SCIENTIFIC AND METHODOLOGICAL PRINCIPLES OF FORMING A ROADMAP FOR DIGITALIZATION OF MANAGEMENT IN THE AGRICULTURAL SECTOR

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In modern conditions, digital transformation of management is an important key factor in increasing the efficiency of business operations, optimizing costs and strengthening its competitiveness. It contributes to the adaptability of enterprises to dynamic changes in the market environment, ensuring flexible, transparent and effective management. In this context, the concept of Management 4.0 is being formed, which combines the latest digital technologies, automation of business processes and modern management approaches (Kravchenko & Salabai, 2023).

Digitalization occupies a central place in modern management, performing a number of important functions; it is a powerful driver of growth, stimulating the development of digital business models both within the core activities of companies and in related areas (Pankratova, 2021). In addition, digitalization allows you to identify new business models and adapt them to changes in the environment, increasing the long-term competitiveness of the enterprise. Another key function is the optimisation of operational processes, which leads to cost reductions, the efficient use of resources and the digitalization of the entire value chain.

Among the main advantages of digitalization of management processes, the following aspects should be noted:

1. Increased productivity through automation of routine tasks and reduction of human intervention.
2. Flexibility and adaptability of management decisions based on the use of Big Data technologies and artificial intelligence.
3. Management transparency, achieved through the implementation of ERP, CRM and other information systems that provide access to up-to-date data in real time.
4. Cost reduction through automation of management and operational processes.
5. Increasing the innovative potential of the enterprise through the use of modern technologies, in particular blockchain, Internet of Things (IoT) and machine learning (Zub & Kalach 2021; Raicheva & Horbanova, 2024).

The concept of Management 4.0 is considered as an innovative approach to management based on digital tools and principles of Industry 4.0. Its characteristic features are:

- automation of business processes through the implementation of ERP, CRM, HRM systems and RPA technologies;
- data-driven decision-making, powered by big data analytics and artificial intelligence algorithms;
- organizational flexibility, which is provided by Agile, Scrum, Lean methodologies, as well as the development of remote work;
- human-centricity and development of digital culture, which involves the formation of digital competencies and «soft» skills of personnel;
- ecosystem management, which consists of interaction based on digital platforms and building partner networks (Khromushyna, 2023).

Digitalization of management and implementation of Management 4.0 principles are fundamental components of the modern business model. They allow enterprises to increase adaptability, efficiency and ability to innovative development.

The Industry 4.0 concept and the active introduction of digital technologies into management activities are leading to new trends in digital management (Derhachova & Koleshnia, 2024). These include:

- development of cloud technology tools for collective documentation management;
- automation of management decision-making in all areas of management;
- implementation of remote access tools that increase employee mobility and engagement;
- integration of industrial IoT technologies into business processes (Hrynko et al., 2022).

Digital transformation is a systemic transformation of the activities of an enterprise or institution, accompanied by the introduction of digital technologies, changes in the business model, organizational structure and culture. At the heart of this concept are not only technological innovations, but also a strategic rethinking of the ways of creating value, interacting with customers, using resources and ensuring management flexibility. The main goal of digital transformation is to form an adaptive, innovative and effective enterprise, capable of quickly responding to the challenges of the external environment (Derhachova & Koleshnia, 2024).

Among the main components of digital transformation, we can distinguish: a digital strategy that forms a vision of change; an organizational culture focused on innovation; data management and analytics that become the basis for decision-making; customer orientation and business process transformation. The technologies most often used in this process are artificial intelligence, machine learning, cloud computing, the IoT, blockchain and robotic process automation (RPA) (Yakovenko et al., 2024).

Implementing digital transformation involves several stages: assessing the digital maturity of the enterprise, developing a digitalization strategy, piloting solutions, scaling and continuous improvement. The effectiveness of this process depends on clear leadership, staff inclusion, the use of Agile approaches and data orientation.

