrial Revolution (4IR) on the global economy and enterprise operations: The World Economic Forum (WEF), led by its president, Klaus Schwab, who coined the term Industry 4.0, holds annual conferences on this topic. Well-known studies on digitalization and the latest technologies are conducted by experts from the European Commission (Eurostat), and there is ongoing evaluation of the business environment and SME activity trends in the Republic of Moldova. Policies to support SMEs are being developed by the Ministry of Economic Development and Digitalization of the Republic of Moldova (MDED), the Organization for Entrepreneurship Development (ODA), and representatives of business associations.

Aim and Objectives. The aim of this study is to develop a change management model for SMEs in the Republic of Moldova, providing enterprises with flexibility and adaptability, considering the turbulent external environment shaped by the process of Industry 4.0.

To achieve this, it is necessary to analyze the main theoretical and practical aspects, logically interconnected within the context of this topic and confirming the need to revise approaches and concepts of change and innovation management under current conditions. This leads to the following **research objectives**:

1. Conduct an analysis of the evolutionary sequence of changes and innovations in the economy since the First Industrial Revolution, comparing them with the evolutionary processes in management science;
2. Analyze the principles of classical management from the perspective of their relevance to the modern enterprise, thereby justifying the need for enterprises to shift to a new level of management, and highlight the characteristics of management in the context of the Fourth Industrial Revolution (4IR);
3. Analyze the characteristics of the modern business environment based on the disruptive technologies of Industry 4.0;

4. Synthesize the foundational approaches to change management as a distinct field within management science, encompassing its own approaches, methods, and tools;
5. Conduct a comprehensive study of the characteristics of the business environment and SME operations in the context of transformational changes abroad and in the Republic of Moldova;
6. Develop a research methodology for studying the characteristics of change management in SMEs and the development directions for SMEs in the Republic of Moldova under transformational changes;
7. Conduct an empirical study reflecting the specific activities of the SME sector and develop corresponding conclusions;
8. Justify the main issues of transformational changes for SMEs in the Republic of Moldova;
9. Develop an econometric model that accounts for the dependencies of changes on various influencing factors;
10. Develop a diagnostic model for SME management in the context of Industry 4.0;
11. Develop a conceptual management model for SMEs under the disruptive changes driven by Industry 4.0;
12. Justify an algorithm for implementing organizational changes in SMEs in the Republic of Moldova;
13. Test the developed models on entities within the national economy to confirm their adaptability and practical applicability;
14. Identify prospects for the future development of change and innovation management and formulate conclusions for SMEs in the Republic of Moldova, taking into account global trends and the specifics of the national environment.

Considering the points listed, **the main problem of the study** lies in the necessity and complexity of justifying a transition model for SMEs in the Republic of Moldova to a new state, or an organizational change management model that would ensure adequate and comprehensive changes in the management system and form an operational model based on the advanced technologies of Industry 4.0, contributing to the further regeneration of the system under uncertain conditions.

The main hypothesis put forward in this study suggests that under the conditions of the Fourth Industrial Revolution (4IR), the classical management model becomes ineffective. Building an adequate model requires a fundamentally different approach to change and innovation management, based on new principles and methods. To ensure a company's resilience and viability, it is necessary to create an ecosystem based on open innovation principles, apply a flexible management methodology, and more.

A more detailed exploration of the topic and a deeper understanding of the real operating environment of national companies has allowed for the identification of **additional hypotheses** that form the basis of this work:

Hypothesis 1: The most important factors in organizational development in the modern business environment, shaped by the challenges of Industry 4.0, are the continuous implementation of organizational changes and the rethinking of the existing business model;

Hypothesis 2: The level of compliance of SMEs in the Republic of Moldova with the conditions dictated by the challenges of Industry 4.0 is assessed as above average;

Hypothesis 3: Most SMEs in the Republic of Moldova do not view the establishment of partnerships and an open innovation system as key factors for their further development.

Hypothesis 4: The predominant leadership style of the manager has a significant impact on the strength of resistance to change;

Hypothesis 5: There is a direct correlation between leadership style and the willingness to change the business model; the most suitable styles in this context are coaching, mentoring, and democratic, with a preference given to the coaching style;

Hypothesis 6: Companies that pursue business model transformation exhibit a higher propensity to adopt the Agile approach as an organizational behavior philosophy;

Hypothesis 7: The contemporary operational environment necessitates a focus on team-based collaboration; in the most effective organizations, employees spend a greater proportion of their time in teams. There is a direct relationship between the growth rate of sales and the time spent in teams;

Hypothesis 8: A company's readiness to undertake change is linked to its performance; more successful companies demonstrate a higher readiness for change;

The new research direction developed within this dissertation is **Transformational Management 4.0 for SMEs**, which is proposed as a distinct branch within change management, characterized by deep and comprehensive, radical processes associated with extreme uncertainty and turbulence in the external environment. This direction focuses on developing an integrated change management model for SMEs in the context of challenges posed by Industry 4.0, based on defining innovative principles of organizational adaptation and transformation through the integration of digital technologies and flexible management models aimed at enhancing SME resilience and competitiveness. The approach to change management adopts a proactive and adaptive model that encompasses technological, cultural, and managerial components essential for navigating an evolving economic landscape.

The scientific novelty presented in this work relates to its objectives, tasks, and hypotheses, and can be summarized as follows:

- A symbiosis of two evolutionary processes - industrial revolutions and management science - has been established;
- The diminishing relevance of classical management principles for the current external environment has been examined, along with the characteristics of change management within the classical management model;
- The role of informal organizations in managing transformation processes has been emphasized;
- The concepts of digitalization, digital transformation, digital economy, and digital society have been analyzed in their interrelation within the context of Industry 4.0, providing a clarified interpretation of these terms;
- Factors influencing transformational change processes in the Republic of Moldova under evolving operational conditions have been identified;
- A methodology for researching the transformation prospects of enterprises in the context of Industry 4.0 has been developed;
- An econometric model of alignment with Industry 4.0, based on empirical research, has been formulated;
- An innovative model for diagnosing the readiness of enterprises for change under Industry 4.0 conditions has been created;
- An algorithm for implementing changes in SMEs within the context of Industry 4.0 has been developed;
- A change management model specifically designed for Moldovan SMEs has been developed, tailored to the specific economic conditions, sociocultural characteristics, and needs of national enterprises, with consideration of Industry 4.0 technologies.

Synthesis of the Research Methodology and Justification of Research Methods Used in the Study. This work employed methods of *analysis and synthesis* to break down complex processes into components and represent them discretely within the research topic. *Phenomenology* was used to examine phenomena in terms of their internal content. The *historical method* was applied to investigate the conceptual characteristics of industrial revolutions and the evolutionary aspects of management and change management. *Induction* was employed to identify general patterns, while *deduction* was used to formulate specific conclusions for particular conditions. *Comparative analysis* facilitated the study of SME development features across various countries and allowed for *benchmarking*, leading to insights for Moldovan SMEs based on best practices worldwide. *System analysis* enabled a representation of the internal environment of SMEs as a system of interrelated elements, as well as an open system with links to the external environment impacted by Industry 4.0. *Observation* and *description* were used to determine the operational features of Moldovan SMEs. *Mathematical (econometric) modeling* supported factor analysis, *principal component analysis*,

varimax rotation, and *logit regression*, contributing to the development of a change model and validating the research hypotheses. *Experimental analysis* was applied in the practical implementation of the developed models within Moldovan SMEs. *Conceptual modeling* facilitated the representation of the conceptual change management model, diagnostic model, and change implementation algorithm under Industry 4.0 conditions.

Thus, the research methodology encompassed a *systematic* and *comparative analysis* of phenomena, processes, and characteristics of Industry 4.0 and management theories, *modeling* using econometric tools, and the application of *induction* and *deduction* to study conceptual features and real events in the Republic of Moldova. The methodology also involved the use of a *questionnaire* developed by the author through the Google Forms application, along with business process analysis and an assessment of Industry 4.0 technology adoption in SMEs.

We should also highlight the **interdisciplinary approach in the research methodology**, which represents the interconnection of studies across three distinct areas: (1) the features of Industry 4.0, which, in the author's view, are represented through three aspects: technological, social, and economic (with an emphasis on new business models); (2) the conceptual features of change management; (3) the specifics of SME activities, which essentially align with the entrepreneurial science field. Additionally, macroeconomic and comparative analyses of different countries on the manifestation of the Industry 4.0 phenomenon and SME specifics enabled a benchmarking analysis, identifying best international practices and integrating them into this research.

The econometric aspect of the study facilitated the development of a factor model for change management and provided a robust evidential basis for testing the hypotheses presented in the work. This approach offers a comprehensive view of the transformations that SMEs of the Republic of Moldova undergo in the context of Industry 4.0, combining technological, economic, and managerial perspectives and grounding the proposed solutions in rigorous scientific analysis of the interactions between these domains.

The fundamentally novel results for science and practice are linked to the innovative nature of the research topic and the originality of the presented developments, summarized as follows:

- The integration of conceptual aspects of industrial revolutions and management schools, identifying prerequisites, developmental features, and environmental characteristics, has helped justify the patterns underpinning the emergence of the Fourth Industrial Revolution (4IR);
- Viewing classical management principles through the lens of their application under Industry 4.0 conditions enabled the formulation of a fundamentally new management model for SMEs;
- A fundamentally new methodology was used to develop an econometric model for assessing SME alignment with Industry 4.0 conditions, presented as the "Formula of Organizational Alignment with the Challenges of Industry 4.0" (*FOAC 4.0: Certificate of Registration of Copyright and Related Rights, Series OȘ 8002 dated 18.09.2024*);
- An original comprehensive diagnostic model has been developed to assess the state of management level in SMEs under Industry 4.0 conditions, which can be utilized by any enterprise, regardless of industry, employee count, or financial indicators (*Diagnostic Model of Organizational Changes for SMEs – 4DIRECT: Certificate of Registration of Copyright and Related Rights, Series OȘ 8001 dated 18.09.2024*).
- An algorithm for implementing changes has been formulated, encompassing the transformation of all essential aspects and elements of enterprise activities for conducting transformations (*Algorithm for Implementing Organizational Changes for SMEs "TRANSFORMATIVE 4.0": Certificate of Registration of Copyright and Related Rights, Series OȘ 8000 dated 18.09.2024*).

Theoretical Significance of the Study lies in the development of the conceptual foundations of a change model for SMEs under Industry 4.0 conditions, the presentation of a conceptual model for new management viewed through the lens of the Fourth Industrial Revolution (4IR), the justification for changing management functions, the understanding of the "teal" organization concept, the formulation of a change algorithm and diagnostic model specific to the modern environment, and the development of a strategy matrix within Industry 4.0 conditions.

Practical Significance of the Research lies in the applicability of the developed models and change techniques in practice, which have proven their effectiveness among operating SMEs of the Republic of Moldova: the alignment formula for Industry 4.0 conditions, the diagnostic model, the transformation algorithm, the strategy matrix, and the updated management model under Industry 4.0 conditions.

The recommendations presented in the section on general conclusions and recommendations are practically applicable to the activities of SMEs, educational institutions, and the Ministry of Economic Development and Digitalization of the Republic of Moldova (MDED).

Content of the Dissertation Chapters

The first chapter presents an analysis and synthesis of the conceptual foundations and evolutionary aspects of industrial revolutions and management approaches, highlighting management principles and analyzing their relevance in the modern environment. It also examines Industry 4.0 technologies in the context of management aspects and justifies their impact on the activities of contemporary enterprises. This chapter further characterizes the external environment within the temporal continuum from the 1980s to the present, introduces the concepts of SPOD, VUCA, and BANI worlds, and outlines the skills required by effective managers in the BANI world.

The second chapter is devoted to the specifics of change management in modern conditions, providing a detailed typology of changes and reasons for resistance to organizational changes. It justifies updated functions of modern management, explores the concept of a change agent and the essential qualities required, and discusses approaches, organizational metaphors, and change models. Additionally, it outlines the main guidelines for digital transformation, the specificities of building business models in today's world, and the principles of organizational design for the future, with an emphasis on creating living, or "teal," organizations.

The third chapter reveals trends in the development of digital transformation processes globally and in the Republic of Moldova, with a focus on the specifics of transformations in SMEs. This chapter also presents the research methodology developed by the author and the results of the empirical study, which served as the foundation for subsequent conclusions and recommendations.

The fourth chapter focuses on developing prospects for a future management model under Industry 4.0 conditions. It presents the results of econometric research and introduces a model linking factors that influence the current state of enterprises. Additionally, it includes the development of a diagnostic model for SMEs under Industry 4.0 conditions, an algorithm for implementing organizational changes, and a strategy matrix that can be utilized in formulating a strategic approach.

General Conclusions and Recommendations provide a summary of the study's key findings and offer suggestions for SMEs, educational institutions, and the Ministry of Economic Development and Digitalization of the Republic of Moldova (MDED).

Limitations of the Research. The limitations of this study are primarily related to the research topic. Industry 4.0 technologies are evolving rapidly, which means that attitudes toward them are also developing; therefore, a study conducted a year ago would be limited to the data from that period. Another limitation is the challenge for a single researcher to cover a large number of SMEs, given their total number and the limited timeframe for the research. One of the most significant limitations is the long-term nature of results that may be achieved in the process of organizational changes: first, transformation processes always require time, and second, outcomes will not always be unambiguous, even when applying the same approach or model. Thus, the impossibility of quantitatively calculating the result of changes is a natural limitation.

The research results were presented at 42 scientific conferences, including 35 international conferences, and in 71 scientific articles, of which 25 were published in peer-reviewed journals, including 8 abroad. Additionally, one monograph titled *Change and Innovation Management under Industry 4.0*, one collective monograph (author's contribution: "Organizational Culture in Ensuring Strategic Change," 3.3 author's sheets), one lecture course on Change Management, and one manual on Innovation Management were produced. Three copyright certificates were obtained (*Series OȘ 8002 dated 18.09.2024*, *Series OȘ 8001 dated 18.09.2024*, *Series OȘ 8000 dated 18.09.2024*), totaling 60.5 author's sheets, along with 18 certificates of implementation in SMEs and the Academy of Economic Studies of Moldova

CONTENT OF THE WORK

Chapter 1, "Study of the Conceptual Foundations of Change Management in the Context of the Fourth Industrial Revolution Phenomenon», is dedicated to the analysis and synthesis of the conceptual foundations and evolutionary aspects of industrial revolutions and management approaches, the identification of management principles, and the analysis of their relevance in the modern environment. It also examines Industry 4.0 technologies within the context of management aspects and substantiates their impact on the operations of contemporary enterprises. This chapter further characterizes the external environment within the temporal continuum from the 1980s to the present, introduces the concepts of SPOD, VUCA, and BANI worlds, and outlines the skills that effective managers should possess in the BANI world.

