American University Kyiv

A Capstone Project

ORGANIZATIONAL AND DIGITAL CONDITIONS FOR FARM MANAGEMENT SYSTEM ADOPTION IN UKRAINIAN SMALL AND MEDIUM-SIZED FARMS

ОРГАНІЗАЦІЙНІ ТА ЦИФРОВІ УМОВИ ВПРОВАДЖЕННЯ СИСТЕМ УПРАВЛІННЯ ФЕРМЕРСЬКИМ ГОСПОДАРСТВОМ У МАЛИХ І СЕРЕДНІХ ГОСПОДАРСТВАХ УКРАЇНИ

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ABSTRACT

This capstone project examines the organizational and digital conditions that affect Farm Management System (FMS) adoption in Ukrainian small and medium-sized farms. The central research question is: What organizational and digital conditions affect Farm Management System adoption in Ukrainian small and medium-sized farms? The study is based on a qualitative exploratory research design and uses semi-structured interviews with eight participants: farm owners and heads, agronomists and farm managers, and representatives of agricultural distributors.

The interview data were analyzed by identifying recurring themes in respondents' answers and comparing these themes across different respondent groups. The findings show that FMS adoption is shaped by a combination of organizational and digital conditions. Organizational factors include centralized decision-making, limited process formalization, workload and seasonal pressure, and the presence or absence of an internal implementation driver. Digital factors include fragmented digital tools, weak connection between different digital systems, limited practical use of data, insufficient digital skills, and difficulties with system integration.

The study also shows that the main challenge is not only initial adoption, but the transition from interest or partial implementation to regular use. FMS creates the strongest value when it becomes part of daily routines, data discipline, planning, control, and decision-making. A key conclusion is that readiness for FMS does not always fully exist before implementation. In some cases, readiness can be gradually developed through the implementation process itself.

The practical implications are relevant for farms, FMS providers, distributors, and AgTech consultants. The study recommends gradual implementation, clear first use cases, internal responsibility, post-sale support, and communication focused on concrete managerial value.

Keywords: Farm Management Systems, FMS adoption, digital agriculture, small and medium-sized farms, organizational conditions, digital conditions, Ukraine.

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GLOSSARY

FMS / Farm Management System — a digital system or platform used to manage farm operations, fields, machinery, inputs, records, planning, monitoring, and decision-making.

NDVI / Normalized Difference Vegetation Index — a vegetation index based on satellite or sensor data that helps assess crop condition, vegetation density, and possible problem areas in the field.

Precision agriculture — an agricultural management approach that uses data, GPS, sensors, satellite imagery, telematics, and variable-rate technologies to apply inputs more accurately and efficiently.

Telematics — digital technology that collects and transmits data from machinery or vehicles, such as location, routes, fuel use, speed, working time, and technical performance.

GPS monitoring — the use of GPS-based tracking systems to monitor the location, routes, movement, and activity of agricultural machinery or vehicles.

Land bank — the total area of agricultural land managed, cultivated, leased, or owned by a farm or agricultural enterprise.

Interoperability — the ability of different digital systems or platforms to exchange, connect, and use data together without excessive manual work.

Sowing campaign — the period when a farm prepares fields and plants crops. In Ukraine, spring sowing usually starts around March–April, while autumn sowing may take place later depending on the crop.

Agricultural season — a full production cycle in farming, including planning, sowing, field operations, monitoring, harvesting, and post-season analysis. In Ukraine, it often runs approximately from March–April to October–November, depending on crops and weather conditions.

Technological map — a farm planning document that describes the sequence of field operations, inputs, timing, machinery, labor, and costs required to grow a specific crop.

Agronomist — a specialist responsible for crop production decisions, field monitoring, input recommendations, crop protection, and practical agronomic management.

Cadastre / Land cadastre — an official land information system that contains data about land plots, including location, boundaries, ownership or use rights, and cadastral numbers.

ERP system / Enterprise Resource Planning system — software used to manage core business processes, such as finance, accounting, procurement, inventory, and reporting. In agriculture, ERP may support resource planning and cost control, but it is broader than a specialized Farm Management System.

CHAPTER 1. INTRODUCTION

Digital transformation has become one of the main directions of change in modern agriculture. Farms increasingly use digital tools to support planning, monitoring, resource control, field operations, and decision-making. This process is often discussed through concepts such as Agriculture 4.0, smart farming, precision agriculture, remote sensing, telematics, and data-driven management. These technologies are expected to improve productivity, reduce costs, increase transparency, and help farms make more accurate decisions based on real operational data rather than only on experience or informal communication (Nehrey & Klymenko, 2024; Lazebnyk & Voitenko, 2021; Kushnir et al., 2024).

For Ukraine, agricultural digitalization is especially important because agriculture remains one of the key sectors of the national economy. At the same time, the level of digitalization in the Ukrainian agricultural sector is uneven. Large agricultural holdings usually have more financial, technical, and human resources to implement digital tools. In contrast, small and medium-sized farms often face more limitations, including financial constraints, lack of technical support, weaker digital infrastructure, shortage of qualified staff, and limited time for implementation. As a result, the adoption of digital technologies in agriculture does not happen equally across different types of farms (Akhnovska & Bondarenko, 2025; Kushnir et al., 2024).

Farm Management Systems (FMS) are one of the important types of digital tools used in agricultural management. In general, FMS are digital platforms or software systems that help farms manage fields, land bank, machinery, inputs, operations, records, planning, monitoring, and decision-making. They may include different functions, such as planning of the sowing campaign, monitoring of field operations, agronomic observations, machinery tracking, resource accounting, logistics, task assignment, documentation, and production economics. They are broader management systems that connect data, operations, and decisions (AgroHub, 2020; Kopishynska et al., 2024).