It is also important to distinguish digital transformation from digitalization LLC «Krolevetsky feed mill». While the latter is reduced to the implementation of individual digital tools, digital transformation changes the very logic of the organization's functioning, its strategy and operating models. At the same time, the process of digital transformation faces numerous challenges: resistance to change, insufficient digital literacy of personnel, limited resources, cybersecurity problems and difficulties in integrating new technologies (Oleshko et al., 2022).

In the context of digital transformation research, the TOE (Technology–Organization–Environment) model is of significant methodological value (Holionko & Kondratieva, 2023). This model has gained wide recognition in the field of information technology management and transformation processes, in particular in the study of factors influencing the implementation of innovative solutions in organizations. The TOE model is based on the assumption that the adoption and implementation of technologies in an organization depends on three interrelated contexts: technological, organizational and external environment. It integrates technical, structural-organizational and institutional factors, forming a holistic view of the complex nature of digital transformations.

The technology element encompasses the internal and external technologies available to the organization at the time of the decision. These include the existing IT infrastructure, the level of technological maturity, innovation capabilities, and implementation costs. In digital transformation, this may include technologies such as ERP systems, cloud services, blockchain, AI, etc. The decision to use a particular technology depends on its complexity, relative advantage, and compatibility with existing processes.

The organizational aspect covers the internal characteristics of the enterprise that can affect the adoption of innovations: the size of the organization, the management structure, the development strategy, the level of IT competencies of the staff, the degree of centralization and the corporate culture. The presence of flexible processes, an innovative culture and leadership are critically important for a successful digital transformation.

The external environment context encompasses external factors of influence that an organization cannot fully control, but must take into account. These include competition, the legislative framework, customer requirements, suppliers, industry standards, and government digital policy. In the digital era, the dynamism of the external environment is of particular importance, requiring enterprises to be adaptable and open to change.

Using the TOE model has a number of advantages:

- provides a systematic approach to the analysis of digitalization processes;
- allows you to adapt innovation strategies to the specifics of the industry and organization;
- serves as a theoretical basis for empirical research in the field of technology management;
- used in diagnosing digital maturity and building digital roadmaps.

The TOE model is a universal analytical tool that allows for a comprehensive assessment of an organization's readiness for digital transformation, taking into account both internal and external factors. Its use is appropriate at the stage of strategic planning of digitalization, as well as in the process of monitoring and evaluating the results of the implemented changes (Holionko & Kondratieva, 2023).

In today's environment, characterized by rapid change, technological turbulence, and increasing competition, an organization's ability to adapt is gaining strategic importance. In this regard, the concept of dynamic capabilities, which is considered a determining factor in successful digital transformation. The concept of dynamic capabilities describes the organizational ability to integrate, rebuild and reconfigure internal and external resources in accordance with changes in the environment, which allows organizations not only to respond to changes, but also to actively influence the market, forming new competitive advantages.

Digital transformation requires organizations to be flexible in management, innovative in strategy development, and able to learn quickly based on market feedback (Ciampi et al., 2021). The components of dynamic capabilities are:

- flexibility allows you to quickly change business processes, approaches to customers, and even the business model itself under the influence of new technologies;
- innovativeness provides an opportunity to generate and implement new ideas, including digital solutions that meet the needs of the modern market;
- organizational learning ensures the accumulation and transformation of knowledge necessary for adaptation and improvement (Lokuge & Duan, 2021).

These aspects are critically important in the context of implementing new IT solutions (ERP, CRM, AI, IoT), when changes affect not only the infrastructure, but also the culture, structure, and management practices of the organization.

To develop dynamic capabilities, organizations should form the following management and cultural elements:

- change-oriented leadership that supports digital initiatives and innovation;
- investments in digital competences of personnel, in particular the development of soft skills, analytical thinking and flexibility;
- using digital platforms and data as a basis for strategic decision-making;
- institutionalization of innovations, in particular through the creation of internal incubators, R&D teams and Agile groups (Petrykiva & Malafiiv, 2024).