Based on the analyzed aspects [2,15,17,41,42], the author presents a personal definition of industrialization: it is a process of societal transformation, encompassing its economic, technological, and social components, founded on the implementation of revolutionary innovative technologies. When applied appropriately, it promotes competitiveness at both the micro- and macro-levels, ensuring sustainable and balanced development.

By comparing the periods of industrial revolutions with the eras of management across specific parameters—such as the prerequisites for emergence, management objectives, and the characteristics of interactions between firms and the external environment—we arrive at the following characteristics, presented in Table 1.

Table 1. Brief Characteristics of Management Eras in Relation to Industrial Revolutions

Management Era (Period, Link to IR)	Prerequisites for Emergence	Primary Management Objectives	Firm-Environment Relationship
Mass Production Era (1850–1920) Corresponds to the Second Industrial Revolution	<ol style="list-style-type: none"> 1. Technical-Technological Prerequisite (development of new machines and equipment) 2. Organizational Prerequisite (division of labor, assembly line) 3. Market Prerequisite (demand determined by price) 	<ul style="list-style-type: none"> • Reducing production costs through the use of new machinery and technology • Increasing efficiency by applying scientific methods of organization • Gaining a competitive advantage by lowering production costs and, consequently, prices, through technical-technological and organizational factors 	Lack of strict business regulation, underdeveloped antitrust regulation, and limited tax oversight
Mass Distribution Era (1920–1950s)	<ol style="list-style-type: none"> 1. Market premise comes to the fore (market saturation leads to demanding behaviour of buyers, producers need to reorient to quality and additional properties of goods) 2. Further development of technology (more efficient) 3. Further development of organisational prerequisite (efficiency issues through proper distribution, control, etc.) 4. Emergence of social prerequisite (more focus on employees) 	<ul style="list-style-type: none"> - Market research (supply tasks, birth of marketing) - Consumer demands are orientated towards higher quality, work in this direction, - Increasing efficiency through improved production, further mechanisation - Development of management science and addressing the needs of employees 	Antitrust legislation becomes stricter, and the importance of social and political control in business increases
The post-industrial Era (late 1950s to the end of the twentieth century). Third Industrial Revolution	<ol style="list-style-type: none"> 1. Social premise - concepts of management 'with a human face' 2. Emergence of an environmental premise (realization that resources are limited) 3. Further development of technical-technological prerequisite (emergence of computers). 4. Further development of the organizational prerequisite (increase in efficiency due to new trends in management) 5. Market prerequisite (quality and consumer properties of goods are largely related to environmental and social factors) 	<ul style="list-style-type: none"> - Creating a comfortable environment for personnel, understanding their needs, - Environmental objectives (production renewal, compliance with environmental safety requirements) - Introduction of new technologies, computerization, creation of programmes - Changing the principles of organizational activity, taking into account the technical-technological, social and environmental prerequisites) 	Firm-environment relations are becoming more branched out along the lines of social and ethical management. Legislation in the field of ecology, human health and society as a whole is becoming stricter

Source: developed by the author based on [25,32,41,42]

The described epochs of management allow us to trace the general evolution of the development of science and the changes that have taken place in the period over the last hundred and fifty years. The last analysed era is called the information era, although various researchers try to call

it “streamlined”, noting the assumed scale of changes. Here we will highlight the definitions of Thomas Siebel [37]-the age of digital transformation, Ray Kurzweil - the age of singularity [11], the age of “machines” as defined by Andrew McAfee, Eric Brynjolfson [31], the age of reengineering by Hammer and Champy [39]. Regardless of the name, the depth and speed of the processes make us think about the future development of humanity, and economists, entrepreneurs and managers about the survivability and reorientation of the existing business model. Thus, management has gradually approached new concepts, principles, approaches and models that characterise the latest trends emerging in the business world and society as a whole, namely, the changes associated with 4PR, which fundamentally change the systems of relationships between organisations and between employees within an organisation. The changes brought about by disruptive technologies necessitate the development of new approaches in management and in change management.

Table 2 summarises the features of the new era in management and the 4IRs.

Table 2. Correspondence of Concepts: Information Age in Management - Fourth Industrial Revolution

Management Era (Period, Link to IR)	Prerequisites for Emergence	Primary Management Objectives	Firm-Environment Relationship
<p>Information Age (early 21st century, intensifying from 2011 to the present)</p> <p>Fourth Industrial Revolution</p>	<ol style="list-style-type: none"> 1. Information prerequisite is of paramount importance (availability, processing, preservation, correct interpretation of information) 2. Technical-technological prerequisite (modification of all processes under the influence of information technologies) 3 Organizational prerequisite (rethinking of the way of activity and the whole management system) 4. Social prerequisite (care for the neighbor, for all categories of the population, strengthening the role of social responsibility of business in the society). 5. Environmental prerequisite (toughening of environmental safety norms) 6. Market prerequisite (focus on individual consumer needs, consumer participation in business models). 7. Sustainable development premise 	<ul style="list-style-type: none"> - Information tasks are related to timely response to changes occurring in the external and internal environment. Proper management of information and information technologies. - Adaptation of the way of activity to technical and technological innovations (AI, Bigdata, IoT, etc.). - Organisation of activities in accordance with new trends (radical revision of organisational structures, methods of motivation, control, planning, etc.). - New technologies make it possible to fulfil the environmental prerequisite if applied correctly - All activities are considered through the concept of ‘sustainable development’, then the enterprise will be sustainable 	<ul style="list-style-type: none"> - Legislation on information systems and security is becoming stricter. Many issues remain regarding AI usage and copyright protection. - Global networks enable shared use and interaction, with collective access and consumption. - Environmental issues are intensifying—a need for addressing global challenges. -The "Sustainable Development" concept is gaining momentum, with public support for companies striving to implement its principles.

Source: developed by the author

Based on analysing the studies of the authors behind this process (Schwab K.[41,42] Siebel T. [37], Blummart T., Brook S.[21], McAfee E., Brynjolfson E.[31], Kurzweil R.[11], Sebastian E., St. J. Endriole, J. Kane, D. Palmer, A. N. Phillips, C. Linz, G. Muller-Stewens [29], etc.), let us define a generalised concept and derive our own understanding of this term: **Industrialisation 4.0** is a global process taking place in the modern world, involving widespread digitalisation and total automation of processes based on the latest technologies related to the Internet of Things, big data processing and cloud computing, AI-driven and expected reorientation of the activities of all enterprises (not only manufacturing), as well as the impact on all areas of human life: business, science, economy, education, politics, social environment. It is obvious that with the omnipresence and speed of the processes, human life will also change.

Let us clarify the difference between the concepts of industrialisation and industry, which, in our opinion, boils down to the following: the term “**Industry 4.0**” refers to the current state of the economic and social environment, characterised by the development of artificial intelligence, the

Internet of Things and other advanced technologies. While “**Industrialisation 4.0**” is a process of transformational change that facilitates the transition to the state defined by Industry 4.0, according to this understanding, further in the paper both concepts will appear depending on the context.

The characteristics of the current external environment are summarised in the **following features**:

- change is accelerating with the force of exponential growth, i.e. the rate of change does not increase linearly, but with increasing effect;
- the technologies that are revolutionising society and business are interconnected in many ways: in how they digitally empower, scale, complement each other, and challenge legacy systems. (Schwab, Siebel, O`Reilly, Blommart, et al.) [41,42, 21];
- in order to take advantage of the benefits of the information age, it is necessary to consider the latest technologies as a way to achieve these benefits by embedding human values for the common good, e.g., environmental protection, human rights (Schwab, Blommart, Roose, et al.) [41,21,35,34];
- to gain competitiveness in the modern environment, companies should form ecosystems in which there are close links between suppliers, consumers, intermediaries, in addition, they should establish close contacts with universities in order to mutually beneficial co-operation and development of innovative solutions.

These factors lead to the concept of “new normalcy” in management, a comparative characterisation of management ‘before’ and ‘after’ the revolution is presented in Table 3.

Table 3. Comparative Analysis of the Old and New "Normal" in Management

Concept	Previous Principles	Modified Principles
Management philosophy	<ul style="list-style-type: none"> • Economies of scale, • Normal, standardised production, • Principles of rational bureaucracy • Benchmarking methods • Product orientation 	<ul style="list-style-type: none"> • The economics of co-operation • Principles of connectedness • Individualisation of production • Management according to the principles of creativity, flexibility, involvement • Individual business model • Solution-orientation
Product specifics	Mass consumer goods	Custom development, production, sales, and service
Minimum order quantity	Batch of products	Unit of specific product
Customer characteristics	Reliant on manufacturer recommendations, fully dependent on suppliers	Empowered, have complete information about the product, have access to databases
Gaining competitive advantage	Through price reduction based on cost reduction	Through high-quality, customized services, recommendations
Processes	Manual, mechanized, and automated	Digital and automated
Payment methods	Cash forms, non-cash payment via bank account	Blockchain technologies
Employee requirements (dependent on position)	Physical endurance, literacy, professional skills, high IQ	High-quality services require higher EQ (emotional intelligence)
Manager requirements	High IQ, organizational skills	IQ + EQ (imagination, empathy, relationship-building skills), leadership qualities
Stakeholders	Interaction as needed, depending on contract terms	Roles of customers, suppliers, consultants, and investors are blurred; each may perform various roles

Source: developed by the author based on analysis [21]

The trends of the modern world and its comparison with the specifics of previous stages of development are now labelled by abbreviations that are becoming increasingly popular. The definitions formulated by scientists divide the periods into three characteristically different ones: SPOD, VUKA, BANI (Fig.1). SPOD is the name of the world that existed until about 1980-1990s and was accompanied by relative stability and predictability. In the 1990s, originating in the military sphere, the term VUKA was adapted to the business world which, due to the development of technology, became characterised by volatility and uncertainty. By embracing an understanding of the complexity and speed of change, many companies have realigned their strategies to manage change in a timely manner. In 2007, Bob Johansen developed the VUCA Prime behavioural leadership model, which has become a guide for rethinking leadership style, overcoming risks and challenges of the external environment.

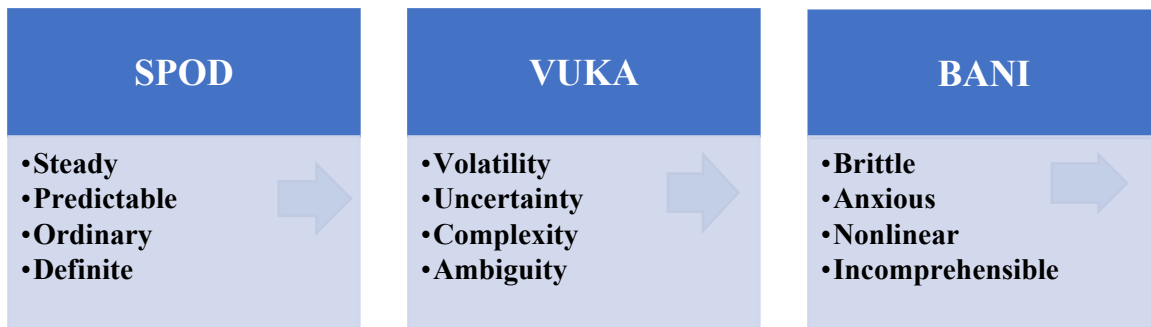


Fig. 1. Characteristics of worlds in the temporal continuum
Source: developed by the author based on research findings

For each element determining the VUCA state, there is a response element of VUCA Prime, capable of keeping the system in equilibrium, that is:

- for unstable conditions - formulation of a vision, since it is impossible to form a precise strategy, and it is not always expedient (in non-linear conditions precise recipes do not work), but general guidelines should be obligatory;
- uncertainty creates an understanding of how the team will react in an unforeseen case, readiness to co-operate and learn, understanding of team members, acceptance of the need to develop and find new creative solutions;
- complexity of the environment implies clarity in prioritisation, values, areas of activity, in understanding what can and cannot be controlled, thus clarity determines the decision-making process, values and orientation of the company;
- ambiguity implies that the company must be flexible under different scenarios and variants of events.

Despite significant similarity to the characteristics of the modern external environment, in 2020, futurist Jamais Cascio introduced the concept of the BANI world, allowing for a shift from a "plane and uncertainty" world to one described as a "multidimensional space of intensifying chaos."

Following the views of many scholars (N. Wolf, D.H. Copley, J. Peil, S. Siebel), it should be noted that in a world characterized by fragility, fear, incomprehensibility, etc., so-called "soft skills" gain paramount importance, alongside relevant "hard skills" that entail professional knowledge and abilities [22,23,30, 37]. Technologies hold primary significance in revolutionary changes, shaping the new normal in management and business. Technologies of the Fourth Industrial Revolution are presented in Fig. 2

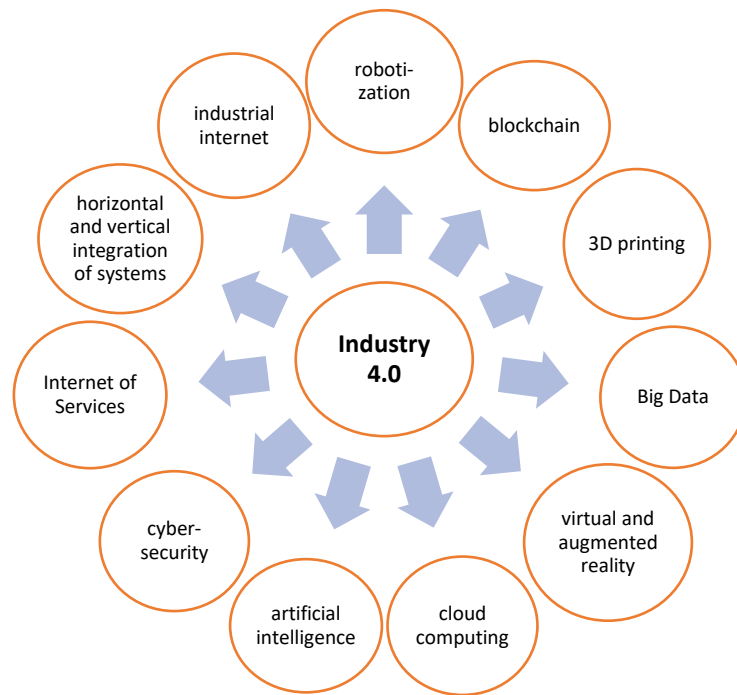


Fig. 2. Industry 4.0 technologies

Source: developed by the author

The analysis of specialised literature has allowed us to summarise the main characteristics of the transformation processes taking place in modern society: 1. All industrial revolutions led to increased efficiency, replacement of labour processes with new technologies, as well as to the reduction of jobs and the emergence of new specialties, which is invariably traceable today;

2. breakthrough technologies in the aggregate create unprecedented advantages for enterprises using them, and on the contrary, a destructive effect for those who do not use them, or are not transformed in time; 3. the changes associated with the 4RPs are reflected in all spheres of human life: they change the image, lifestyle, are characterised by irreversibility and exponential speed, which is associated with the emergence of a “new normal” in management.