The potential value of FMS is clear. Such systems can help farms improve control over resources, reduce dependence on manual records, store field history, support planning, and create a more complete picture of farm operations. However, the availability of digital tools does not automatically lead to their regular and effective use. A farm may test a platform, attend a demonstration, or use one module of a system, but still fail to integrate FMS into daily management routines. This gap between initial interest and regular use is especially important for small and medium-sized farms, where time, staff, digital skills, and implementation support may be limited.

This study focuses on the organizational and digital conditions that shape FMS adoption in Ukrainian small and medium-sized farms. The term “organizational conditions” refers to internal farm

factors such as decision-making structure, role distribution, process formalization, staff availability, workload, and the presence of a responsible person who can support implementation. The term “digital conditions” refers to data availability, digital skills, technical infrastructure, system integration, interoperability, historical data, and the practical ability to use digital information in decision-making. These two groups of conditions are different, but in real farm practice they often overlap. For example, the absence of a responsible employee is an organizational problem, while the absence of a person who can work with data and digital systems is both an organizational and a digital problem.

The problem addressed in this study is that FMS may be objectively useful, but small and medium-sized farms do not always move from initial interest to regular use. This means that the adoption problem is not only about whether the technology exists or whether the farm can buy it. It is also about whether the farm has the internal structure, people, processes, data discipline, and support needed to make the system work in practice. In this sense, FMS adoption should be understood not only as a technological choice, but also as a managerial and organizational process.

In this study, FMS adoption is understood not only as the initial decision to try or implement a system, but as a broader process that includes initial interest, implementation, regular use, and long-term value creation.

The research question of this study is:

What organizational and digital conditions affect Farm Management System adoption in Ukrainian small and medium-sized farms?

Based on the research question and the literature review, the study is guided by one main hypothesis and three supporting hypotheses:

H0: If small and medium-sized farms develop stronger organizational and digital conditions during or before FMS implementation, they are more likely to move from initial interest to regular and value-creating use of the system.

H1: Farms are more likely to reach regular FMS use when they have an internal implementation driver, clear responsibility, and more formalized management processes.

H2: Fragmented digital tools, weak system integration, limited data use, and insufficient digital skills reduce the likelihood of regular FMS use.

H3: FMS readiness can develop during implementation when the system is introduced through a clear use case, supported by internal responsibility and post-sale support.

Since this study uses a qualitative exploratory design, these hypotheses are not tested statistically. Instead, they are assessed through thematic coding, cross-case comparison, and interpretation of interview findings.

The aim of the study is to examine how organizational and digital conditions influence the adoption and regular use of FMS in Ukrainian small and medium-sized farms. More specifically, the study identifies key barriers and enabling conditions, compares perceptions across farm owners, operational users, and distributor representatives, and explores whether readiness for FMS should be understood only as a precondition or also as something that can develop during implementation.

The study has both academic and practical relevance. Academically, it contributes to the discussion of digital technology adoption in agriculture by focusing specifically on FMS and the internal conditions of small and medium-sized farms. Practically, the findings may help farms, FMS providers, distributors, and AgTech consultants improve implementation planning, onboarding, communication, and post-sale support.

The study uses a qualitative exploratory design based on semi-structured interviews with eight respondents. The analysis applies thematic coding and cross-case comparison to identify recurring organizational and digital conditions, differences between respondent groups, and the transition from initial interest to regular FMS use.

Overall, this study argues that FMS adoption in Ukrainian small and medium-sized farms should be understood as a gradual organizational and digital transformation process. FMS can create value when it becomes part of everyday management, supports data discipline, improves control, and helps farms make better decisions over time. At the same time, the findings suggest that readiness for FMS does not always fully exist before implementation. In some cases, readiness may be gradually created through the implementation process itself, as farms clarify roles, formalize routines, improve data practices, and move toward more structured management.

CHAPTER 2. LITERATURE REVIEW

2.1 Digital transformation in agriculture

Digital transformation has become a central trend in modern agriculture. The agricultural sector is increasingly moving away from fragmented, experience-based, and paper-based management toward data-driven approaches that support planning, monitoring, forecasting, and operational control. In academic and applied sources, this transition is commonly described through such concepts as Agriculture 4.0, smart farming, and precision agriculture. These concepts emphasize the use of sensors, satellite imagery, telematics, digital platforms, artificial intelligence, and other information technologies to improve productivity, efficiency, and sustainability in agricultural production (Nehrey & Klymenko, 2024; Lazebnyk & Voitenko, 2021; Kushnir et al., 2024).

For Ukraine, digital transformation in agriculture is especially important, as agriculture remains a key sector of the national economy. At the same time, digitalization in the Ukrainian agricultural sector is uneven. Large agricultural holdings tend to invest more actively in digital technologies and integrated management solutions, while small and medium-sized farms more often face financial, infrastructural, and organizational constraints. As a result, digital development in the sector remains asymmetric, and the gap between larger and smaller producers remains significant (Akhnovska & Bondarenko, 2025; Kushnir et al., 2024).

Importantly, the literature does not reduce digital transformation merely to the purchase of new technologies. It is also understood as an organizational and strategic process that requires changes in managerial routines, communication practices, staff roles, and interactions with clients and partners. In other words, digital transformation in agriculture involves not only technologies themselves, but also the internal capacity of enterprises to integrate digital tools into everyday decision-making and operational processes (Kushnir et al., 2024).

This broader perspective is significant for the present study, as Farm Management Systems are not merely technical products. Their practical value is determined by the extent to which farms can integrate these systems into existing processes and convert digital information into routine managerial actions.