Organizations with developed dynamic capabilities are able to quickly rethink strategic priorities; adapt products and services; integrate new technologies into operations; and enter new markets.

Thus, an organisation’s dynamic capabilities are not merely a means of responding to change, but also a strategic tool for creating new value, making them the cornerstone of successful digital transformation. They form the foundation of digital adaptation and transformation, ensuring that an enterprise is not only technologically flexible but also strategically forward-thinking. In a world where digital change has become a constant feature of business operations, the development of such capabilities is becoming a prerequisite for long-term sustainability and competitive advantage.

Effective implementation of digital technologies in management requires scientifically sound methodological approaches that take into account the specifics of the enterprise, industry and external environment. One of the basic tools is the assessment of the digital maturity of the organization, which allows determining the level of readiness for digital transformation and forming an appropriate digital strategy (Hryshko, 2021).

Digital management is considered as a comprehensive management system focused on the use of digital processes and tools in intra-organizational interaction (Chen, 2023). Particular attention is paid to innovative approaches to personnel management, which include the use of HR analytics, digital recruitment platforms, and automated competency assessment systems.

Methodological approaches to digitalization also include management of innovation activities using system, project and process approaches, which allows optimizing the implementation of digital solutions at the level of the entire organization. In addition, strategic controlling in the context of digitalization allows for feedback and maintaining the effectiveness of change management through digital metrics and KPIs (Dombrovska & Farion, 2024).

An important direction is the design of digital HR systems that combine the functions of strategic and innovative personnel management and create conditions for sustainable development of human capital. Also used are the concepts of design of management technologies focused on the transformation of the organizational structure taking into account digital tools and personnel needs (Khromushyna & Mohylna, 2025).

In general, methodological approaches to digitalization of management are comprehensive in nature and involve the integration of strategic, innovative, project and technological levels of management. Their implementation ensures the transition to flexible digital management structures capable of quickly adapting to external challenges and ensuring sustainable development of the enterprise.

Let us analyze the practical aspects of digital management transformation using the example of LLC «Krolevetsky feed mill» of Sumy region, which is a large agricultural enterprise with an integrated structure that includes crop cultivation, grain trading and elevator capacities. Despite the positive dynamics of asset growth over the past three years, modernization of fixed assets and increase in sales volumes, the enterprise is unprofitable. The main problems are disproportionate growth in costs, high dependence on borrowed capital and low level of solvency. Slow growth in labour productivity and unsatisfactory financial stability necessitate reforms in the field of cost, finance and labour management.

The basis of the digital enterprise management platform is formed by the ERP system (Enterprise Resource Planning), which allows you to integrate all basic business processes: financial planning, accounting, logistics, production management, purchasing, sales, inventory accounting. At LLC «Krolevetsky feed mill», the ERP system provides coordination of the sowing campaign, control over the use of equipment and material resources, and operational analysis of costs and profits (BAS ERP).

To maintain effective communication with clients, particularly in the field of grain trading, a CRM system is used (Customer Relationship Management). It allows you to record and analyze counterparties, create commercial offers, monitor contract execution, automate communication with partners (grain buyers, suppliers of plant protection products, fertilizers, etc.). Using CRM allows you to reduce communication risks and increase customer loyalty.

In conditions of significant document flow (invoices, acts, contracts, invoices, customs documents), the implementation of EDO systems is extremely important. The enterprise under study implemented MEDoc, which reduces the time for document processing, reduces the paper load, ensures the legal significance of digital signatures, and increases the transparency of internal procedures.