The second chapter “*Changing the paradigm of organizational development in the conditions of transformational change*” is devoted to the peculiarities of change management in modern conditions, provides a detailed typology of change and causes of resistance to organizational change, substantiates the updated functions of modern management, the concept of a change agent and the necessary qualities inherent in him, reveals approaches, organizational metaphors and models of change, provides the main benchmarks of digital transformation, the features of building business models in modern business environment, and provides a detailed description of the concept of change management.

Change management is a special type of management activity aimed at obtaining tangible results, both for the short and long term, as well as timely adaptation of the company to the requirements of the environment. This is a relatively new direction in the theory of management, the emergence of which is due to many reasons: the rapid dynamism of changes occurring in the external environment, the ever-increasing level of informatisation of society, and the globalisation of the economy. In addition, one of the factors dominantly influencing the formation of change management is the change in the consciousness of mankind, revision of values, and, above all, changes in managerial thinking.

The diversity of types of organisational changes is due to the complexity of the management system, for example, R. Daft considers technological, product, structural and external environment changes [25]. In addition, changes can be planned and spontaneous. At the same time, the system approach assumes the interrelation of individual, team and organisational changes, which affect the outcome of change in different ways [26]. Change models are based on organisational metaphors that

influence the way a company behaves and reacts to possible external or internal events; the metaphor forms the approach to change and the approach forms the model. Thus, this relationship is reflected in the end result of the change process.

During the evolution of change management, many approaches have changed. If until recently the most effective approach was the behavioural approach, based more on the ‘machine’ metaphor, today successful enterprises should implement approaches related to the consideration of the organisation as an organism, which closely overlaps with Fr. Laloux's concept of “turquoise organization” [28].

The most well-known models of change include the model of K. Levin, Kotter, the Ballok and Batten change formula, the Senge model, Edgar Schein, the McKinsey 7S model and others [3,9,10,38,26,23,20]. In addition, approaches are often divided into two polar approaches - cardinal one-time (reengineering of business processes) and gradual small changes (similar to Kaizen methodology), each company is determined individually with techniques and approaches depending on preferences, goals and means.

Organisational development in the era of Industry 4.0 is an approach that implies the formation of an organisation's vision aimed at continuous transformation, taking into account exponential changes in the external environment, focusing on the introduction of the latest technologies and building new business models under their influence, as well as adapting to changes occurring in all elements of the business model in order to gain competitive advantage and organisational sustainability.

Such changes imply a rethinking of the paradigm of planning and foresight in modern enterprises, thus, Foresight (from the English Foresight - ‘foresight’) is widely spread. Having summarised the definitions of this term by various authors (Martin B., Popper S., Wagner C., Larson E., Sokolov A.) [12, 33, 20], we give our own formulation: **foresight** is a form of defining the future based on group communication and anticipation of possible scenarios, taking into account the conditions in which the organisation operates, and thus, having defined the desired scenario, agree on the possibilities of its implementation. Moreover, it is more important - not to predict the future, but to find a consensus to realise the scenario. Fig. 3 shows the principle scheme of foresighting.

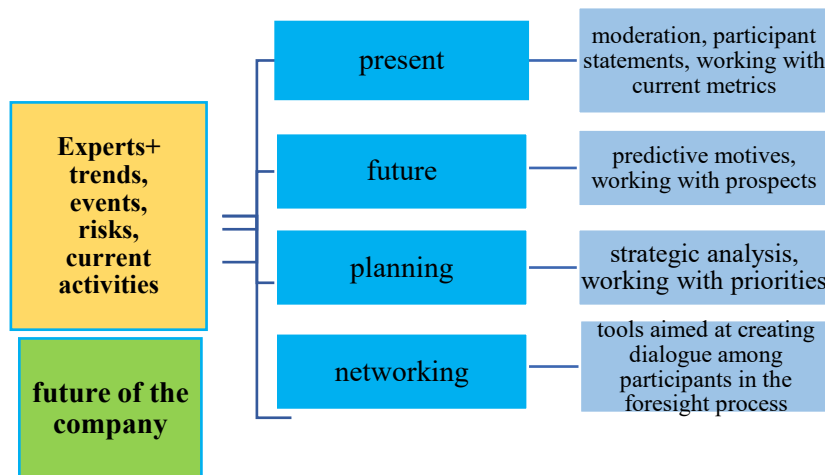


Fig. 3. Principle scheme of foresight functioning

Source: prepared by the author

Management in this context of the new approach is the art of eliminating difficulties, conflicts, anticipating the situation, finding ways to overcome adversity and frustrations that stand in the way of change. Through effective management it is possible to achieve harmony in the relationship between managers and subordinates in an organisation that has made change one of its competitive advantages. All the **management functions of such a company should pass through the prism of change** (Fig.4.): **Planning for** change in the short and long term should take place within a renewed

strategic planning system, working through the strategic alternatives and factors that will entail change in the organisation. Taking into account the factor of unpredictability, the planning function represents, first of all, the formulation of the vision of change, the overall picture of the process, the factors of change of the organisation in the future, clarification of the characteristics of the new business model of the company. A decisive role is played by the company's values and motives that will guide the management in carrying out changes.

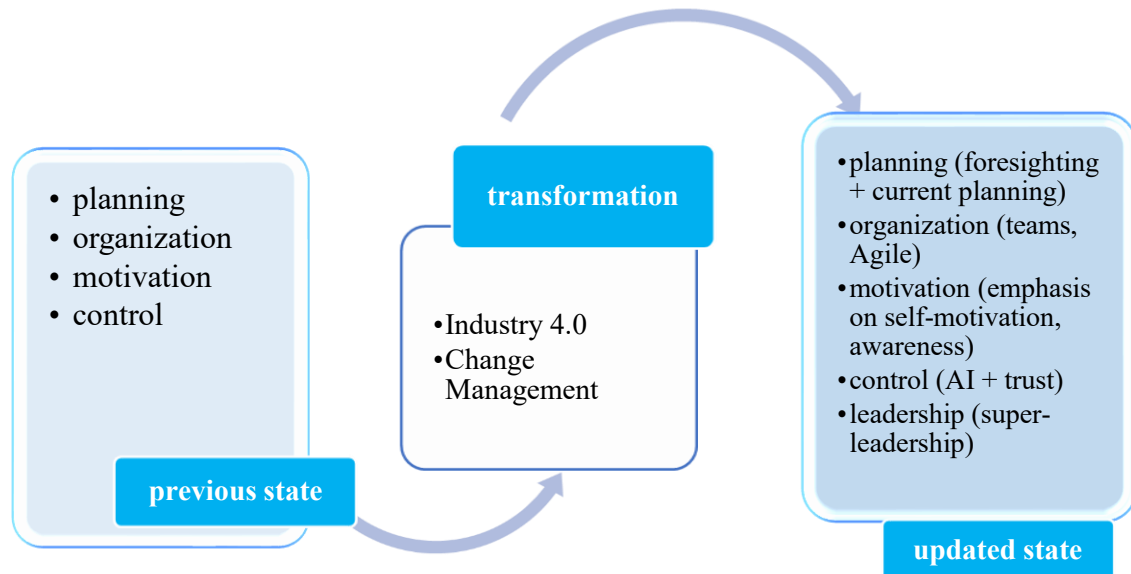


Fig. 4. Updated management functions through the lens of Industry 4.0

Source: developed by the author

The function of **organising** the change process should present a rational combination of roles in the change team, take into account the balance of power, and provide for the construction of an effective organisational structure that will function in the transformed company. If a company has a traditional management structure, under the impact of Industrialisation 4.0 it will have to be revised, many links will be reduced and functions will change. New technologies imply hiring new specialists and/or retraining existing ones. Either way, this function will be transformed dramatically.

The defence reaction of the personnel in the process of transformation is resistance, so the correct construction of the **motivational mechanism** should be given a lot of attention. If we talk about organisations of a new type, self-motivation plays a big role here, which is fuelled by delegation of authority, trust, additional responsibility. Identifying the needs of the staff, using an incentive system that does not contradict the expectations of employees will help to reduce the forces of resistance, and on the contrary, will increase the promotion of change.

Changing the **control system** is another provocation of the new environment. Firstly, new technologies inherently imply transparency in the system. Secondly, the relationships built in a new type of organisation focus on trust in employees, awareness of the importance of their work in the common cause and the desire to do the best possible job. Here it is more about self-control, which is based on a sense of responsibility and commitment to the work. The setting of standards, which the quality system and safety system of the company implies, also complements the control function. Control in the new organisation is not an end in itself, but should help to identify bottlenecks in the system and justify the need for subsequent changes.

In addition to the four basic, classical functions of management, let us highlight **leadership**. For example, R. Daft replaces the traditional function of motivation with leadership, explaining that it is primarily used to motivate employees [25]. We are more inclined to consider the management process in the classical form, taking into account, at the same time, that leadership, as well as corporate culture, is the basis, the base of the management process, from which follow values, goals, mission, vision, organisational behaviour, development and, naturally, change management. So, leaving the notion of motivation as the main function of the management process, in particular, of the change

management process, taking into account that it is possible to motivate not only by relationships, values and goals, but also by financial incentives, we will present leadership as a basic element of the management system, which sets the tone for both the change process and the subsequent activity of the company.

One of the key factors of successful transformation is the presence of “change agents” - or 4.0 leaders (we believe that this term succinctly combines the main components). Leaders 4.0 should create a vision of the future, create a culture of continuous improvement and ensure that the organisation adapts to the conditions of transformation. In our opinion, such understanding of a leader is close in meaning to the concept of “superleadership”, or fulfilment of the roles of a teacher, designer, steward (servant) by a leader, according to the terminology of P. Senge [20]. The use of these styles presupposes a high level of emotional intelligence, in addition to intelligence per se and a high trust coefficient, which is highly valued in the modern world.

The main aspects of digital transformation are business processes, business models and corporate culture, they can be considered as separate parts of the process or together. As alternative approaches that are relevant for modern SMEs stand out bimodal and 2x2 - approach, which provide a gradual transition of the business model to transformation [21].

The innovative approach to the development of start-ups is the strategy of unicorn companies, which due to their uniqueness achieve rapidly high results. The mindset of entrepreneur-owners of unicorns is based on risk, intuitive approach and constant refinement of the minimum viable product (MVP) [29].

As the formation of a fundamentally new approach to organisational structure, the most successful companies apply the concepts of living, learning, or turquoise organisation, which are essentially similar concepts combining the principles of self-managed teams, trust, personal responsibility associated with professionalism, which also closely overlaps with the agile methodology in management, or Agile approach [30,40].

The *third chapter “Analysing the development of SMEs in the Republic of Moldova in the context of global trends in the transition to Industry 4.0”* reveals the trends in the development of digital transformation processes in the world and in the Republic of Moldova, focusing on the specifics of transformation in SMEs. It also presents the research methodology developed by the author and the results of the empirical study, which served as a basis for further conclusions and proposals.

Given the large number of definitions of the *digital economy and the digital society*, we have reduced them to a generalised representation. Interest in these concepts is growing exponentially, as is the power of technology itself.

Digital economy is a certain stage of economic development characterized by the integration of all activities with the help of information tools: digital reporting, digital money, virtual relationships, online sales, which are part of e-business. In fact, the 4IR is the transition of states to digital economies, including economic, social and technological spheres under the influence of information technologies.

Digital (information) society is a society that equally has access to necessary information and communications, uses information technologies in all spheres of activity, is not disadvantaged in rights and is not discriminated by any criteria in the field of information assets.

A component of transformational processes is e-commerce, the growth of which has also been significant during and after the pandemic. According to estimates from McKinsey Global Institute Analysis, this increase ranged from two to five times in a country context in 2020 compared to the average from 2015 to 2019. According to McKinsey Consumer Pulse surveys conducted worldwide, about three-quarters of people who first used digital channels during the pandemic report that they continue to use them in the post-pandemic period.

The growth of this indicator is evident in the global trade turnover, with forecasts expecting that by 2027, 22.6% of all retail purchases will be made online. Starting in 2021, the share of retail purchases through the Internet is growing by an average of 0.32% each year [5] (Fig. 5). This underscores the relevance of transitioning part of the business to online platforms and the increasing interest in this type of business relationship.

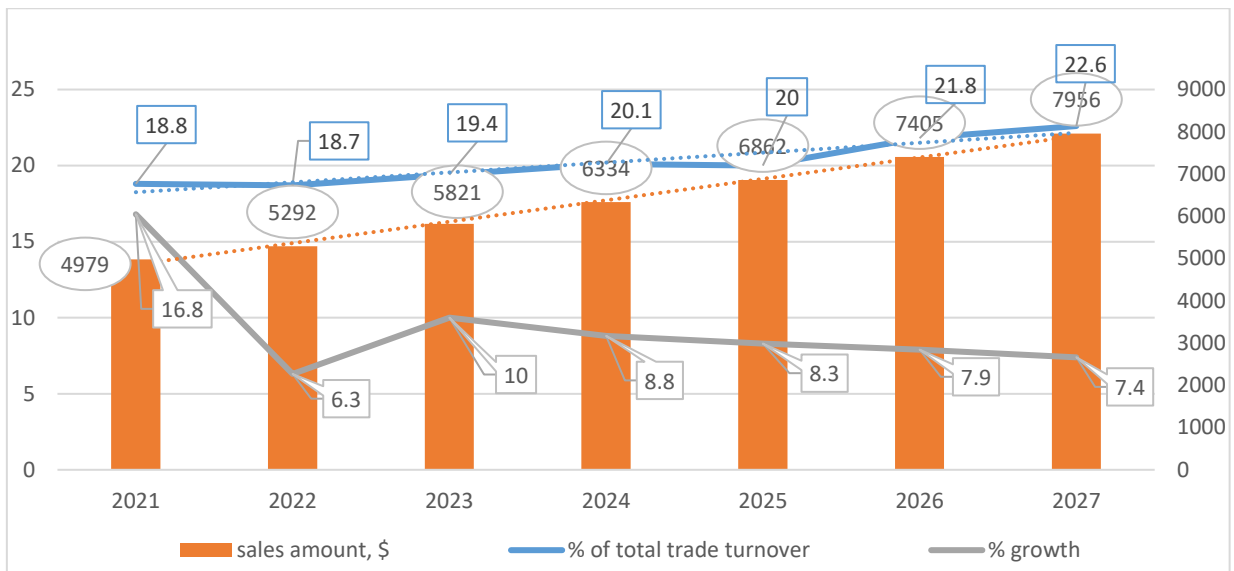


Fig. 5. Growth of the share of e-commerce worldwide from 2021 to 2027 as a percentage of total sales (2024-2027 - projected)

Source: [5]

Despite the growing popularity of e-business, SMEs are lagging behind in terms of growth rates. According to European statistics, small enterprises (with 10 to 49 employees) participate in e-commerce less frequently than medium-sized enterprises (with 50 to 249 employees) in the European Union. In 2023, the share of small companies selling goods through websites or applications was 21%, which is almost 10% lower than that of medium-sized companies.