2.2 Farm Management Systems in agricultural management

Within the broader process of agricultural digitalization, Farm Management Systems (FMS) are among the most important categories of digital tools. In general terms, FMS are intended to integrate different areas of farm activity into a single management environment through a single interface. They

may include land bank management, planning of the sowing campaign and the agricultural season, monitoring of field operations, agronomic observations, resource accounting, logistics, task assignment, documentation, and production economics. Therefore, FMS should be understood not as isolated applications, but as integrated management systems that combine data, operations, and decisions (AgroHub, 2020; Kopishynska et al., 2024).

The development of FMS reflects changes in the structure of agricultural production itself. Early solutions often grew out of accounting and ERP-type systems, especially in large enterprises that required stronger control over land, machinery, staff, and resources. Over time, cloud-based and modular solutions made FMS more accessible for smaller producers as well. This expanded the range of users who could benefit from digital tools for monitoring, planning, and analysis. However, the needs of small and medium-sized farms still differ from those of large agribusinesses. For smaller farms, the most valuable functions often include field visibility, crop observation, and simplified planning, whereas large enterprises place greater emphasis on financial control, inventory accounting, and resource efficiency (AgroHub, 2020).

Therefore, Farm Management Systems should be regarded not only as digital products but also as managerial infrastructure. Their value becomes evident when they facilitate regular planning, control, data recording, and decision-making over time.

2.3 Organizational conditions of Farm Management System adoption

The adoption of digital technologies in agriculture depends not only on the characteristics of the technologies themselves, but also on the internal organizational conditions of farms. Contemporary literature shows that adoption decisions are shaped by managerial structure, the allocation of responsibility, staff competencies, openness to change, internal routines, and the extent to which an organization already uses data systematically (Addorisio et al., 2025; Vakulenko et al., 2023).

One useful line of explanation comes from technology acceptance research. Hrynevych et al. (2022), using the Technology Acceptance Model, show that the intention to adopt agricultural technologies depends on perceived usefulness and perceived ease of use. This means that even when a technology has objective value, adoption may remain weak if potential users do not clearly see that value or consider the system too difficult for practical use. For farms operating under strong seasonal pressure and limited managerial time, such perceptions may significantly influence adoption behavior.

A more detailed view of adoption barriers is offered by Addorisio et al. (2025), who identify obstacles such as low trust in innovations, cultural resistance, limited awareness of benefits, insufficient availability of extension services, lack of technical expertise, limited investment capacity, and

insufficient technical support. These findings are especially important for the present study because they show that adoption problems are deeply embedded in the farm's organizational environment. In other words, the issue is not only whether the technology is available, but whether the farm has the organizational conditions necessary to absorb it.

This is particularly important for small and medium-sized farms, where decision-making is often highly centralized around the owner or a small number of key individuals. In such settings, a system may be purchased or tested, but regular use may fail to emerge if there is no clearly identified person responsible for implementation, data entry, interpretation, and follow-up support. Likewise, if internal processes remain informal and weakly documented, the potential benefits of a management system may remain invisible or underused.

Therefore, the literature suggests that FMS adoption should be understood as an organizational process rather than only a technological choice. A farm needs a certain degree of internal structure, clarity of roles, and willingness to redesign routines if digital tools are to become genuinely useful.

2.4 Digital conditions of Farm Management System adoption

In addition to organizational conditions, the adoption of FMS depends on the digital conditions in which an agricultural enterprise operates. These include digital infrastructure, the availability and quality of data, exchange and interoperability between systems, the team's digital skills, and the ability not only to collect data but also to use it meaningfully. In many cases, the key problem is not a complete absence of data but an inability to integrate and connect information from different sources (Addorisio et al., 2025; Vakulenko et al., 2023).

One recurring theme in the literature is fragmentation. Digital agriculture often develops through separate tools rather than through one coherent system. A farm may use one platform for satellite imagery, another for machinery monitoring, another for agronomic observations, and additional tools for accounting or planning. When these instruments do not interact with each other, the complexity of use increases. This may discourage the adoption of more integrated systems, especially when farms lack the skills or support needed to combine multiple data streams into a single decision-making process (AGRISTATIS, 2025; Addorisio et al., 2025).

This point is supported by both Ukrainian and international sources. Vakulenko et al. (2023) note that agricultural enterprises often lack unified digital platforms, while data exchange between systems remains incompatible. Addorisio et al. (2025) similarly show that stakeholders emphasize not so much data collection itself as the complexity of data management and processing. This suggests that digital adoption depends not only on technical access but also on interoperability and usability of data.

Another important factor is the gap in digital maturity between large agricultural holdings and smaller farms. Kushnir et al. (2024) identify several barriers that particularly affect smaller producers, including insufficient financing, high borrowing costs, difficulties in calculating ROI, and labor shortages. Linde et al. (2024) also emphasize that small and medium-sized farms face low technological readiness, limited awareness, weak infrastructure, and insufficient adaptation of many solutions to their actual conditions. This is directly relevant to FMS adoption because it shows that smaller farms often operate in digital environments that are not yet ready to support integrated management systems on a regular basis.

Consequently, digital conditions must be considered integral to the adoption challenge. The adoption of Farm Management Systems is hindered when farms operate in fragmented digital environments, lack confidence in data management, or do not receive adequate technical support for routine system use.

2.5 Adoption barriers in small and medium-sized farms

Small and medium-sized farms provide an especially important context for studying FMS adoption because they often need stronger management systems while simultaneously facing greater implementation barriers than large enterprises. Existing studies suggest that such farms are usually constrained by low investment capacity, weaker access to advisory services, lack of technical support, insufficient team competencies, and shorter strategic planning horizons (Addorisio et al., 2025; Linde et al., 2024).