GPS monitoring and telemetric of agricultural machinery are also used in production activities in the field of transport operations and the use of agricultural machinery. The use of digital monitoring systems for the machine and tractor fleet allows you to track the location, fuel consumption, load and productivity of tractors, combines, seeders, etc. This optimizes the use of equipment, prevents downtime, improves the quality of agricultural work and reduces costs. The main components of such systems are:

- GPS trackers (GPS bugs), which are installed directly on equipment (tractors, combines, sprayers, trucks, etc.). They collect data on location, speed, and travel route;
- fuel level sensors that are integrated into fuel tanks for precise control of fuel consumption, detection of leaks and refuelling;
- driver (operator) identification sensors, which allow you to track who was driving the equipment at a certain moment and control working hours;
- sensors for the operation of attached equipment, which allow you to monitor when the equipment (for example, a plough, a seed drill, a sprayer) was in working condition and record the amount of work performed;
- monitoring platform (software); a web interface or mobile app that receives all data from trackers and sensors. This is where visualization, analysis, report generation, and notification settings take place.

To manage the elevator infrastructure, a WMS (Warehouse Management System) elevator management system has been implemented. Management System), which allows you to manage grain storage, batch accounting, moisture analysis, clogging, temperature control in silos, and shipment automation. Cloud services and mobile applications are used to access data from any point and organize remote work in the enterprise. Mobile applications for agronomists, machine operators, and managers provide input of primary data directly from the field or machine and tractor fleet, which speeds up the accounting process and reduces errors. Since the enterprise employs a significant number of personnel, an HRM system, in particular BAS Payroll and HR Management is used for effective personnel management, automation of personnel accounting, payroll calculation, work shift planning, and personnel training. It allows you to optimize personnel costs, maintain statistics on vacations, sick leave, certifications, etc.

We will conduct a diagnostics of the digital maturity of the enterprise using the adapted MIT & Capgemini model, which is one of the most famous in the world and was developed by the Center for Digital Business at the Massachusetts Institute of Technology and Capgemini Consulting (global consulting company).

In this model, the level of digital maturity is determined by two main criteria: digital capabilities and leadership capabilities. Digital capabilities are presented:

- customer experience (use of CRM, online services, personalized communications with customers);
- operational processes (ERP, GPS monitoring, electronic document management, production automation);
- business model (new sources of income through digital services, mobile services, integration with partners through platforms);

According to leadership capabilities, digital maturity is assessed through:

- digital vision (availability of a digitalization strategy, support for changes by management);
- culture of innovation (employee readiness for innovation, internal initiatives, development of digital competencies);
- availability of IT infrastructure (cloud services, integrated systems, cybersecurity, mobile access).

The results of the digital maturity diagnostics of LLC «Krolevetsky feed mill» using the MIT & Capgemini model are presented in Table 1.

So, the company is at the initial digital transformation level, digital solutions have already been implemented in the operational sphere, but it needs a systemic digital strategy, personnel development, and business model transformation.

We will also assess the digital maturity of the enterprise according to maturity levels (Table 2).

LLC «Krolevetsky feed mill» according to the scale of Table 2 corresponds to level 3 «Integrated Automation», with a transition to level 4 subject to the implementation of business analytics, digital strategy and personnel training, and in further development to the level of digital leadership.

The digital maturity diagnosis showed that the company has reached an average level of digital integration, is actively implementing IT solutions for management, but has not yet formed a full-fledged digital strategy, does not fully use analytics and needs to develop digital competencies of employees. The next step should be to form a digital transformation roadmap.

Table 1. Results of digital maturity diagnostics of LLC «Krolevetsky feed mill» using the MIT & Capgemini model

Component	Description	Rating (low – medium – high)
Customer experience	Using CRM systems for customer interaction, personalization of communication, electronic order processing	Average
Operational processes	ERP, GPS monitoring, electronic document management, automation of agricultural production and logistics	High
Business model innovation	Using digital platforms for sales, trading, and implementing new digital services	Low
Digital vision	Presence of elements of a digital strategy, management support for digitalization initiatives	Average
Culture of innovation	The level of employees' openness to change, the introduction of innovations, and the digital literacy of staff	Low
IT infrastructure	Cloud services, mobile applications, telemetric, unified information systems	Average

Source: compiled by the author.