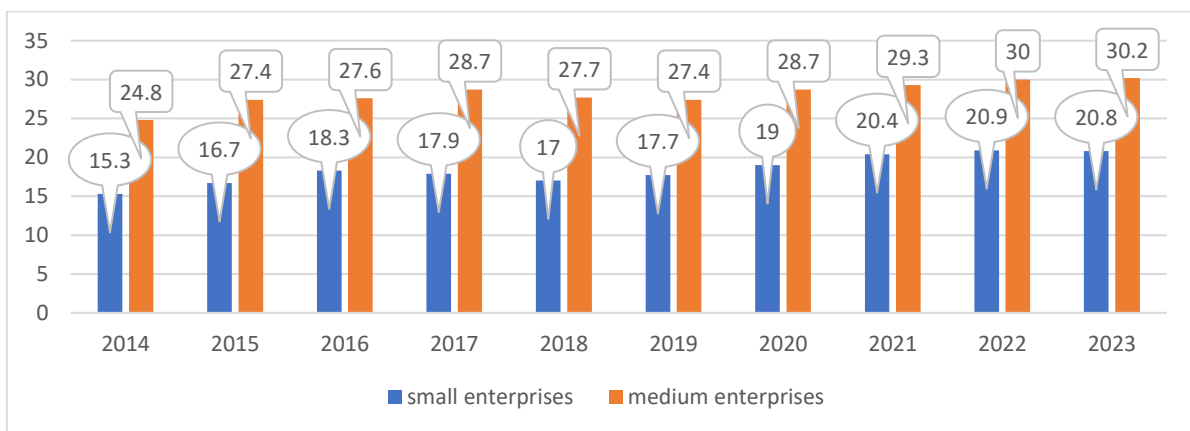


Fig. 6. Share of SMEs engaged in sales through e-commerce in the EU from 2014 to 2023 (as a % of total sales)

Source: [6]

According to global statistics, SMEs account for over 90% of all companies worldwide, provide approximately 70% of all jobs, and contribute up to 70% of global GDP. These enterprises play a significant role in creating conditions for growth, innovation, and sustainable development in the global, regional, and local economies.

As key development benchmarks, the World Economic Forum (WEF) identifies scaling businesses and entering new markets, while the main challenges include attracting and retaining talent (48%), culture and values (34%), financing and access to capital (24%), as well as an unfavorable political environment for business (22%). The report also outlines ways in which SMEs can incorporate future readiness into their strategies and highlights two main orientations: sustainable development and digital transformation [16]. It is emphasized that a high level of adaptability can be supported by: a strategic approach to talent management; a phased approach to digital transformation;

and specific measures to ensure sustainable development depending on the company's maturity level in this area.

Additionally, the WEF explores the readiness of SMEs for the future, where "readiness" is understood as the ability to ensure long-term financial growth, positively impact society and the environment, and achieve high levels of flexibility and resilience. Regarding the third component, this, in our view, is the development of change management, which, when implemented and maintained in SMEs, will enhance the ability to "recover in difficult times, identify and seize opportunities as they arise, and create new business models in the future" (p. 6 of the WEF report). The main issues identified in the study are presented in Fig. 7.

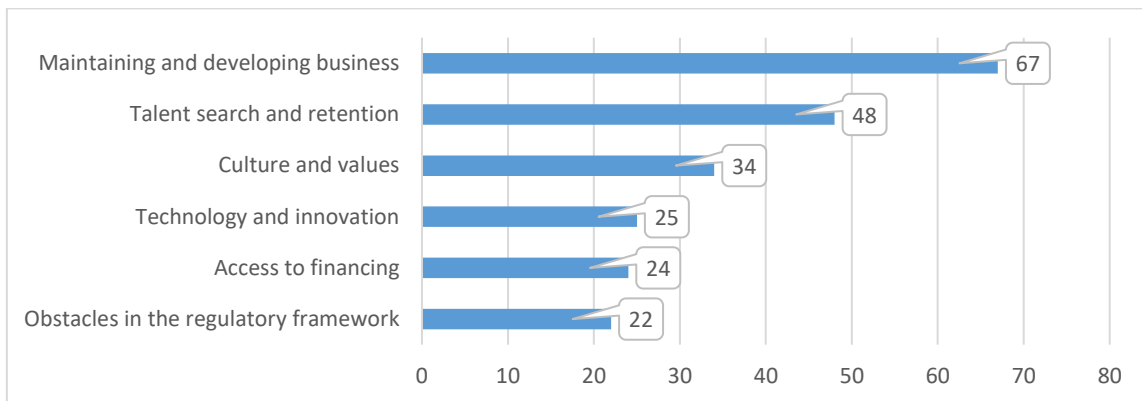


Fig. 7. Main challenges facing SMEs worldwide (according to WEF estimates)

Source:[7]

To address these challenges, specialists from the WEF suggest that small companies use a framework that provides a holistic view of digital transformation while breaking it down into three components:

- ✓ Innovations in digital processes (process innovation), i.e., digitization;
- ✓ Innovations in digital products/services (product innovation), i.e., digitalization;
- ✓ Innovations in digital business models (innovative model), i.e., digital transformation.

Thus, complete digital transformation will encompass all three directions, aligning with our understanding of this phenomenon.

As recommendations to enhance the level of digitalization of SMEs in public policies, specialists identify the following: creating favorable framework conditions by government bodies; investing in digital infrastructure; having a comprehensive national strategy to combat cybersecurity threats; addressing the energy crisis by centralized authorities; and reducing bureaucracy to simplify digitalization procedures. For representatives of SMEs, the recommendations mainly pertain to change management: developing an approach, change strategy, change procedures, involving personnel, motivation, and training employees.

In 2023, a new Digital Transformation Strategy was adopted in the Republic of Moldova (Strategia de transformare digitală a Republicii Moldova pentru anii 2023–2030, STDM 2030) [1,4,18].

The development of the strategy highlighted the following key issues, identified through consultations with stakeholders, that hinder the planned transformations: slow growth of innovative companies, lack of venture capital, low level of cooperation between enterprises and higher education institutions, insufficient technological readiness (number and development of 5G routes, auction plans for the 5G spectrum, etc.), absence of legislative acts on new digital technologies (such as artificial intelligence, blockchain, IoT, Big Data, mining, etc.), which presents a legislative gap for the development and commercialization of these technologies, inadequate adaptation of the regulatory framework to digital business models, skill mismatches; a shortage of skilled labor in the industry, central government authorities, and especially in local public administration; low levels of digital skills and public awareness; resistance to change among public servants; lack of financial resources; absence of connectivity and compatibility between disparate IT systems of government institutions; weak IT infrastructure; low levels of investment in ICT in agricultural SMEs; low engagement of local companies in state-funded projects;

insufficient motivation among civil servants regarding final outcomes; and a lack of scientific research in the development and monitoring of policies aimed at advancing the information society.

As for the Digitalization Strategy of the Republic of Moldova until 2030, it is based on six fundamental directions (Table 4).

Table 4. Directions of the Digitalization Strategy of the Republic of Moldova for the Period 2023-2030

Strategy Direction	Description
Digital Society	<ul style="list-style-type: none"> • Approximately 50% of citizens should have digital medical records • Approximately 80% of the population should possess basic digital skills
Competitive IT Sector	<ul style="list-style-type: none"> • The share of specialists among the adult population will reach at least 1.5% • The share of IT companies will be at least 10% of existing companies • The share of IT products in total export volume will be at least 7%
Digital Economy	<ul style="list-style-type: none"> • At least 40% of companies will sell online • 100% of companies will exclusively use electronic invoices. • Digital state: 100% of key government services will be available online, with 70% of transactions conducted electronically
Digital State	<ul style="list-style-type: none"> • Access to 100% of key government services online • 70% of all transactions conducted online
Secure Online Environment	<ul style="list-style-type: none"> • Moldova should rank among the top 50 countries according to the international UTI ranking
Moldova - Digital Nation	<ul style="list-style-type: none"> • Moldovan digital signatures should be recognized in the EU • Moldova should become part of the most progressive global networks in the field of ICT, as well as various forms of international cooperation in digital and cybersecurity

Source: prepared by the author based on [1,8]

The priority objectives of the Strategy are [1,8]: development of a digital society; a strong, innovative, and competitive ICT environment; a secure ICT and digital environment; digital government services leading to a functional and transparent digital state; international cooperation and promotion of digital Moldova; and a digital economy.

Summarizing the readiness indicators of the Republic of Moldova for a new digital future, we present the data from the Network Readiness Index (NRI) for 2023, which shows an overall country ranking of 67 (out of 134 countries) with a score of 47.69%. The ranking represents a composite score across four areas, which are further divided into subcategories.

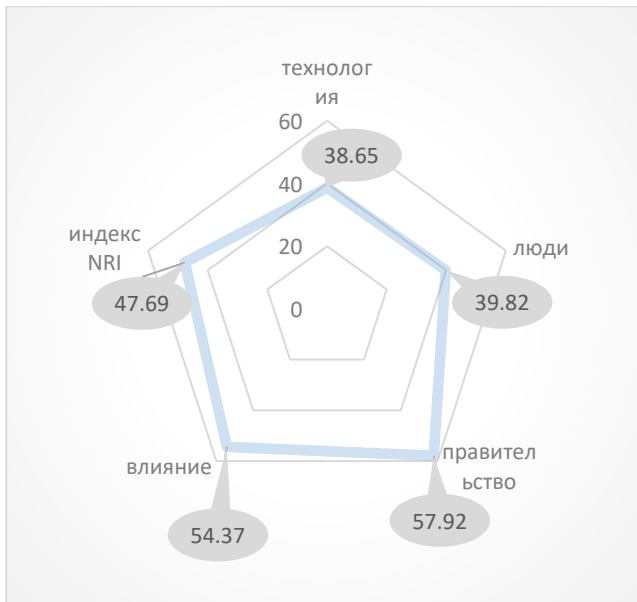


Fig. 8. Indicators of the NRI Index for the Republic of Moldova in 2023

Table 5. Components of the Index NRI of the Republic of Moldova for 2023

Indicator	Rank (out of 134)	Score, %
1.Technological Level	75	38,65
1.1 Access	46	70,87
1.2 Content	63	23,71
1.3 Future Technologies	108	21,37
2.People	80	39,82
2.1 Individuals	71	46,54
2.2 Business	101	32,15
2.3 Regulation	60	40,77
3.Government	63	57,92
3.1 Trust	59	49,57
3.2 Regulation	76	62,78
3.3 Inclusiveness	68	61,41
4.Impact		
4.1 Economy	69	27,02
4.2 Quality of Life	42	74,82
4.3 Contribution to Sustainable Development	73	61,26

Source: NRI

A distinct and critically important sector of the economy that is subject to digitalization processes and, consequently, the Fourth Industrial Revolution (4IR), similar to the global context, is the SME sector. Given the vital role of this sector in the economy of the Republic of Moldova, it is essential to consider its specific characteristics during periods of transformational change. In March 2022, the Government of Moldova issued Resolution No. 129 dated 02.03.2022, "On the Approval of the Program for the Digital Transformation of Small and Medium Enterprises" [1], published on 11.03.2022 in Monitorul Oficial No. 68-71, p. 176, which outlines the Program and the plan for implementing digital transformation for SMEs, assigning responsibility for implementation to ODIMM (now ODA).

Thus, the Digital Transformation Program for SMEs represents a comprehensive set of activities aimed at providing non-repayable financial support for the implementation of various digital transformation tools (facilitating the transition to e-commerce, acquiring equipment and software to introduce innovations and new technologies in the digital transformation process, as well as to mitigate or minimize risks). To identify the operational characteristics, principles of activity, and challenges faced by SMEs in the Republic of Moldova during the period associated with transformational changes of Industry 4.0, a comprehensive study was conducted, comprising several phases. The profile of the respondents who participated in the study is presented in Table 6.

Table 6. Profile of Respondents Participating in the Main Study

Gender	Quantity, %	Age			Position Held in the Company			
		Years	Number of People	%	Affiliation with Management (Yes/No)	Level	Number of People	%
Female Gender	100 (47,6%)	18-25	74	35,2	Manager	top	75	35,7
		26-35	45	21,4		middle	38	18,1
		36-50	76	36,2		lower	13	6,2
Male	110 (52,4%)	51-60	13	6,2	Subordinate (subordination to management level)	top	77	36,7
		61+	2	1,0		middle	46	21,9
						lower	4	1,9

Source: prepared by the author based on research findings

The study involved representatives of SMEs, differentiated by various sectors of the economy, distributed territorially, and varying in the number of personnel. Describing the trends in financial performance, respondents indicate a sustainable growth trend in 40% of cases, stagnation in 12%, and a sustainable decline in 3%. This situation also confirms the diversity of the sample, highlighting its representativeness.