One of the most relevant barriers to the present study is the gap between the time horizons of FMS value creation and managerial evaluation within farms. Farm Management Systems often generate value gradually through better planning, stronger control, improved traceability, more consistent record-keeping, and cumulative improvement in decision quality. However, many farms, especially small and medium-sized ones, assess new tools within much shorter timeframes, such as one season or one sowing campaign. If the value does not become visible immediately, the technology may be perceived as too complicated, too expensive, or not sufficiently necessary. This problem becomes even stronger when a farm lacks reliable internal data and therefore cannot easily measure delayed or indirect benefits (Kushnir et al., 2024; Hrynevych et al., 2022).

Another challenge is that many digital solutions are not sufficiently adapted to the realities of small and medium-sized farms. Linde et al. (2024) emphasize that smaller farms face high capital requirements, infrastructural gaps, limited access to training, and weak localization of solutions. Similarly, practical sources from Ukraine show that there is often a weak understanding of

implementation algorithms and a shortage of qualified people who are able to support or operate digital systems properly (Linde et al., 2024; Derkach et al., 2021).

These findings suggest that low adoption among smaller farms should not be interpreted simply as conservatism or resistance to innovation. Rather, it reflects a combination of financial constraints, organizational weakness, inadequate support environments, and a mismatch between the design of digital systems and the practical realities of smaller agricultural businesses.

2.6 The role of data, integration, and decision-making in FMS adoption

The literature increasingly shows that the real value of digital systems in agriculture depends not only on collecting information, but on whether that information is transformed into routinized managerial action. This is especially important for Farm Management Systems, as their value lies precisely in integrating dispersed data into a coherent decision-making structure. When farms collect information but do not use it regularly in planning, control, or coordination, the practical value of digital systems remains limited (Shebanina et al., 2023; Addorisio et al., 2025).

A particularly useful observation here comes from Addorisio et al. (2025): in their study, stakeholders did not consider data collection to be the main problem. Instead, they emphasized difficulties in data management and the ability to process information effectively. This is important because it suggests that barriers to digital adoption often arise after access to technology has already been achieved. In other words, the transition from initial use to effective and regular use may be more difficult than the initial decision to try the technology.

This observation is also important for the conceptual direction of the present study. A significant part of the literature treats readiness as something that should exist before technology implementation. However, the reviewed sources suggest another possibility: readiness may be partially formed through staged implementation itself. If a farm introduces a system gradually, receives support, and uses it in manageable ways, it may over time develop stronger routines, clearer responsibilities, and more structured decision-making. In this sense, adoption may not only depend on readiness but also help produce it (Addorisio et al., 2025; Linde et al., 2024).

2.7 Research gap

The reviewed literature creates a strong basis for understanding the digital transformation of agriculture, smart farming, and the adoption of digital tools. Existing studies explain many important elements of the adoption process, including perceived usefulness, technical complexity, cost-related and support-related barriers, and the role of stakeholder interactions. Practical and market-oriented sources

also describe the functions of FMS and show that the actual use of such systems is often partial, fragmented, and dependent on issues of platform interoperability (Hrynevych et al., 2022; Addorisio et al., 2025; AGRISTATIS, 2025).

At the same time, several important gaps remain. First, a large part of the available literature broadly addresses digital agriculture, precision agriculture, or technology adoption in general, rather than Farm Management Systems specifically. Second, Ukrainian literature often describes digital transformation at the macro or sectoral level, but provides less detailed analysis of the internal organizational and digital conditions that shape FMS adoption in small and medium-sized farms. Third, practical materials describe available systems and their functionality, but do not fully explain why some farms move from initial interest to regular use, while others do not (Kushnir et al., 2024; Nehrey & Klymenko, 2024; Lazebnyk & Voitenko, 2021).

In addition, the literature still leaves open an important conceptual question: should readiness be treated only as a precondition for adoption, or can readiness also be gradually formed through implementation itself? This question is especially relevant in the context of small and medium-sized farms, where full readiness may hardly exist in advance, yet digital systems can still trigger gradual improvements in routines, planning, coordination, and managerial discipline.

This gap is not only theoretical, but also practical, because FMS providers and distributors need to understand not only why farms become interested in systems, but why they do or do not move to regular use.

For this reason, there is a clear need to examine the organizational and digital conditions of Farm Management System adoption in Ukrainian small and medium-sized farms. Such a study can contribute to both academic understanding of digital adoption in agriculture and to practical decisions on segmentation, positioning, support, and implementation strategies in the AgTech sector.

CHAPTER 3. RESEARCH METHODOLOGY

3.1 Research aim

The aim of this study is to examine the organizational and digital (technical) conditions that shape the adoption of Farm Management Systems (FMS) on Ukrainian small and medium-sized farms. The study seeks to explain why potentially useful digital management tools do not always develop into regular and systematic use in farm practice, despite their expected value for planning, monitoring, traceability, and operational control.

The study also has a practical orientation. In addition to its academic contribution, it is intended to generate insights relevant to customer segmentation, product positioning, implementation support, and communication strategies in the AgTech sector. In this sense, the study addresses not only the broader problem of digital transformation in agriculture, but also a practical business issue: understanding what prevents farms from moving from initial interest in FMS to their regular use in everyday managerial and operational processes.

More specifically, the research focuses on three interrelated analytical tasks. First, it identifies the main organizational and digital barriers and enabling conditions affecting FMS implementation in small and medium-sized farms. Second, it compares how these barriers are perceived from different positions within the agricultural ecosystem, including strategic managers, operational users, and external market actors. Third, the study examines whether FMS adoption should be understood only as a consequence of existing readiness, or also as a process through which farms gradually develop stronger routines, clearer responsibility, and more structured decision-making.

3.2 Methodological approach

This study employs a qualitative exploratory research design. Such an approach is appropriate because the research focuses on perceptions, decision-making logic, implementation barriers, and real managerial practices that cannot be adequately captured through quantitative indicators alone. The implementation of Farm Management Systems is not only a technical or economic issue; it is also connected to internal routines, managerial priorities, employee competencies, and how farms interpret the practical value of digital tools. Accordingly, a qualitative design enables understanding of the logic of adoption decisions and exploration of how different market participants explain the same process from their own perspectives.