Table 2. Results of the digital maturity assessment of LLC «Krolevetsky feed mill» by maturity levels

Level	Name	Characteristic
1	Digital absence	Almost complete lack of digital solutions
2	Fragmentary digitization	There are separate tools: accounting, document management
3	Integrated automation	ERP, CRM, GPS, electronic services
4	Analytical digitalization	BI systems, analytics, digital strategy
5	Digital leadership	Complete transformation of business models, digital culture, digital ecosystems

Source: compiled by the author.

We will determine in which functional areas of management (production, logistics, human resources, finance, marketing) digitalization has already been implemented, and where it is absent or fragmented.

In the field of production management, we assess the state of digitalization at an average level (or partially implemented), since the digitalization of production processes is implemented through GPS-monitoring systems of equipment, fuel accounting, field cultivation control, weather stations, agro-scouting, and precision farming systems. However, management of sown areas, technological maps, and agronomic accounting are often still conducted in a semi-digital format (Excel, local programs), and analytics are fragmented.

At the level of logistics management, truck tracking systems (GPS, telemetric), basic route and cargo accounting, warehouse modules in ERP are used. The planning of logistics chains is not sufficiently automated, there is no end-to-end integration with traders or elevators, and the WMS system for the elevator is partially functioning. Therefore, the state of digitalization of logistics management can be assessed at an average level.

In the field of personnel management, the state of digitalization is fragmented. Timesheets, payroll calculations (in BAS Payroll and HR Management) have been automated, and electronic personnel records are maintained. However, digital modules for personnel adaptation, competency assessment, training, and productivity management have not been implemented.

Since LLC «Krolevetsky feed mill» has been making losses for the last three years, the digitalization of financial management is assessed as fragmented and so far ineffective. The ERP system or accounting software performs only the function of recording transactions, but does not provide strategic financial management. The lack of BI analytics, scenario planning, profitability analysis by crops or areas leads to ineffective decisions. There is no budgeting system with execution control, or it works formally. Financial risks (inflation, seasonality, fluctuations in grain prices) are not compensated by a well-thought-out financial strategy.

In the field of marketing and sales, work with customers is carried out mainly in the form of tables, there are no contacts in CRM or it is not fully functional. Grain sales are organized through personal connections or standard tenders without customer base analytics. Digital communication tools, electronic commercial offers, competitor analysis are absent or used unsystematically. That is, we assess the state of digitalization in the field of marketing as low (or fragmented).

The general state of digitalization in terms of functional areas of management activity is presented in Table 3.

Table 3. Status of digitalization by functional areas of management of LLC «Krolevetsky feed mill»

Functional direction	State of digitalization	Justification
Production	Average	Telemetric, GPS, basic equipment control are used. There is no deep analytics of agricultural production.
Logistics	Average	Transport monitoring has been implemented, but logistics chains are not fully optimized.
Human Resources (HRM)	Fragmentary	Payroll and accounting are automated, but there is no HR analytics and staff development.
Financial management	Fragmented / Ineffective	Despite accounting automation (ERP), analytics, planning, cost and risk management do not work properly, which is confirmed by chronic losses.
Marketing, sales	Low	Lack of CRM, electronic client base, digital promotion, trading analytics.

Source: compiled by the author.

Thus, the most developed areas are production and logistics, where telemetric systems, GPS monitoring, and ERP elements have already been implemented. However, these areas lack end-to-end analytics and data integration, which hinders the improvement of management efficiency. Despite the presence of ERP systems, the lack of strategic financial analytics, cost control, and effective planning has led to long-term losses for the company. This indicates not only weak digital maturity, but also management risks that are not neutralized by digital tools.

The HR function is at a fragmented level, as the implementation of only basic HR solutions (payroll, accounting) without tools for developing competencies, motivation, and staff analytics hinders the formation of an adaptive and innovative corporate culture.