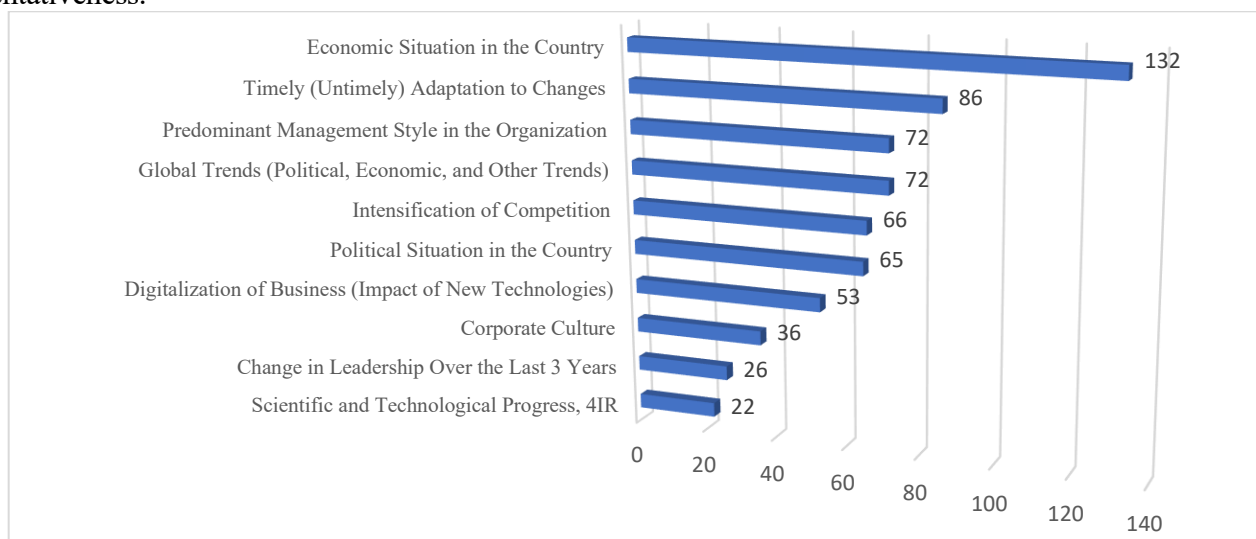


Fig. 9. Factors that Most Significantly Impact Financial Performance of SMEs (Number of Respondents Indicating the Factor's Greatest Influence: 10 out of 10)
Source: developed by the author

Figure 9 presents the factors that, according to respondents, had the greatest influence on the financial performance of companies. The majority of respondents believe that the economic situation has the most significant impact on the financial stability of companies (63%, or 132 people indicated this factor as the most important). This is followed by timely/untimely adaptation to ongoing changes, with 41% of respondents assigning a priority value (10 points out of 10) to change management and the necessity of adapting to changing conditions. The top three most significant factors are rounded out by the predominant management style in the organization, which undoubtedly affects performance indicators, according to both theory and respondents' opinions (34%), as well as factors related to the international environment, such as political, economic, and social influences, which are intensified alongside the processes of economic globalization.

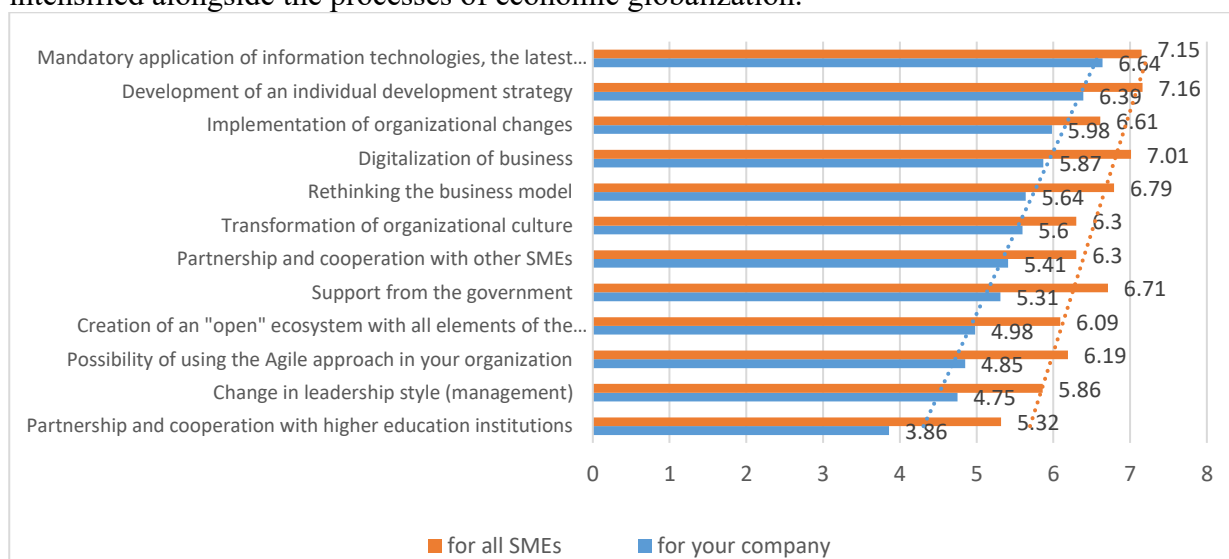


Fig. 10. Consolidated Weighted Averages of the Importance of Factors for the Future Development of the Studied Companies and All SMEs in the Republic of Moldova (1 - not important, 10 - extremely important)
Source: developed by the author

The data in Fig. 10 represent the hierarchy of factors that employees associate with the future success of both the studied companies and all SMEs in the Republic of Moldova. The figure shows that the hierarchy of weighted average indicators is consistent across all factors in both categories. It is also important to note that the weighted average indicators regarding the prospects for all SMEs significantly exceed those of the studied enterprises. This indicates that respondents attribute greater importance to the examined factors for the hypothetical, abstract companies, which may be related, firstly, to a clear understanding of the difficulties that lie ahead in implementing organizational changes in their own enterprises, and secondly, to less optimistic forecasts for their own companies regarding radical transformations.

The process of change encounters many obstacles along the way. The main reasons for the problems, as assessed by respondents, that may accompany organizational changes are presented in Fig. 11.

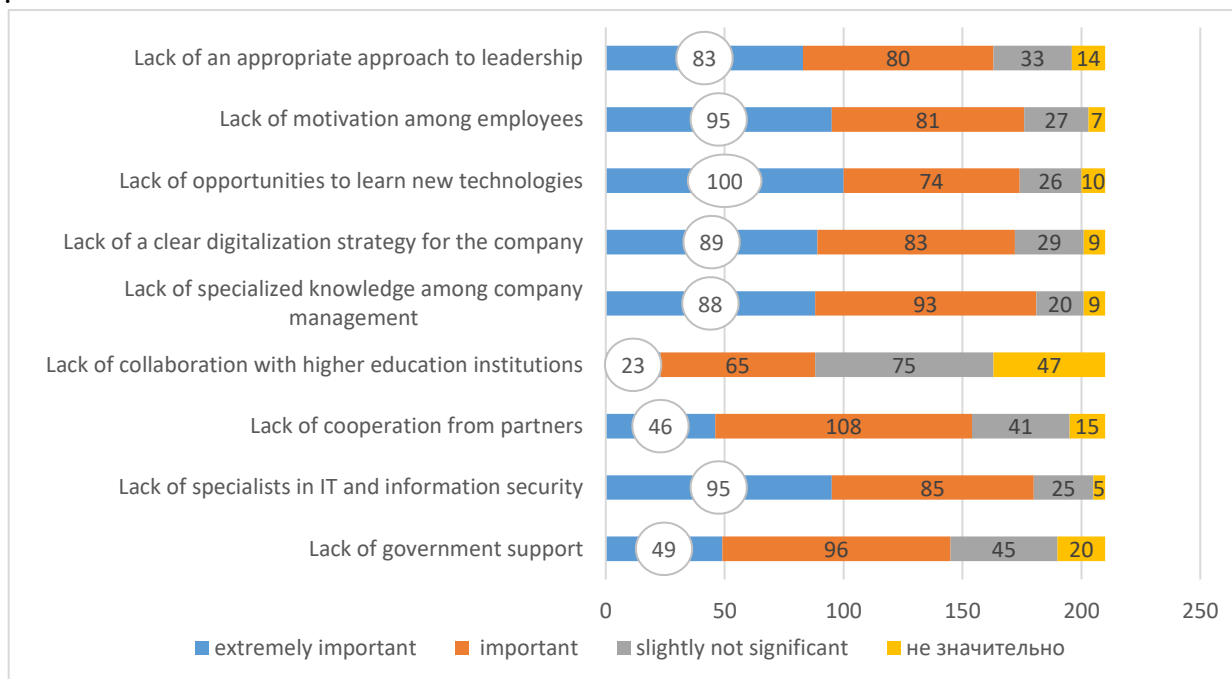


Fig. 11. Distribution of the Main Reasons for Problems Accompanying Organizational Changes by Degree of Importance, According to Respondent Assessments

Source: developed by the author

The most pronounced problem identified by respondents is the lack of opportunities to learn new technologies. Additionally, they cite the absence of specialists in IT and information security, followed by a lack of motivation among employees, an inappropriate approach to leadership, and a clear digitalization strategy for the company. The least significant reasons mentioned by respondents are the lack of interaction with higher education institutions, the absence of government support, and the lack of cooperation from partners.

Modern change management entails a continuous process of implementation and execution, taking into account the fluidity of the external environment; therefore, successful companies rarely cease these activities. The responses regarding the area of changes are distributed as follows (Fig.12).



Fig. 12. Types of Organizational Changes Implemented in the Studied Companies Over the Last 3-5 Years (Number of Enterprises Based on Respondent Assessments)

Source: developed by the author

In describing the situation of SMEs in the Republic of Moldova and characterizing the objects of study within the context of Industry 4.0, we conclude that most SMEs in the Republic of Moldova face various problems: a shortage of specialists with skills in advanced technologies, which poses a significant barrier to the implementation of Industry 4.0; limited access to financing and investment, which hampers the adoption of innovative solutions and the modernization of production capacities; as well as managerial issues.

Despite these challenges, SMEs in the Republic of Moldova have the potential for successful integration into Industry 4.0, provided there is an increase in government support and the active utilization of international experience.

Chapter Four, "*Justification of the Approach and Formation of a Change Model for SMEs in the Republic of Moldova in the Context of Industry 4.0*", is dedicated to the development of a change model based on empirical research. The study utilized factor analysis, a method of multivariate analysis employed to examine the structure of relationships among variables and to identify the most significant ones.

The equation for factor analysis is conditionally represented by the following formula (1):

$$Cm_i = \sum_{k=1} a_{ik} F_k \quad (1),$$

where:

Cm_i – component representing the combination of factors and factor loadings;

a_{ik} – factor loadings;

$F_{1,2...k}$ – factors influencing a specific set of variables $C_{m_{(1,2...k)}}$

To conduct the factor analysis, the following steps were undertaken:

1. Proof of data reliability representing the study;
2. Construction of a correlation matrix, i.e., calculation of correlation coefficients between selected variables to determine the degree of their interrelationship;
3. Extraction of factors using the principal component method;
4. Application of the varimax method, which involves optimizing an appropriate function based on factor loadings to enhance the interpretation of factors.

For the application of the method, questions regarding the significance of factors in the process of organizational changes were used, totaling 12, with their conditional designations presented in Table 7.

Table 7. Designations of Components of the Model for Conducting Factor Analysis

Conditional Designation	Factor
X	Period of Digital Transformation of Your Enterprise
F1	Partnership and Cooperation with Other SMEs
F2	Partnership and Cooperation with Higher Education Institutions
F3	Development of an Individual Development Strategy
F4	Mandatory Application of Information Technologies, AI
F5	Rethinking the Business Model
F6	Continuous Implementation of Organizational Changes
F7	Transformation of Organizational Culture
F8	Change in Management Style
F9	Support from the Government
F10	Creation of an "Open" Ecosystem with All Elements of the External Environment
F11	Possibility of Using the Agile Approach in Your Organization
F12	Digitalization of Business

Source: developed by the author

To demonstrate the reliability of the data [14], a test widely used in the processing of sociological instruments, such as surveys and questionnaires, was employed to determine the internal consistency of the data. The value of the coefficient ranges from 0 to 1, with a threshold value of 0.7 being considered acceptable in the social sciences, and values above 0.8-0.9 being regarded as very good. The coefficient is calculated using the following formula:

$$\alpha = \frac{N}{N-1} \left(1 - \frac{\sum_{i=1}^N \sigma_i^2}{\sigma_{total}^2} \right) \quad (2),$$

where:

N - the number of items in the scale;

σ_i^2 – the variance of each individual item in the scale;

σ_{total}^2 - the variance of the sum of all items.

Thus, to identify the internal consistency of the data, we present the coefficients in Table 8.

**Table 8. Reliability Statistics for the Presented Sample
(Reliability Statistics)**

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,912	,914	12

Source: Elaborated by the author

In our case, the reliability coefficients are 0.912 and 0.914, indicating a very high level of reliability. Following additional steps according to the algorithm described above, we obtained the model presented by the corresponding formula (3).

$$Y = 0,283 * F1 + 0,12 * F2 + 0,737 * F3 + 0,683 * F4 + 0,825 * F5 + 0,859 * F6 + 0,81 * F7 + 0,623 * F8 + 0,314 * F9 + 0,313 * F10 + 0,322 * F11 + 0,5 * F12 \quad (3)$$

where:

Y - level of alignment of the organizational structure of enterprises (business model) with the challenges of Industry 4.0;

F1...12 - success factors of organizational changes presented in Table 7.

The matrix of factor loadings, calculated during the factor analysis of the model, after rotation, helped to confirm **the first hypothesis of the study**, which states that the most important factors for organizational development in the modern business environment, shaped by the challenges of Industry 4.0, are the continuous implementation of organizational changes and the rethinking of the existing business model. According to the presented model, these factors have the highest weights: 0.859 and 0.825, respectively.

To universalize its perception, the formula was designated as LOAC4.0 (Level of Organizational Alignment with the Challenges of Industry 4.0), or FOAC (Formula of Organizational Alignment with the Challenges of Industry 4.0). By substituting the evaluation data obtained during the study into the LOAC4.0 formula, comparative values of the actual and optimal levels of alignment with the conditions of Industry 4.0 were derived, represented by the coefficients: Mean, Median (coefficient), Mode (coefficient), and Max (%), as shown in Fig. 13. The presented data indicate that the level of alignment of SMEs with the conditions of Industry 4.0 is nearly 64%, which corroborates the mean weighted score of success factors for changes (36.25 out of a maximum possible 56.7%). This finding supports **the second hypothesis of the study**, which posits that the alignment level of SMEs in the Republic of Moldova with the conditions dictated by the challenges of Industry 4.0 is rated above average. Although this percentage is characterized as above average, it is, in our view, insufficient for occupying a respectable position in the context of the Fourth Industrial Revolution (4IR).