Semi-structured interviews were selected as the primary method of data collection. This method combines comparability across interviews with flexibility during the conversation itself. A shared

interview guide ensured that all respondents addressed the same key themes, while follow-up questions allowed them to explore specific examples, experiences, and explanations in greater depth. This was especially important because the respondents represented different roles and therefore approached the issue of FMS implementation differently.

The semi-structured format was also appropriate because the study aimed to understand not only what respondents think about digital tools, but also how they describe real implementation processes, what barriers they face, what value they expect from such systems, and why regular use often does or does not emerge in practice.

3.3 Sample description

The study uses purposive sampling and includes respondents selected for their direct relevance to the research question. The sample consists of eight participants divided into three groups: three heads or owners of small and medium-sized farms, three agronomists and farm managers responsible for operational processes, and two representatives of agricultural distributors who communicate directly with farms regarding digital tools and technological solutions.

The sample structure was designed to capture three connected perspectives on FMS adoption. Farm owners and heads represent strategic decision-making, investment logic, and managerial control. Agronomists and farm managers represent operational use, field-level routines, workload, and practical data use. Distributor representatives provide an external market-facing perspective on recurring objections, onboarding problems, and the transition from first interest to regular use.

The sample is not statistically representative and is not intended for broad quantitative generalization. Instead, it was formed to generate insights into the organizational and digital conditions that shape FMS adoption in Ukrainian small and medium-sized farms.

For the purposes of this study, the terms small and medium-sized farms are used as practical market categories rather than strict legal classifications. The study focuses on farms that do not have the full managerial and digital infrastructure typical of large agricultural holdings, but are large enough to face growing needs for systematized planning, control, data use, and operational coordination. Exact farm sizes are not disclosed in order to protect respondent confidentiality.

Table 3.1. Respondent Coding Scheme

Respondent code	Respondent group	Role / perspective	Farm or market segment
R1	Farm decision-maker	Farm owner / head	Small or medium-sized farm
R2	Operational user	Agronomist / farm manager	Medium-sized farm
R3	Farm decision-maker	Farm director / head	Small or medium-sized farm
R4	Farm decision-maker	Farm owner / head	Young or growth-oriented farm
R5	Operational user	Agronomist / farm manager	Small or medium-sized farm
R6	Operational / implementation actor	Digitalization or implementation manager	Farm using or implementing digital tools
R7	External market actor	Distributor representative	Agricultural distributor working with farms
R8	External market actor	Distributor representative	Distributor working with medium-sized and growing farms

3.4 Interview procedure

Data were collected through semi-structured interviews guided by an open-ended interview guide. The guide covered such topics as how management decisions are usually made in the farm, what digital tools are already in use, whether any technologies had recently been implemented, what specific problem those tools were expected to solve, how farm data are used in managerial and operational decisions, what barriers affect the adoption of digital tools and Farm Management Systems, how economic considerations influence such decisions, and what role is played by distributors, consultants, or suppliers in the process. An additional reflective question prompted respondents to identify an issue they believed should also have been included in the interview.

The structure of the interviews ensured comparability across cases while still allowing flexibility for clarifying questions and deeper exploration of examples that respondents considered important. Such flexibility was especially necessary because respondents represented different roles and therefore interpreted the same problem from strategic, operational, and intermediary positions.

The interviews were conducted individually. Their duration varied depending on the depth of the responses and the respondent's practical experience, but all interviews were sufficiently detailed to support further thematic analysis. Since the study focused on adoption conditions rather than formal system performance metrics, the main emphasis was on narratives, examples, and lived experiences rather than on standardized scales or quantitative measurements.

3.5 Data analysis

The collected interviews were analyzed through thematic coding and cross-case comparison. At the first stage, the interview notes were reviewed in full to identify recurring themes, typical concerns, and patterns related to FMS adoption. Particular attention was paid to how respondents described the decision-making process, data-use practices, organizational routines, perceptions of value, implementation barriers, and the role of external actors in the adoption process.

At the second stage, the material was grouped into broader analytical themes reflecting the organizational and digital conditions that shape adoption. These themes included, among others, managerial centralization, clarity of roles, team competence, short- and long-term value perceptions, fragmented digital environments, problems with data integration, insufficient support, implementation complexity, and the gap between initial interest and regular use of the system.

At the third stage, cross-case comparison was used to identify similarities and differences across the three respondent groups. This made it possible to compare how farm owners, agronomists, and distributor representatives described the same adoption process from different positions. Such comparison is especially important for this study because adoption is not experienced in the same way by strategic decision-makers, operational executors, and market intermediaries. Therefore, the analysis focused not only on explicit barriers but also on hidden tensions, mismatches in expectations, and differences in how usefulness and readiness are interpreted across cases.

The analytical purpose of this process was not to test the hypotheses statistically, but to assess the main hypothesis and supporting hypotheses qualitatively through thematic coding, cross-case comparison, and evidence-based interpretation of respondents’ accounts.

3.6 Ethical considerations and limitations

Participation in the interviews was voluntary. Respondents were informed about the academic purpose of the study, and the information they provided was used exclusively for research purposes. To protect confidentiality, respondents were anonymized in the analytical chapters and, where necessary, are referred to through role-based descriptions or coded identifiers. No personal names, company names, or commercially sensitive details are disclosed in the final analysis.

Ethical caution was especially important because some respondents discussed managerial difficulties, digital weaknesses, implementation failures, and communication problems that could be sensitive from both business and reputational perspectives. For this reason, anonymization was used not only as a formal ethical measure, but also as a practical condition for obtaining more open and reflective responses.