The digitalization of marketing and sales is at a low level: the lack of a CRM system, digital channels of interaction with customers, market analytics, and trading platforms indicates significant losses of potential opportunities in promoting products and building an effective sales system.

The overall level of digital maturity of the enterprise is below average. Although some technologies are implemented, there is no coherent digital strategy, and most functions operate in isolation, without a single information platform and system analytics, which reduces the speed of decision-making, transparency of management, and the enterprise's ability to adapt to market conditions.

So, LLC «Krolevetsky feed mill» is at the stage of integrated automation, having implemented a number of digital solutions in production, logistics and accounting (ERP, GPS, EDM). However, the lack of end-to-end analytics, a full-fledged CRM system, a digital HR and financial strategy limits the effectiveness of management decisions. Financial losses for three years, a low level of digital maturity in marketing and personnel management indicate the need for a comprehensive digital transformation. The enterprise needs to form a single digital strategy, develop business analytics, increase the digital literacy of personnel and integrate digital solutions into all functional areas to achieve sustainable efficiency and competitiveness.

The process of digital transformation in the agricultural sector, despite the active implementation of modern technologies, faces a number of limitations that slow down or complicate the development of digitalization of management processes. For an enterprise that carries out a full production and sales cycle, we classify the restraining factors into groups.

1. Technical factors:

1) outdated material and technical base: the enterprise still uses outdated computers, servers, and equipment without telemetric modules, which makes it impossible to effectively connect to digital systems;

2) lack of high-quality Internet coverage in remote production areas, fields or elevators, which limits the use of cloud solutions and online services;

3) low level of compatibility of existing systems (ERP, accounting, GPS monitoring), which operate autonomously and are not fully integrated with each other.

2. Financial factors:

1) limited funding for digital projects due to the loss-making nature of the enterprise, which makes large-scale implementation of software or modernization of equipment impossible;

2) high cost of implementing complex ERP, CRM, WMS solutions, including their maintenance, updates and licensing;

3) lack of financial support from the state or donor programs, which reduces interest in long-term digital investments.

3. Personnel factors:

1) low level of digital literacy of some personnel, in particular in production units and middle management;

2) employee resistance to change, related to fear of losing their job, reduced influence, or lack of confidence in their own skills.

4. Organizational factors:

1) the lack of a single digital strategy that would define the vision of transformation, priorities, and stages of implementing changes;

2) insufficient level of internal coordination between departments, leading to fragmented implementation of digital tools without proper integration;

3) weak project management, when the implementation of new IT solutions is carried out without clear KPIs, timelines, responsible persons, and risk analysis.

5. Cultural factors:

1) conservative corporate culture, focused on traditional management methods, paper-based document management, and manual reporting;

2) lack of innovative motivation, lack of encouragement for initiatives related to digital change;

3) distrust of digital tools, particularly among the older generation of workers who have no experience working with automated systems.

Table 4 summarizes the factors that hinder the development of digitalization of management at LLC «Krolevetsky feed mill».

The development of digitalization of management at LLC «Krolevetsky feed mill» is constrained by a set of interrelated barriers: technical (infrastructural), financial (lack of investment), human resources (low

digital competence), organizational (lack of strategy), and cultural (resistance to change). Overcoming these barriers requires a systemic approach, strategic vision, staff training, involvement of external resources, and consistent digital leadership from management.

We will identify problems in communication, system integration, and the level of digital literacy of staff, as well as identify risk areas when implementing digital solutions.

Table 4. Main restraining factors of digitalization of management of LLC «Krolevetsky feed mill»

Group of factors	Characteristic
Technical	Insufficient modernity of IT infrastructure, weak Internet coverage in rural areas, low compatibility of existing systems and lack of development telemetric.
Financial	Budget constraints, chronic losses of the enterprise, high cost of licensed programs, maintenance and technical support of digital systems.
Personnel	Insufficient level of digital literacy of staff, resistance to change, low level of motivation for learning.
Organizational	Lack of a digital strategy, fragmented implementation of IT solutions, lack of responsible structures or units for digital transformation.
Cultural	Traditionalism of management approaches, focus on paper processes, low innovation culture, distrust of digital tools on the part of staff.