Regarding the readiness for partnerships with other SMEs and higher education institutions, the creation of an "open innovation" system shows significantly lower factor loadings (as evident from the model coefficients), which accordingly confirms **the third hypothesis of the study**. Specifically, most SMEs in the Republic of Moldova do not view the establishment of partnerships and an open innovation system as key factors for their further development, which, in our opinion, poses a serious barrier for the future.

Further econometric analysis substantiated **the fourth hypothesis**, indicating that the predominant leadership style has a statistically significant impact on the strength of resistance, as well as **the fifth hypothesis**, which states that there is a direct relationship between leadership style and the company's willingness to change its business model. The most suitable styles in this regard are coaching, mentoring, and democratic, with a preference for the coaching style. The calculation of parametric estimates for the threshold regression of readiness for Agile management indicated an increasing dependency of readiness to implement the Agile approach on the desire to change the business model, thereby proving **the sixth hypothesis**.

That is, companies that aspire to change their business model are more prepared to adopt the Agile approach as a philosophy of organizational behavior. Similarly, **the seventh hypothesis** is supported regarding the relationship between organizational effectiveness and team interaction.

The **eighth hypothesis** was proven using a similar algorithm; however, the data from the obtained model indicate its ambiguous interpretation: the model shows that with a 1% increase in the sales growth rate, the readiness to implement changes increases by 1 point, as evidenced by the estimate (Estimate=1.011). However, this pattern is partially fulfilled, specifically occurring only when the growth rate reaches an average level of 70% (only at this parameter value is the Sig. significant, i.e., less than 0.05), and from this threshold, it further increases (the level of estimates grows from 1.929 to 3.582). Thus, the hypothesis regarding the positive influence of organizational effectiveness on readiness for change is partially proven.

Final Remarks Regarding the Use of the Alignment Model:

1. The model is comprehensive, as it encompasses various areas of enterprise activity and focuses on changes in both internal and external factors;

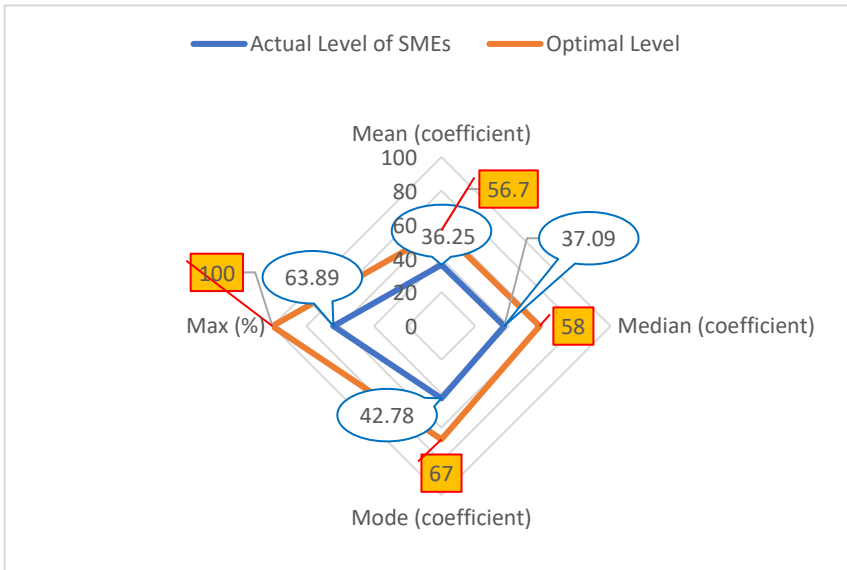


Fig. 13. Comparison of the Actual and Optimal Levels of Alignment of SMEs with the Conditions of Industry 4.0 According to the Developed Model

Source: developed by the author

2. Although some factors may be less significant compared to others (for example, factors related to collaboration), they must also be considered in the context of Industry 4.0;

3. The current approach to determining the number of factors included in the model is justified by the fact that the model explains a sufficient percentage of overall variance, which is important when working with various types of enterprises that focus on different success factors.

Given the rapid development of technologies and the necessity to transition to Industry 4.0, SMEs face numerous challenges and opportunities. Diagnosing the

state of SMEs on their path to transformation becomes a key element in understanding their current

level of readiness for change and developing strategies for successful adaptation to new conditions. his study proposes a comprehensive approach to assessing the readiness of SMEs for digital transformation, including the analysis of various factors influencing their ability to adapt and implement innovative technologies. The model entails a detailed description of each element. For ease of use by SMEs, the author suggests implementing it in a developed Excel application. To assess the model for each component, a scale from 0 to 4 will be used, where 0 indicates "not applicable at all" and 4 signifies "advanced level requiring monitoring and maintenance." To obtain the final digitalization coefficient (or level of digitalization) for SMEs, it is proposed to use the weighted average across all criteria. To denote the final coefficient for each of the nine elements, we will use the following formula developed by us:

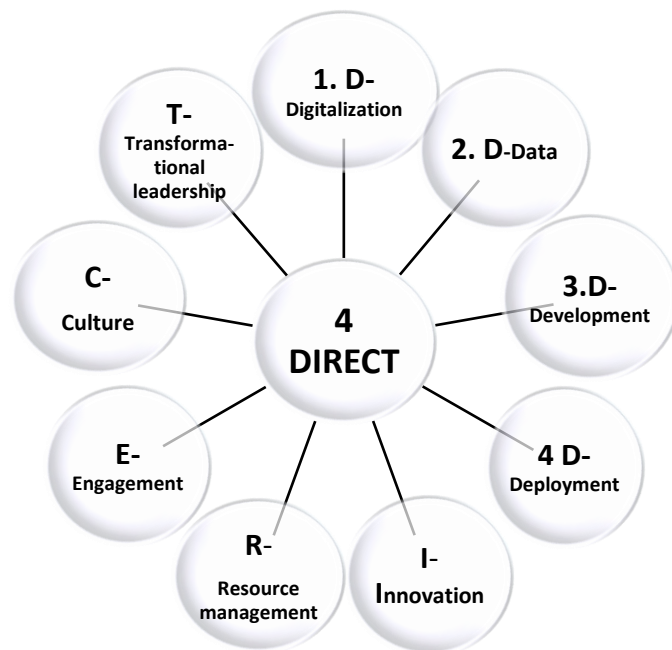


Fig. 14. Elements of the Diagnostic Model for Transitioning SMEs to the New DIRECT Level

Source: developed by the author

$$FC = \sum_{i=1}^n (O_i \cdot W_i) \quad (4)$$

where:

FC - final coefficient (for each criterion);

n - number of criteria;

O_i - score for the i-th criterion on a scale from 0 to 5 points;

W_i* – weight of the i-th criterion (the sum of all weight W_i must equal 1).

The evaluation criterion for the final coefficient can range from 0 to 4 based on the score obtained. Thus, to calculate the final digital readiness coefficient (IC) across the entire 4DIRECT model, which includes the components: Digitalization, Data, Development, Deployment, Innovation, Resource Management, Engagement, Culture, and Transformational Leadership, we use the following formula developed by us (5).

$$IC = \sum_{i=1}^9 \left(\frac{\sum_{j=1}^n (O_{ij} \cdot W_{ij})}{m_i} W_i \right) \quad (5)$$

where:

IC - final coefficient of readiness for changes;

n = 9 - number of components in the 4DIRECT model;

m_i - number of criteria for component i;

O_{ij} - score for the j-th criterion of the i-th component on a scale from 0 to 5 points;

W_{ij} - weight of the j-th criterion of the i-th component;

W_i - weight of the i-th component (the sum of all weights must equal 1).



Fig. 15. Model of the Organization of the Future for SMEs in the Republic of Moldova

Source: developed by the author

A logical conclusion of the study is the presentation of a generalized model of the enterprise of the future, aligned with all updated elements of the system.

The comprehensive study of organizational behavior and changes in the context of Industry 4.0 logically leads to the conclusion that the development of an effective change management model is a critically important task for ensuring their survival and competitiveness.

* To calculate W_i, we find it appropriate to assume that all factors are equally significant for the given coefficient. Accordingly, the weight is calculated by dividing 1 by the number of factors being analyzed. In the case of digitalization, dividing 1 by 9 does not yield a whole number; therefore, it is reasonable to assign the automation level factor a weight coefficient of 0.12.

As is well known, ideal models do not exist, and all the presented change models have demonstrated their viability concerning the conditions and time to which they apply. In this context, the integration of various approaches to change management and the search for individuality that takes into account the specific characteristics of each enterprise become particularly significant. In our opinion, conceptually important models such as Lewin's model, Kotter's model, and the 7S framework can be effectively combined with the philosophies of Agile, Lean, breakthrough, and open innovations. Therefore, the presented model is a symbiosis of numerous approaches while also focusing on the individuality of the organization.

We will also present an algorithm for implementing the new approach, which will contribute to the vision and design of the updated company. Given that the algorithm is intended to facilitate transformational changes in SMEs, we will name it TRANSFORMATIVE 4.0, in accordance with the acronym derived from the initial words:

- T - Thorough Analysis (Diagnostics: thorough analysis);
- R - Research Trends (Foresighting: researching trends);
- A - Assemble Teams (Formation of teams and distribution of roles);
- N - Necessitate Technologies (Justification of necessary technologies for Industry 4.0);
- S - Strategic Planning (Project roadmap development: strategic planning);
- F - Formulate Cybersecurity (Clarification and implementation of cybersecurity rules, development of cybersecurity policy);
- O - Organize Collaborations (Development of collaboration plans to ensure an open ecosystem, organization of cooperation);
- R - Reinforce Culture (Cultural transformation: strengthening culture);
- M - Monitor Progress (Continuous monitoring and implementation of changes, monitoring progress);
- A - Adopt Improvements (Change management, adoption of improvements);
- T - Track Efficiency (Assessment of economic efficiency);
- I - Incorporate Feedback (Implementation of feedback);
- V - Validate Results (Validation of results);
- E - Evaluate Success (Evaluation of success).

The TRANSFORMATIVE 4.0 change implementation algorithm will provide a structured and comprehensive approach to change management, which includes thorough analysis, strategic planning in its modern interpretation, and the implementation of advanced technologies. It is designed to engage employees at all levels and maintain a culture of continuous improvement and innovation. The flexibility and adaptability of the algorithm will enable SMEs in the Republic of Moldova to respond swiftly to changes in the external environment. Continuous monitoring and assessment of effectiveness will help ensure transparency and accountability, facilitating the achievement of the company's strategic goals. Thus, the implementation of the TRANSFORMATIVE 4.0 algorithm will assist SMEs in enhancing their competitiveness and resilience to the challenges of Industry 4.0.

In addition, it is recommended to use a strategy matrix for developing change strategies, based on indicators calculated using the two aforementioned formulas (Fig. 16).

LOAC4.0 \ 4DIRECT	Low LOAC4.0 0-33%	Medium LOAC4.0 34-66%	High LOAC4.0 67-100%
Low 4DIRECT 0-33%	Basic strategy: Initiation of digital infrastructure development and training in basic skills	Fundamental strategy: Optimization of basic IT processes and improvement of organizational aspects	Target strategy: Strengthening leadership through digital transformations
Medium 4DIRECT 34-66%	Fundamental strategy: Integration of simple digital tools and development of leadership qualities	Flexible strategy: Implementation of advanced technologies, improvement of resource management, and culture of change	Innovative strategy: Development and scaling of digital solutions with an emphasis on automation and innovations
High 4DIRECT 67-100%	Target strategy: Preparation for digital changes through strengthening leadership and resource management	Innovative strategy: Integration of advanced technologies and development of an internal culture of innovation	Leadership strategy: Leadership in digital transformations, development of new business models, and implementation of advanced innovations

Fig. 16. Strategic Change Matrix Based on the Indicators of LOAC4.0 and 4DIRECT Levels

Source: developed by the author

Thus, each of the strategies presented in the matrix has its own characteristics:

1. **The basic strategy** is designed for companies with a low level of readiness for change and low alignment with the conditions of the Industry 4.0 environment. Its goal is to establish a foundation for further digitalization, develop basic digital skills among staff, streamline management processes, and implement basic IT tools.
2. **The fundamental strategy** is intended for companies with a low or medium level of readiness for change and a corresponding level of digital maturity. The objective is to advance beyond the basic level, optimize and integrate basic digital solutions, and strengthen readiness for change.
3. **The target strategy** is meant for companies with a low level of digital maturity but a high level of readiness for change, or conversely, those with a high level of maturity but a low level of readiness for change. Therefore, depending on their position in the matrix, the strategy should either prepare the company for deeper digitalization by developing change management and transformational leadership, or implement initial digital solutions based on high readiness and developed leadership qualities.
4. **The flexible strategy** is suitable for companies with a medium level of alignment and a medium level of readiness (change management). The goal of this strategy will be to implement advanced technologies and develop flexibility in change management processes, improving resource management and the culture of change.
5. **The innovative strategy** is appropriate for companies with a high level of readiness and a medium level of alignment, or vice versa. In any case, these are companies that have a well-established understanding of the necessity for change and the readiness to adapt to the conditions dictated by Industry 4.0. The aim for such companies will be to scale digital solutions and implement innovative technologies such as artificial intelligence, machine learning, and the Internet of Things (IoT).
6. **The leadership strategy** is characteristic of companies with a high level of alignment and readiness for change. The primary goal of this strategy will be leadership in digital transformation, development of new business models, and breakthrough innovations.

Any selected strategy entails the use of the TRANSFORMATIVE 4.0 transformation algorithm; at the same time, the company must individualize its approach based on its goals and available resources. In addition to the presented change tools, it is essential to highlight that applying the concept through the lens of Industry 4.0 and the characteristics of the operational environment is of paramount importance.

CONCLUSIONS AND RECOMMENDATIONS

The changes brought about by the Fourth Industrial Revolution underscore the critical need for SMEs to adapt to new conditions. This makes the primary objective of this study—developing an effective change management model for SMEs in the context of Industry 4.0—relevant and significant for ensuring their competitiveness and sustainable development. In the context of digital transformation and the rapid advancement of Industry 4.0 technologies, enterprises must integrate advanced technologies and management methods.

Achieving the research objective helped address the main problem of this study, related to the necessity and complexity of justifying the transition model for SMEs in the Republic of Moldova to a new state, or the model of organizational change management, which would provide adequate and comprehensive changes to the management system and shape an organizational functioning model based on progressive technologies of Industry 4.0, thereby facilitating further regeneration of the system in uncertain conditions.