The study has several methodological limitations. It is based on a small purposive sample and does not aim at statistical generalization. The findings rely on self-reported interview data and should be interpreted as qualitative, context-specific insights. The inclusion of distributor representatives adds a useful external perspective, but also means that part of the analysis reflects market observations rather than only internal farm experience.

CHAPTER 4. FINDINGS AND DISCUSSION

4.1 Analytical positioning and thematic structure

This chapter presents the qualitative findings from semi-structured interviews with farm owners and heads, agronomists and farm managers, and agricultural distributor representatives. The analysis focuses on the organizational and digital conditions that shape FMS adoption and regular use in Ukrainian small and medium-sized farms.

The chapter distinguishes between initial implementation and regular use. In the interviews, these stages did not fully coincide: some farms tested or partially used digital tools without embedding them into daily management routines. Therefore, the analysis focuses not only on first contact with FMS, but also on the transition from interest to regular and value-creating use.

The analysis treats organizational and digital conditions as analytically distinct but practically interconnected. Organizational conditions include decision-making structure, role distribution, process formalization, workload, and internal responsibility. Digital conditions include data availability, system integration, interoperability, usability, historical records, and digital skills.

To organize and compare the interview material, a codebook was developed. The interview notes were reread to identify recurring themes, strong evaluative statements, and practical implementation situations. Similar statements were then grouped into broader analytical codes. For example, references to the absence of a responsible person, weak follow-up after launch, and the need for someone to “carry” the implementation process were grouped under the code of internal implementation driver. References to Excel, messengers, disconnected platforms, and manual data transfer were grouped under fragmented digital environment.

At the final stage, the codes were organized into five core dimensions: organizational conditions, digital conditions, adoption logic and value perception, transition from implementation to regular use, and external actors and tensions. This thematic structure became the basis for the cross-case analysis, comparison between respondent groups, and integrative interpretation presented in the following sections. The full codebook is provided in Appendix B.

4.2 Cross-case analysis of the main conditions affecting FMS adoption

The cross-case analysis of the interviews shows that the adoption of Farm Management Systems in small and medium-sized farms in Ukraine is not determined by one single factor. Rather, it is shaped by a combination of organizational conditions, digital constraints, the logic of economic feasibility, and

the farm's ability to move from initial interest to regular use of the system. In respondents' accounts, FMS appears not simply as a software product, but as an instrument that changes the way a farm is managed, requires a new discipline of data, and increases demands on the internal structure of the enterprise.

The first major group of conditions consists of organizational conditions of implementation. In most cases, decisions about new digital tools remain centralized: even if an agronomist, manager, or another person within the farm initiates interest in FMS, the final decision is still made by the owner or director. This centralization is not inherently negative, but it slows implementation when the manager does not see direct value or is not ready to change the existing logic of management. In one interview, this was stated very directly: the problem lies not only in the technology, but in the fact that digitalization means "restructuring processes and responsibility within the farm" (R1, farm owner). Another important organizational factor is the presence of an internal implementation driver. Respondents repeatedly emphasized that the system does not begin to function on its own: there must be someone responsible for launching it, maintaining it, training others, and carrying the process through to actual results. Without such a person, FMS risks remaining "on the shelf" or turning into yet another unfinished tool.

The second major group of conditions consists of digital conditions of implementation. Across all respondent groups, one recurring theme is that the digital environment of most farms is fragmented. Instead of one integrated system, farms use a combination of Excel, messengers, satellite services, GPS monitoring, technical platforms, and separate accounting tools. This is why one of the strongest recurring themes in the interviews is the absence of an "ideal universal platform." Respondents describe what seems to be a normal market reality: one system solves agronomic tasks better, another offers stronger machinery control, and a third is more suitable for selected managerial or accounting functions. However, this multi-platform reality creates a new type of complexity: data often have to be transferred manually, duplicated, or consolidated from different sources, which increases workload and the risk of error. One respondent described this very precisely by saying that "systems often do not integrate with each other, and data have to be transferred manually or duplicated" (R2, agronomist), while another explicitly stated that the farm does not search for one platform, but rather "building a working ecosystem from several tools" (R6, implementation manager). Thus, the digital barrier is not only lack of access to technology, but also the difficulty of building a connected digital environment.

A separate layer of digital conditions concerns data and their practical usefulness. In most cases, the problem is not the complete absence of data, but the fact that they are not brought together, not accumulated over enough seasons, or not transformed into systematic managerial decisions. Respondents mentioned NDVI, yield data, field maps, fuel, machinery routes, and the history of applications, but

stressed that in reality data often function only as a signal rather than as the basis for full-scale management. This creates an important distinction: looking at data is not yet the same as managing in a data-driven way. One respondent noted that “many already look at data, but far fewer actually use them in decisions” (R7, distributor representative), while another emphasized that the main problem is that data exist, but are “not brought together” (R3, farm director). Several respondents also pointed out that deeper value requires several seasons of historical data, and leaving a system often means losing already accumulated field history. This makes data not only an analytical resource, but also a factor tying farms to the current platform.

The next key theme concerns the logic of value and usefulness of FMS. Across all three respondent groups, the usefulness of the system is not described through abstract “innovation,” but through concrete managerial and economic outcomes. Most often, FMS is associated with better control of resources, more transparent field operations, reduction of the human factor, faster identification of problems, and the creation of a “unified picture” for the manager. Especially frequent are references to control of fuel, machinery routes, timing of operations, and the possibility of reducing dependence on verbal reporting or the memory of individual employees. One owner expressed this very directly by saying that what the farm needs is not “beauty,” but “control and less human factor” (R3, farm director). At the same time, for most respondents this value must be translated into business logic: lower costs, higher profitability, fewer losses, and faster reaction to problems. This is why the interviews repeatedly show that without a clear benefit, the system “hangs,” is postponed, or is not treated seriously.