Source: compiled by the author.

1. Communication problems:

1) lack of a single digital communication platform. Employees of different departments (field, technical, administrative) use disparate means of information exchange (Viber, telephone, e-mail), which leads to data loss or distortion;

2) insufficient transparency of information exchange between management levels. There is information isolation between middle and top management, agronomic services and logistics;

3) lack of clear protocols for transferring digital information (for example, photo reports, equipment tracking, weather data), which reduces the quality of management decisions.

2. Problems with digital systems integration:

1) fragmentation of IT infrastructure: various systems (ERP, GPS monitoring, accounting, fuel accounting, warehouse modules) operate autonomously, without real-time data exchange;

2) lack of end-to-end analytics Data is stored in different formats and cannot be centrally processed in BI systems, which makes effective dashboard analytics impossible:

3) difficulties in connecting new modules. Due to the lack of unified technical standards, the enterprise faces compatibility problems between new digital solutions and the existing system.

3. Low level of digital literacy of staff:

1) difficulties in using new technologies among field and technical personnel. Most machine operators, elevator workers and agronomists have a low level of proficiency in digital tools, which leads to resistance to innovation;

2) lack of training programs. The company does not implement systematic training in digital skills, and training initiatives are limited to briefings when launching a new program;

3) uncertainty in roles and responsibilities for IT processes. Often, IT functions are scattered among several employees without clearly defined areas of responsibility.

Risk areas for further implementation of digital solutions at LLC «Krolevetsky feed mill» are summarized in Table 5.

Table 5. Risk areas when implementing digital solutions at LLC «Krolevetsky feed mill»

Risk zone	Possible consequences
Lack of technical support	Digital system failures, data loss, downtime
Staff resistance	Decreased productivity, conflicts, sabotage of innovations
Incorrect systems integration	Double counting, data inconsistencies, reporting errors
Insufficient training	Using only basic digital tool functions
Financial constraints	Incomplete implementation of solutions, refusal of updates
Lack of a digital strategy	Chaotic actions, loss of focus, duplication of projects
Information insecurity	Risks of data leakage, cyberattacks, lack of backups

Source: compiled by the author.

Thus, for a successful digital transformation of an enterprise, it is necessary not only to implement the latest technologies, but also to ensure a single communication platform, integration of digital systems, development of digital literacy of personnel and risk management. Without overcoming barriers, even the most modern digital solutions may remain ineffective or not fully implemented.

In order to ascertain the current state of digital transformation, identify problem areas and assess the perception of digital change among the management team at LLC «Krolevetsky feed mill», a survey was conducted among managers at various levels

Representatives of the following functional areas were involved in the survey: production, logistics, finance, marketing and HRM (a total of 15 people). The survey results are presented in Table. 6.

Table 6. Generalized results of a survey of the management of LLC «Krolevetsky feed mill» on the state of digital transformation and digital changes, 2025

Question	Key responses from managers
Does your department use digital tools?	ERP – yes, CRM – partially, BI – absent
How integrated are the systems between departments?	Weak integration, each department works autonomously
Does the staff have sufficient digital competences?	Basic level, especially in production and warehousing
What problems arose when implementing the technology?	Resistance to change, lack of training, technical failures
What is the biggest obstacle to digitalization?	Lack of budget and clear strategy
Does management support digital change?	Partially, there is no systemic vision
What areas need digitalization first?	Sales, finance, agricultural planning, analytics

Source: own research.

The survey results show that digitalization in the enterprise is implemented unsystematically: there are separate IT solutions, but there is no coordination between departments, as well as a low level of digital skills of personnel. Managers recognize the need for further transformation, but point to significant barriers.