During the theoretical and practical developments, the main hypothesis of the research was proven, which posits that in the context of the Fourth Industrial Revolution, the classical management model becomes ineffective. To construct an adequate model, a fundamentally different approach to change and innovation management is required, based on new principles and methods. Moreover, to ensure the sustainability and viability of a company, it is essential to create an ecosystem based on the principles of open innovation, apply flexible management methodologies, and more. It is noteworthy that seven of the hypotheses were proven using econometric tools, while one was proven partially, i.e., under certain assumptions (research and evidence of the hypotheses are detailed in Chapter 4.1 of the dissertation).

When analyzing the concepts and theories related to the theme of the work, the following research **objectives were accomplished:**

- **The first objective** involved analyzing the evolutionary aspects of industrial revolutions and the eras of change management. By comparing these, the author concluded that the science of management emerged during the second industrial revolution, corresponding to specific prerequisites described in Chapter 1.1 of the work;
- **The second objective**, which focused on analyzing the principles of classical management and justifying the need for their reorientation, was also accomplished and is presented in Chapter 1.1. This chapter details the principles of management schools concerning their alignment with the current situation. It concludes that most principles from the scientific and classical schools do not ensure the adaptability of companies today;
- The realization of **the third objective** (Chapters 1.2 and 1.3) led to the conclusion that the technologies of Industry 4.0 are key factors driving transformations. Artificial intelligence, the Internet of Things, big data, and cloud computing play a crucial role in modern organizational changes. Their implementation provides enterprises with tools to enhance efficiency and innovation. Contemporary changes in business necessitate adaptation to a new normal characterized by exponential growth (the BANI world), which is defined by complexity, uncertainty, and variability. Therefore, modern management should focus on flexibility, speed, and innovative thinking, allowing organizations to respond more effectively to the challenges and opportunities of the current market;
- In executing **the fourth research objective** (Chapters 2.1, 2.2, and 2.3), we conclude that it is necessary to reorient the business models of companies to ensure their adaptability in the future. This involved examining approaches to organizational changes (based on organizational metaphors) and change models. The study of change models was preceded by their categorization into individual, team, and organizational models, along with their respective characteristics and theories.

The analysis and synthesis of statistical data, analytical applications, publications, and legislative frameworks enabled the realization of the following research objective (Chapters 3.1, 3.2):

A comprehensive analysis of the characteristics of the business environment and trends in the development of SMEs in different countries, as well as the specifics of transformational processes

depending on the level of technological development, facilitated the execution of **the fifth research objective**. Additionally, to accomplish this task, an analysis of statistical reporting concerning SMEs in the Republic of Moldova was conducted, focusing on the level of innovation activity, internet coverage, and the use of IT tools. An analysis of the legislative framework regarding the stimulation of digitalization processes was also performed.

For the study on SMEs in the Republic of Moldova, a proprietary methodology was developed, which represented the **sixth research objective** (Chapter 3.3), under which an empirical analysis was conducted:

- ✓ The empirical study, which included a pilot phase (46 enterprises) and a main phase (210 SMEs), substantiated the relevant conclusions and development directions, thus helping to realize **the seventh objective** (Chapter 3.4);
- ✓ The research also contributed to identifying the problems faced by national SMEs when operating in a complex and uncertain environment (which represented the implementation of **the eighth objective**, Chapter 3.4). These problems can be divided into three groups: those related to the use of IT tools and technologies, management issues, and problems associated with the lack or absence of collaboration.

The synthesis of theoretical and practical findings and the application of econometric methods contributed to the development of the econometric model:

- ✓ The empirical study provided the basis for econometric analysis and formulation of the model using factor analysis and varimax methodology, which realised **the ninth objective** (Ch.4.1). As a result, a formula for the influence of 12 factors on the change process was obtained (copyright registration certificate Seria OȘ 8002 din 18.09.2024: Formula of Organisational Alignment with the Challenges of Industry 4.0' (FOAC 4.0). Ideally, the formula gives 100% realisation. When it was applied to the SMEs studied, almost 64% compliance with Industry 4.0 was obtained, which confirms one of the hypotheses of the study;
- ✓ The paper developed a model for diagnosing a company's readiness to implement organisational change, which was attributed to **the tenth objective of the research** (Ch.4.2). The 4DIRECT model includes all the necessary aspects to clarify the state at the beginning of the development of the change programme. The developed model for diagnosing the state of SMEs allows for assessing readiness for change and identifying key areas for transformation. To facilitate its use in SMEs, the model was also developed in Excel programme, which was used by the SMEs under study. The model is protected by copyright registration certificate Seria OȘ 8001 din 18.09.2024: Model de diagnostic al schimbărilor organizaționale pentru IMM-uri - 4DIRECT;
- ✓ Creating a new type of organisation capable of operating effectively in the Industry 4.0 environment requires the development of appropriate infrastructure and adaptation of organisational culture, rethinking business models and management functions. Such approaches include the introduction of flexible management methods and the use of advanced technologies and a certain type of culture in accordance with the agile methodology, the metaphor of a living organisation, or 'turquoise' organisation. The above recommendations were the basis for the development of a conceptual model of SME management in an Industry 4.0 environment, which contributed to **the eleventh research objective** (Ch.4.3, 4.4);
- ✓ For the implementation of changes in SMEs in the Republic of Moldova, the paper developed the TRANSFORMATIVE4.0 change implementation algorithm, which will provide instructions for the implementation of changes (realisation of **the twelfth objective**). It also presents a conceptual model of the future organisation, which should become a reference point for organisational change. All this should contribute to helping businesses plan and implement change more effectively (Ch.4.4). The algorithm is protected by copyright registration certificate Seria OȘ 8000 din 18.09.2024: Algoritmul

de implementare a schimbărilor organizaționale pentru IMM-uri TRANSFORMATIVE 4.0;

- ✓ Combining the two developed aspects of the research - the FOAC4.0 conformity formula and the 4DIRECT model - together we obtain a strategic choice matrix that classifies enterprises into 6 strategies: basic, fundamental, target, flexible, innovative and leadership. The development of the strategy matrix contributed to the realisation of **the thirteenth task** - the practical testing of the developed models. Examples of practical implementation of the models are presented in 10 SMEs of the Republic of Moldova. To confirm the practical implementation, 18 model implementation reports from the SMEs that participated in the study and the Academy of Economic Studies of Moldova are presented;
- ✓ Transformational change in SMEs requires a holistic approach, including resourcing, public support and awareness of the need for change among business owners and managers. SMEs in the Republic of Moldova face a number of challenges, including a lack of financing, high technology implementation costs and a shortage of skilled labour. Nevertheless, there is a significant potential for growth and development, provided that the state actively supports them and introduces advanced technologies. The dissertation develops recommendations based on the analysis of global trends and taking into account the specifics of the national environment, which helped to realise **the fourteenth objective** of the study.

On the basis of the research conducted, a new direction called **transformational management 4.0 for SMEs** was developed, taking into account that the relevant conditions require a transformation process, i.e. something cardinal and comprehensive; in addition, the specifics of the research object were taken into account. We believe that this direction should be emphasised in change management and developed in further research.

Describing the obtained results of the research, it is worth noting the limitations that were described in the introduction of this paper. Given the presence of **these limits (constraints)**, we assume the development of **future research directions**.

1. Thus, the limitation, directly related to the topic of the paper and the exponentially developing trends of Industry 4.0 technologies, implies that the conclusions presented at the moment (in particular, the coefficients of the FOAC 4.0 formula or the 4DIRECT model) need to be revised in the future, i.e., they cannot be a constant due to the rapidity of changes in the environment. Therefore, one direction for future research is related to revising the numerical values of the formulae used to calculate the compliance level and the diagnostic model.

2. The short-term nature of this study also represents a limitation of the research, therefore, we believe that models and tools related to transformational management 4.0 should be developed further and represent its development.

3. The next limitation is related to the previous one and is defined by the notion of technological maturity of companies. This study is oriented towards the use of disruptive technologies such as: AI, IoT, big data, but takes into account that many companies are in the early or middle stages of digital transformation. This limitation may affect the feasibility of implementing the sophisticated technologies and approaches proposed in the study. Therefore, as a future direction of the study, we present the implementation of the next stage of change after companies have achieved an increased level of technological maturity.

4. This study was not intended to specify the specifics of change depending on the specifics of the industry and business type. At the same time, features related to the level of industry development may influence the perception and implementation of change. Therefore, as a further direction of the research we propose a study in the context of industries.

Thus, a change model for SMEs should combine proven approaches with innovative solutions. This ensures the uniqueness and effectiveness of the transformation of each enterprise, taking into account its specific needs and conditions.

To summarise the above, we would like to make some suggestions:

Recommendations for SMEs:

1. Use the Industry 4.0 compliance formula at the initial stage of change to establish the current level and thereafter to capture progress;
2. Use the 4DIRECT model to diagnose management's readiness for organisational change. One-time measurement will indicate the level of management's readiness for changes, at the same time, periodic calculation of the value, according to the model, will indicate a certain dynamics;
3. Justification of the development strategy according to the matrix of change strategies, based on the combination of two components - the level of compliance with the environment and readiness to change;
4. Using the TRANSFORMATIVE4.0 algorithm to implement changes in SMEs in order to systematise the process of change in the enterprise and cover all the necessary elements of the enterprise system;
5. Utilise the concept of foresight in formulating future strategy, which involves formulating a vision for the enterprise and adjusting the strategy to changing conditions;
6. Invest in staff training and development by investing in programmes to train employees in new technologies and management methods. This can include courses on digital transformation, innovative management and Industry 4.0 best practices. Staff development improves productivity and readiness for change;
7. Adopt Industry 4.0 technologies for survival and competitiveness. SMEs should actively adopt advanced technologies such as artificial intelligence, internet of things and big data, etc. to improve productivity and business efficiency. The adoption of these technologies will enable businesses to manage their resources more effectively and adapt to rapidly changing market conditions;
8. Develop partnerships and co-operation to create open entrepreneurial ecosystems. Participate in networking and co-operation projects aimed at developing innovations and sharing experience with other enterprises and scientific institutions;
9. Introduce a flexible management methodology that promotes adaptability of organisations and self-organisation of teams, which will be an essential element of a “turquoise” organisation;
10. Rethinking management functions in accordance with the new view of the operating environment, taking into account the peculiarities of Industry 4.0: the planning function should be transformed into anticipation (foresight) and current planning, which should be constantly revised under the prism of changes in the external environment; the organisation function should be oriented towards flexibility (Agile) and teamwork; motivation should also be revised with a focus on self-motivation and awareness of team players; the control function is changing under the influence of AI, firstly, and secondly,

Suggestions for educational institutions:

1. HEIs need to introduce courses and subjects focused on training professionals in the field of Industrialisation 4.0 and digital transformation, it is recommended to add elements that promote STEAM skills to the academic subjects, which should help to provide the labour market with qualified personnel capable of working with advanced technologies and management techniques;
2. Creation and organisation of research centres, incubators, Hubs at HEIs, together with the real sector of the economy, aimed at studying and implementing innovative technologies and methods of their management, which will have a synergy effect for HEIs, students, business environment and the state. It will also allow HEIs to actively participate in the development of the innovation economy and support SMEs in their transformation processes;

3. Establishing partnerships with business. It is possible to join efforts in projects between HEIs, SMEs and large enterprises to realise joint projects and research aimed at implementing innovations. Exchange of experience, joint development and implementation, knowledge sharing will also accelerate the process of introducing new technologies;
4. Introduce changes in training curricula at all levels of education based on collecting feedback from potential and actual beneficiaries on the necessary skills to develop in an Industry 4.0 environment;
5. Organisation of meetings of entrepreneurs with students and teachers to exchange ideas, skills, joint participation in business games simulating real conditions of business environment, development of innovations based on open principles;
6. Integration of innovative technologies into the learning process, application of technologies in the process: virtual reality (VR), augmented reality (AR), BigData and the Internet of Things (IoT);
7. Building digital and cybersecurity skills of learners at all levels:
 - *at the level of general education*: basic knowledge of cyber risk, basics of using AI, ethical use of IT and internet space;
 - *at the level of higher education institutions*: more in-depth study of the specifics of cyber security, development of skills in threat and risk analysis and prevention; training in specialised programmes used depending on the specialty;
 - *for postgraduate education*: training of professionals for advanced training and certification in cybersecurity;
8. Updating university curricula with subjects related to the development of specialised skills in the use of digital platforms and programmes, development of innovation and change, improvement of soft skills, creativity, design and critical thinking, ethical behaviour in the online environment, team organisation. Their importance has been proven by global and national studies and is also supported by this paper. We believe that their development is important without exception in all specialities, given that these are the skills of the future, necessary for all people preparing for life in the Singularity.

For the Ministry of Economic Development and Digitalisation of the Republic of Moldova (MDED):

1. Development and implementation of programmes to support SMEs in the digital transformation process, aiming at financial, advisory and information solutions in the digital transformation process;
2. Increasing the funding to support the digital transformation programme implemented through ODA, given the successful experience of providing business vouchers for 3.5 million lei and 16.5 million lei in grants, which have already been used by 277 enterprises, according to the Agency's data [13];
3. Continued implementation of grants for enterprises wishing to automate processes and implement IT solutions, such as supply chain management systems and human resource management (HRM), which are in demand but poorly implemented;
4. Expanding training programmes for skills development, given that a priority issue following the lack of funding is the lack of IT skills among staff. Thus, organising programmes aimed at improving knowledge and skills in AI and IT would significantly improve the process, given that 70-80% of SMEs do not use them sufficiently (as this study has shown);
5. Development of programmes to enhance SMEs' understanding of the need to implement change management technologies applicable to Industry 4.0, inclusion of topics related to change diagnostics in programmes, in particular the LOAC4.0 formula, the use of the 4DIRECT model and the TRANSFORMATIVE4.0 algorithm, identification of the necessary change strategy for further development of transformational processes;

6. Developing and implementing specific programmes with a focus on cybersecurity to protect customer and business data, in view of their absence, according to this study and ODA research, as well as implementing consulting programmes in this area;
7. Creating a centralised platform for information sharing and communication between SMEs to access educational materials and tools for digital maturity assessment, conferences and workshops, communication and exchange of knowledge and opinions, as lack of coordination between programmes and low awareness hinders digitalisation;
8. Establishment of initiative groups for partnerships between SMEs and large companies to consolidate efforts and enter international markets by integrating SMEs into global supply chains through digital technologies (following the example of Partnership for Capability Transformation), taking into account the advantages of SMEs: emphasis on exclusive activities, originality and specialisation, as opposed to large companies that benefit from economies of scale;
9. Develop tax incentive programmes for enterprises adopting 4DP technologies (as in Malaysia, where enterprises adopting 4DP technologies are granted an income tax exemption of up to 10% for 10 years, depending on the economic sector);
10. Inclusion of additional CAEM codes such as: trade, business consulting services, management consulting and other types of tourism in the digital transformation programme of the Republic of Moldova for access to financing [13]. Assistance in the digitalisation of these activities should have a positive impact on the growth of the overall level of transformation processes, given their large share in the economy of the Republic of these sectors.