A particularly important issue is the tension between short-term and long-term evaluation logic. For many farms, the decision to adopt digital tools is assessed through one sowing campaign, one season, or a quickly visible result. If the value of the system does not become apparent almost immediately, interest in it declines sharply. At the same time, respondents who already use FMS more systematically describe a different logic: the real strength of the system appears gradually, through accumulation of field history, routes, applications, seasonal observations, and the ability to compare decisions across years. This means that FMS creates value cumulatively, but farms often enter the process with a short evaluation horizon. Here emerges one of the central tensions of the entire study: the system requires time to produce its full effect, but many decisions about its future are made too early.

Another strong theme is the gap between initial adoption and regular use. The interviews show that the most problematic phase lies between a demo, a test period, or the technical connection of the system and its actual everyday use. Some farms have already tried FMS, partially use it, or work only with selected modules, but do not reach full routinized use. The reasons are repeated across cases: lack of time, lack of a responsible person, insufficient integration, overly broad functionality, duplication with

other tools, and the perception that part of the system becomes just another layer of reporting. One agronomist described this particularly accurately by saying that “systems look like a solution, but in practice add another layer of work” (R2, agronomist). Thus, the main challenge is not only entering the system, but keeping it in use long enough for it to begin to affect the quality of managerial decisions.

Another strong theme is the role of external actors in implementation. Almost all respondents agreed that distributors, consultants, company representatives, and peers in the market play a major role in the initial introduction to FMS. Through them, farms first see digital solutions, hear about other cases, receive demos, or gain access to testing. However, almost as frequently, respondents criticized weak post-sale support. Several interviews stressed that external actors often present the product well and open the door to trying it, but do not always support the phase of actual implementation. As a result, after the start farms are left alone with questions of integration, training, data entry, and discipline of use. One owner described this in the most direct way possible: “without support, the system dies” (R1, farm owner). This makes the quality of post-implementation support not a secondary service, but part of the conditions for successful adoption itself.

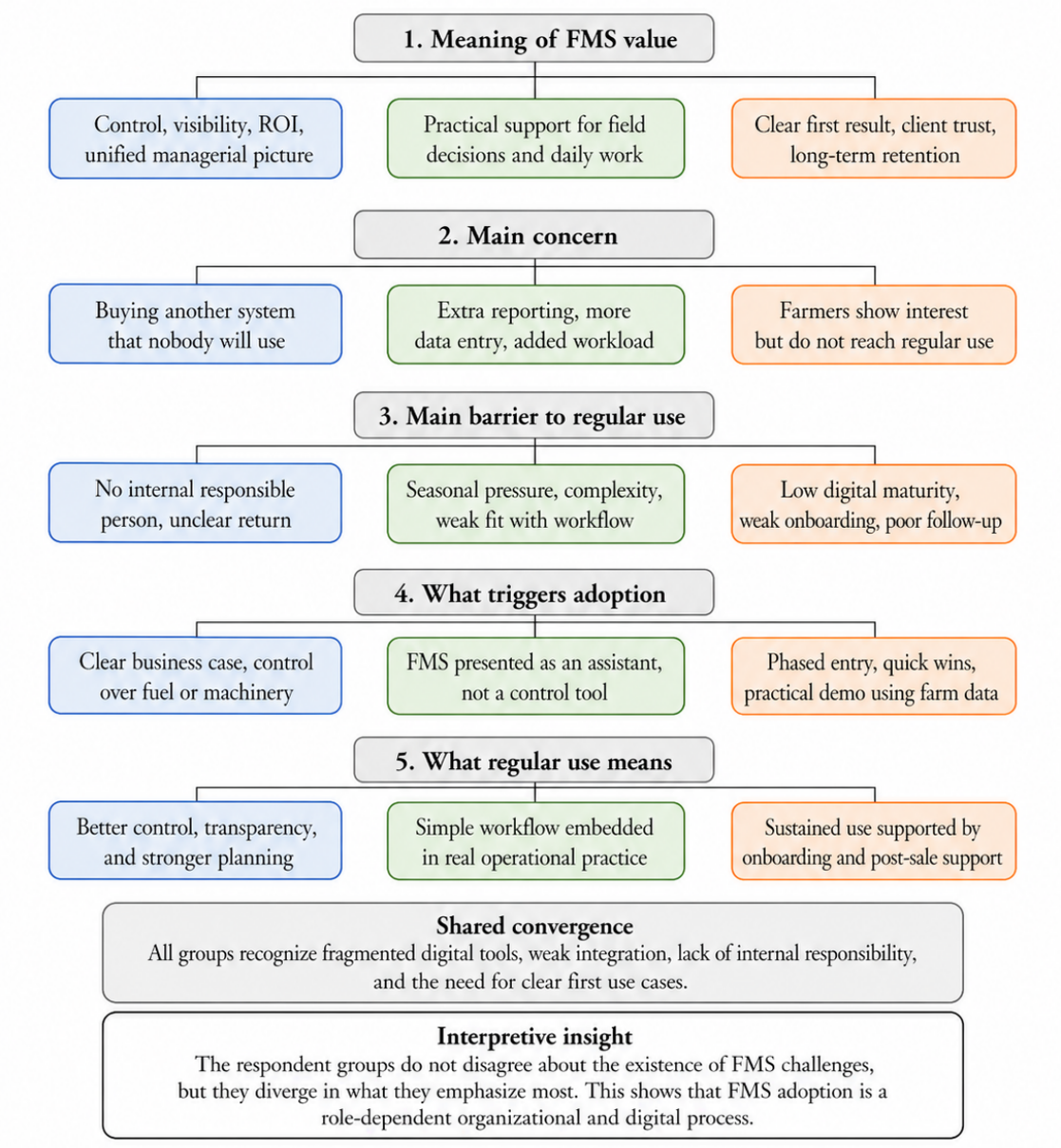
Overall, the cross-case analysis shows that the main conditions of FMS adoption cannot be reduced either to money alone or to technology alone. They emerge from the interaction of the farm’s organizational structure, its level of digital maturity, the presence of an internal implementation driver, the ability to perceive the long-term value of the system, and the quality of support after initial connection. In this sense, FMS in the studied cases acts not simply as software for agronomy or machinery control, but as an instrument that confronts the farm with questions about its internal structure, data discipline, manageability of processes, and readiness to move from a manual mode to more system-based management.