We believe that at the highest level of management (director, his deputies) with the participation of the chief software specialist, computer systems engineer, a unified digital strategy of the enterprise should be developed and approved; KPIs for digital transformation should be determined and a Digital Development Department should be created. Such management processes provide for financial support in the form of an appropriate budget.

At the functional level of management, in particular financial management, it is advisable to implement BI systems for cost, income, and crop profitability analytics, scenario planning and budgeting. In the field of marketing and sales, it is advisable to ensure the implementation of a fully functional CRM system, online trading platforms, digital customer analytics. In the HRM system, launch modules for competency management, training, personnel assessment, mobile access to HR functions. In the field of logistics, create a single logistics data centre; integrate WMS with ERP and GPS. In production management, it is advisable to introduce agricultural planning, accounting for technological maps, and the use of digital weather stations.

At the technical level of digitalization of the management of LLC «Krolevetsky feed mill», it is necessary to modernize the IT infrastructure (servers, computer equipment, Internet networks); integrate all systems into a single digital platform and implement cloud data storage; ensure a reliable level of information security (backup, cyber protection).

At the level of personnel management, it is necessary to create conditions for systematic training of personnel in digital skills, the formation of a digital culture and motivation for innovation; implement programs for adapting to change.

To promote the digital development of the management of LLC «Krolevetsky feed mill», we offer a version of the digital transformation roadmap for the next three years (Table 7).

Table 7. Roadmap for digital transformation of LLC LLC «Krolevetsky feed mill», 2026–2028

Stage	Period	Main tasks	Expected results
1. Preparatory	1st quarter 2026	Digital strategy approval; appointment of a transformation manager; IT infrastructure assessment; digital budget formation	Organizational readiness for transformation
2. Infrastructure formation	2nd–3rd quarters 2026	Updating equipment; improving Internet connectivity at all locations; establishing a single data «cloud»; ensuring data security	Technical basis for digitalization
3. Systems integration	4th quarter 2026 – 1st quarter 2027	Integration of ERP, CRM, WMS, GPS; automation of accounting and document flow; creation of end-to-end analytics	Unified information system
4. HR and financial transformation	2nd–4th quarters 2027	Implementation of HRM modules; launch of BI system; implementation of budgeting systems	Improving the efficiency of personnel and financial management
5. Marketing and sales	1st–2nd quarters 2028	CRM launch; online interaction with traders; marketing analytics	Digital customer experience and sales
6. Personnel development	Entire period	Conducting training; shaping digital culture; motivating innovation	Digital literacy, engagement, adaptation
7. Evaluation and correction	3rd–4th quarters 2028	Audit of achievements; adjustment of digital strategy; planning for the next cycle	Sustainability and efficiency of digital transformation

Source: suggested by the author.

The map provides for the modernization of IT infrastructure, implementation and integration of key digital systems (ERP, CRM, HRM, BI), development of internal analytics and management competencies. A special emphasis is placed on increasing the digital literacy of personnel and eliminating internal barriers to change. The final phase provides for an audit of the results and adaptation of the strategy taking into account new challenges.

The proposed digital transformation roadmap is a phased action plan aimed at comprehensively updating the enterprise's management processes through the implementation of modern digital technologies in 2026–2028. It covers seven main stages: from preparing the organizational and technical base to the full integration of IT solutions and the formation of a digital culture. Thus, the roadmap is a comprehensive tool for achieving the strategic goal of the enterprise's transition to a sustainable, adaptive and analytically driven digital management model.

It is clear that the implementation of the digital transformation roadmap involves adequate financing and expenditure. In the context of systematic losses observed in the activities of LLC «Krolevetsky feed mill» over the past three years, there is an urgent need to conduct a management audit of financial efficiency. Such an audit is an important tool for identifying internal reserves, shortcomings in accounting, analytical and management subsystems, as well as for formulating practical recommendations for improving the financial condition of the enterprise.

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