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АННОТАЦИЯ

Дорогая Ирина «СОЗДАНИЕ МОДЕЛИ МЕНЕДЖМЕНТА ИЗМЕНЕНИЙ ДЛЯ МАЛЫХ И СРЕДНИХ ПРЕДПРИЯТИЙ ЧЕРЕЗ ВЫЗОВЫ ИНДУСТРИАЛИЗАЦИИ 4.0».

Диссертация на звание доктора хабилитат экономических наук, Кишинев, 2024г.

Структура работы: введение, четыре главы, общие выводы и рекомендации, библиография из 426 наименований, 56 приложений, 293 страницы основного текста, 124 рисунка и 88 таблиц.

Результаты опубликованы 71 научных работах и трех свидетельствах об авторском праве.

Ключевые слова: менеджмент изменений, изменения, малые и средние предприятия, Индустриализация 4.0, гибкие методы управления, инновации, цифровая трансформация, диагностика

Цель исследования: разработка модели менеджмента изменений для МСП Республики Молдова, которая обеспечит предприятиям гибкость и адаптивность, учитывая турбулентные условия внешней среды, формирующиеся вследствие процесса Индустриализации 4.0.

Задачи исследования: анализ современных теорий и подходов к менеджменту изменений и Индустрии 4.0; исследование специфики и проблем, с которыми сталкиваются МСП в процессе изменений; формулирование концептуальной модели менеджмента изменений, включающей ключевые элементы Индустрии 4.0; разработка эконометрической модели, устанавливающей зависимости успеха изменений от различных факторов влияния; разработка модели диагностики для МСП Республики Молдова; обоснование алгоритма проведения изменений для МСП в условиях Индустрии 4.0; разработка рекомендаций по внедрению модели в практику управления МСП.

Новое направление исследования, развитое в рамках данной диссертационной работы, является трансформационный менеджмент 4.0 для МСП, который предполагает отдельное направление в менеджменте изменений.

Научная новизна и оригинальность: Предложена новая модель менеджмента изменений, МСП, учитывающая вызовы Индустрии 4.0, которая включает гибкие методы управления, обучающий и коучинговый стиль лидерства, ориентирована на внедрение прорывных инноваций и создание открытых экосистем. При эконометрическом анализе была разработана формула соответствия среде в Индустриализации 4.0, предложена модель диагностики для МСП, алгоритм трансформации и стратегическая матрица.

Принципиально новые результаты для науки и практики: Объединение концептуальных аспектов промышленных революций и школ управления; рассмотрение классических принципов менеджмента через призму их применения в условиях Индустриализации 4.0; использована принципиально новая методика для разработки эконометрической модели при выявлении уровня соответствия МСП условиям Индустриализации 4.0, представленная формулой соответствия (*FOAC 4.0*); разработана оригинальная комплексная модель диагностики для выявления состояния уровня менеджмента на МСП в условиях Индустриализации 4.0 (*4DIRECT*); сформулирован алгоритм проведения изменений, включающий преобразование всех необходимых аспектов и элементов деятельности предприятий для проведения трансформаций (*TRANSFORMATIVE 4.0*).

Теоретическая значимость работы заключается в разработке концептуальных основ модели изменений МСП в условиях Индустрии 4.0, представлении концептуальной модели нового менеджмента, рассмотренного через призму 4ПР, обосновании необходимости изменения функций менеджмента, понимании «бирюзовой» концепции организации, формулировании алгоритма изменений и модели диагностики, разработки матрицы стратегий в условиях Индустрии 4.0.

Практическая значимость: результаты исследования могут быть использованы руководителями МСП для повышения эффективности управления изменениями, ускорения процесса внедрения инноваций и адаптации к условиям Индустрии 4.0. Рекомендации способствуют улучшению организационной культуры, развитию кооперации и интеграции с внешними партнерами. Результаты исследования уже были проработаны для 10 МСП, которые провели расчет по формуле соответствия, провели диагностику уровня менеджмента, используя разработанную программу в Excel, внедрили некоторые элементы модели трансформации и определили будущую стратегию.

Результаты исследования были представлены на 42 научных конференциях, в том числе 35 международных, 71 научных статьях, в том числе 25 рецензированных журналах, из которых 8 – за рубежом, одной монографии «Менеджмент изменений и инноваций в условиях Индустриализации 4.0», одной коллективной монографии (часть автора – ”Cultura organizațională în asigurarea schimbărilor strategice”, 3,3 с.а), тремя свидетельствами о защите авторского права. Seria OȘ 8002 din 18.09.2024, Seria OȘ 8001 din 18.09.2024, Seria OȘ 8000 din 18.09.2024, общим количеством 58,41 авторских листов, 18 сертификатами о внедрении на МСП и Экономической Академии Молдовы.

ADNOTARE

Dorogaia Irina, "CREAREA MODELULUI DE MANAGEMENT AL SCHIMBĂRILOR ORGANIZAȚIONALE PENTRU ÎNTREPRINDERILE MICI ȘI MIJLOCII PRIN PROVOCĂRILE INDUSTRIALIZĂRII 4.0",

Teză pentru titlul de doctor habilitat în științe economice, Chișinău, 2024.

Structura lucrării: introducere, patru capitole, concluzii generale și recomandări, bibliografie cu 426 de titluri, 56 de anexe, 293 de pagini de text principal, 124 de figuri și 88 de tabele.

Rezultatele au fost publicate în 71 de lucrări științifice și trei certificate privind dreptul de autor.

Cuvinte-cheie: managementul schimbării, schimbare, întreprinderi mici și mijlocii, Industrializare 4.0, metode flexibile de management, inovații, transformare digitală, diagnosticare.

Scopul cercetării: elaborarea unui model de management al schimbării pentru IMM-urile din Republica Moldova, care să asigure flexibilitate și adaptabilitate întreprinderilor, având în vedere condițiile turbulente ale mediului extern, formate ca urmare a procesului de Industrializare 4.0.

Obiectivele cercetării: analiza teoriilor și abordărilor moderne privind managementul schimbării și Industria 4.0; studierea specificului și problemelor cu care se confruntă IMM-urile în procesul de schimbare; formularea unui model conceptual de management al schimbării, care include elemente cheie ale Industriei 4.0; elaborarea unui model econometric care stabilește dependența succesului schimbărilor de diferiți factori de influență; dezvoltarea unui model de diagnosticare pentru IMM-urile din Republica Moldova; fundamentarea unui algoritm pentru implementarea schimbărilor în IMM-uri în condițiile Industriei 4.0; elaborarea de recomandări pentru implementarea modelului în practica de management a IMM-urilor.

Un nou domeniu de cercetare: este managementul transformațional 4.0 pentru IMM-uri, care implică un domeniu separat al managementului schimbării.

Noutatea științifică și originalitatea: A fost propus un nou model de management al schimbării, adaptat pentru întreprinderile mici și mijlocii, care ia în considerare provocările specifice și oportunitățile oferite de Industria 4.0. Modelul include metode flexibile de management și un stil de leadership axat pe formare și coaching, orientat spre implementarea inovațiilor disruptive și crearea de ecosisteme deschise. Utilizând analiza econometrică a fost elaborată o formulă de corespondență cu mediul în Industrializare 4.0, a fost propus un model de diagnosticare pentru IMM-uri, un algoritm de transformare și o matrice strategică.

Rezultate fundamentale noi pentru știință și practică: Combinarea aspectelor conceptuale ale revoluțiilor industriale și ale școlilor de management; considerarea principiilor clasice ale managementului prin prisma aplicării lor în condițiile Industrializării 4.0; utilizarea unei metodologii fundamentale noi pentru elaborarea unui model econometric de identificare a nivelului de conformitate a IMM-urilor cu condițiile Industrializării 4.0, reprezentat prin formula de conformitate (FOAC 4.0); elaborarea unui model original de diagnostic complex pentru identificarea stării nivelului de management în IMM-uri în condițiile Industrializării 4.0.

Semnificația teoretică a lucrării rezidă în dezvoltarea fundamentelor conceptuale ale modelului de schimbări în IMM-uri în condițiile Industri 4.0, prezentarea unui model conceptual de management nou, privit prin prisma 4PR, justificarea necesității schimbării funcțiilor de management, înțelegerea conceptului „turcoaz” al organizației, formularea algoritmului de schimbări și a modelului de diagnostic, dezvoltarea unei matrice de strategii în condițiile Industri 4.0.

Valoarea aplicativă: Rezultatele cercetării pot fi utilizate de către managerii și conducătorii IMM-urilor pentru a crește eficiența managementului schimbărilor, a accelera procesul de implementare a inovațiilor și a se adapta la noile condiții ale Industriei 4.0. Recomandările propuse contribuie la îmbunătățirea culturii organizaționale, la dezvoltarea cooperării și integrării cu parteneri externi. Rezultatele cercetării au fost deja aplicate în 10 IMM-uri, care au efectuat calcule conform formulei de corespondență, au realizat diagnosticarea nivelului de management folosind un program dezvoltat în Excel, au implementat anumite elemente ale modelului de transformare și au stabilit strategia viitoare.

Implementarea rezultatelor științifice. Rezultatele cercetării au fost prezentate la 42 conferințe științifice, inclusiv 35 internaționale, 71 articole științifice, inclusiv 25 reviste de specialitate, dintre care 8 în străinătate, o monografie „Managementul schimbării și inovării în condițiile Industrializării 4.0”, o monografie colectivă (parte de autor - «Cultura organizațională în asigurarea schimbărilor strategice», 3,3 c.a), trei certificate de protecție a drepturilor de autor. Seria OȘ 8002 din 18.09.2024, Seria OȘ 8001 din 18.09.2024, Seria OȘ 8000 din 18.09.2024, cu un total de 58,41 coli de autor, 18 certificate de implementare la IMM-uri și Academia de Studii Economice din Moldova.

ANNOTATION

Dorogaia Irina, "CREATION OF A MODEL OF CHANGE MANAGEMENT FOR SMALL AND MEDIUM-SIZED ENTERPRISES THROUGH PROVOCATIONS OF INDUSTRIALISATION 4.0"

Dissertation for the degree of Doctor Habilitat in Economic Sciences, Chişinău, 2024.

Structure of the work: introduction, four chapters, general conclusions and recommendations, a bibliography of 426 titles, 56 appendices, 293 pages of main text, 124 figures, and 88 tables.

Results have been published in more than 71 scientific works and three copyright certificates.

Keywords: change management, changes, small and medium enterprises (SMEs), Industrialization 4.0, flexible management methods, innovations, digital transformation, diagnostics.

Purpose of the research: To develop a change management model for SMEs in the Republic of Moldova that provides flexibility and adaptability, considering the turbulent external environment resulting from the process of Industrialization 4.0.

Research objectives: analyze modern theories and approaches to change management and Industry 4.0; investigate the specifics and problems faced by SMEs during changes; formulate a conceptual change management model that includes key elements of Industry 4.0; develop an econometric model establishing the dependence of change success on various influencing factors; create a diagnostic model for SMEs in the Republic of Moldova; substantiate an algorithm for implementing changes in SMEs under Industry 4.0 conditions; develop recommendations for implementing the model in SME management practices.

A new area of research developed in this thesis is Transformational Management 4.0 for SMEs, which implies a separate area of change management.

Scientific novelty and originality: A new change management model is proposed, adapted for small and medium enterprises, accounting for the specific challenges and opportunities offered by Industry 4.0. The model includes flexible management methods and a teaching and coaching leadership style, focusing on implementing breakthrough innovations and creating open ecosystems. An environmental compliance formula for Industrialization 4.0 was developed during econometric analysis, along with a diagnostic model for SMEs, a transformation algorithm, and a strategic matrix.

Fundamentally new results for science and practice: Combining conceptual aspects of industrial revolutions and schools of management; consideration of classical principles of management through the prism of their application in the conditions of Industrialisation 4.0; used a fundamentally new methodology for developing an econometric model for identifying the level of compliance of SMEs with the conditions of Industrialisation 4.0, represented by the formula of compliance (FOAC 4.0); developed an original complex diagnostic model to identify the state of the level of management in SMEs in the conditions of Industrialisation 4.0.

Theoretical significance of the work lies in the development of conceptual foundations of the model of changes in SMEs in the conditions of Industri 4.0, presentation of the conceptual model of new management, considered through the prism of the 4PR, justification of the need to change the functions of management, understanding of the 'turquoise' concept of the organisation, formulation of the algorithm of changes and diagnostic model, development of a matrix of strategies in the conditions of Industry 4.0.

Practical significance: the results of the study can be used by SME managers to improve the effectiveness of change management, accelerate the process of innovation implementation and adaptation to Industry 4.0. The recommendations contribute to the improvement of organisational culture, cooperation and integration with external partners. The results of the study have already been worked out for 10 SMEs, which have carried out a calculation using the compliance formula, carried out a diagnosis of the management level using the developed Excel programme, implemented some elements of the transformation model and defined a future strategy.

The **results of the research** were presented at 42 scientific conferences, including 35 international ones, 71 scientific articles, including 25 peer-reviewed journals, of which 8 abroad, one monograph "Management of change and innovation in the conditions of Industrialisation 4.0", one collective monograph (part of the author – "Organizational culture in ensuring strategic change", 3.3 c.a), three copyright certificates: Seria OŞ 8002 din 18.09.2024, Seria OŞ 8001 din 18.09.2024, Seria OŞ 8000 din 18.09.2024, a total of 58,41 copyright sheets, 18 certificates of implementation at the SME and the Academy of Economic Studies of Moldova.

DOROGAIA IRINA

**CREATING A CHANGE MANAGEMENT MODEL FOR SMALL AND MEDIUM
ENTERPRISES THROUGH THE CHALLENGES OF INDUSTRIALIZATION 4.0**

**521.03 ECONOMY AND MANAGEMENT
in the fields of activity**

Dissertation abstract for the degree of Doctor habilitat in economics

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