4.3 Differences in perceptions across respondent groups

A comparison of the three respondent groups — farm owners and heads, agronomists and farm managers, and distributor representatives — shows that they all describe the same FMS implementation process but view it from different practical perspectives. Across all groups, recurring themes include control, data fragmentation, staffing shortages, integration complexity, and the importance of economic feasibility. At the same time, their emphases differ: for managers, the dominant logic is control and return on investment; for agronomists, it is workload, practicality, and the relationship between the system and real fieldwork; and for distributors, it is the entry point into the system, customer objections, and the difficulty of moving from initial interest to actual use. These differences make it possible to better

understand why the same FMS may simultaneously be perceived as a useful tool, an additional burden, and unrealized potential.

To illustrate how the respondent groups diverge in their understanding of FMS adoption, Figure 4.1 presents a response divergence map across the three stakeholder groups.



Note. Blue = farm owners / heads; Green = agronomists / farm managers; Orange = distributors / provider representatives.

Figure 4.1 Response Divergence Map Across Respondent Groups. Source: Developed by the author.

For farm owners and directors, FMS most often appears as a tool of managerial control. Their responses emphasize transparency, reduction of the human factor, cost control, machinery discipline, timeliness of operations, and the ability to see the farm as a whole rather than as separate fragments. This

group evaluates FMS mainly through practical and economic questions: whether the system improves control, identifies problems faster, preserves organizational memory, and justifies investment. At the same time, owners also recognize that implementation requires changes in processes and responsibilities. Their main concern is that without a visible effect or an internal person capable of carrying implementation forward, FMS may become another costly and unused tool.

For agronomists and farm managers, FMS is perceived more ambiguously. They recognize that digital tools can support monitoring, record operations, and identify problem areas, but they also describe the system as a possible source of additional reporting, workload, and control. This concern is especially strong during the agricultural season, when time pressure is high. Agronomists also emphasize that FMS cannot replace field experience, direct observation, and professional judgment. Therefore, their skepticism should not be interpreted as rejection of digital tools, but as evidence that FMS must be positioned as support for agronomic expertise rather than as a replacement or control mechanism.

For distributor representatives, FMS appears primarily as a market and communication process. Their responses focus on the initiation of interest, typical objections, social proof, the first use case, and the difficulty of moving from demo or trial access to regular use. They emphasized that farmers rarely adopt FMS because it is “the future”; adoption is usually triggered by a concrete problem, such as fuel disorder, weak control, growing farm scale, or examples from similar farms. For this group, successful implementation depends on phased entry, clear early value, internal responsibility inside the farm, and consistent support after the first contact.

The comparison shows that FMS performs different functions for different actors. For owners, it is a tool of visibility, control, and economic feasibility. For agronomists, it is a potentially useful but burdensome tool that must fit field reality. For distributors, it is a solution that requires the right framing, onboarding, and support. These differences do not contradict the broader findings; rather, they show that FMS adoption is simultaneously managerial, operational, behavioral, and market-driven.

4.4 Tensions, blind spots, and limiting factors of FMS implementation

The interviews reveal several tensions that affect whether FMS moves from initial interest to regular use. The first tension is the gap between promised simplification and actual additional workload. At the presentation stage, FMS is often shown as a tool that reduces chaos and automates control. In practice, however, it may initially create more work: data entry, record checking, training, updating information, and maintaining discipline of use. This is especially difficult for agronomists and operational staff during the agricultural season. If this transition period is not explained and supported, users may perceive FMS as additional bureaucracy rather than as a tool for future efficiency.

The second tension concerns the relationship between field intuition and system logic. Agronomists may recognize the usefulness of digital tools, but they also emphasize that no system can fully replace field observation and professional judgment. Digital data, including NDVI, satellite maps, telematics, or field history, can highlight a problem, but it cannot always explain its cause without a person in the field. Therefore, FMS should be presented as a digital extension of agronomic expertise, not as a replacement for it.

The third tension is partial implementation. The presence of FMS in a farm does not mean that the system has become part of management. In many cases, farms use only selected modules, such as machinery monitoring, satellite data, fuel control, field maps, or separate reports. Formally, implementation has happened, but the system has not yet changed daily routines, planning, reporting, or decision-making. This creates a gap between access to the platform and regular use.

The fourth tension is integration. When farms use several platforms that do not exchange data automatically, manual transfer, duplication, and errors increase. In this situation, FMS, which should reduce fragmentation, may become another element of the fragmented digital environment. This is especially important for small and medium-sized farms, which often lack the resources for complex technical integration.

The fifth tension is premature evaluation of results. FMS creates much of its value gradually through accumulated field history, application records, machinery routes, yield data, and comparisons across seasons. However, farms often evaluate the system after one campaign or the first months of use. If benefits are not immediately visible, the system may be judged too early, before it has had time to show its full value.

Overall, these tensions show that the problem is not only the presence or absence of technology. Even a useful system may fail to take root if it increases workload without visible benefits, is perceived as control rather than support, does not integrate with other tools, lacks an internal driver, or receives insufficient support after launch.

4.5 Integrative interpretation of the findings

The integrative interpretation of the findings makes it possible to move from separate themes to a broader model of FMS implementation in Ukrainian small and medium-sized farms.

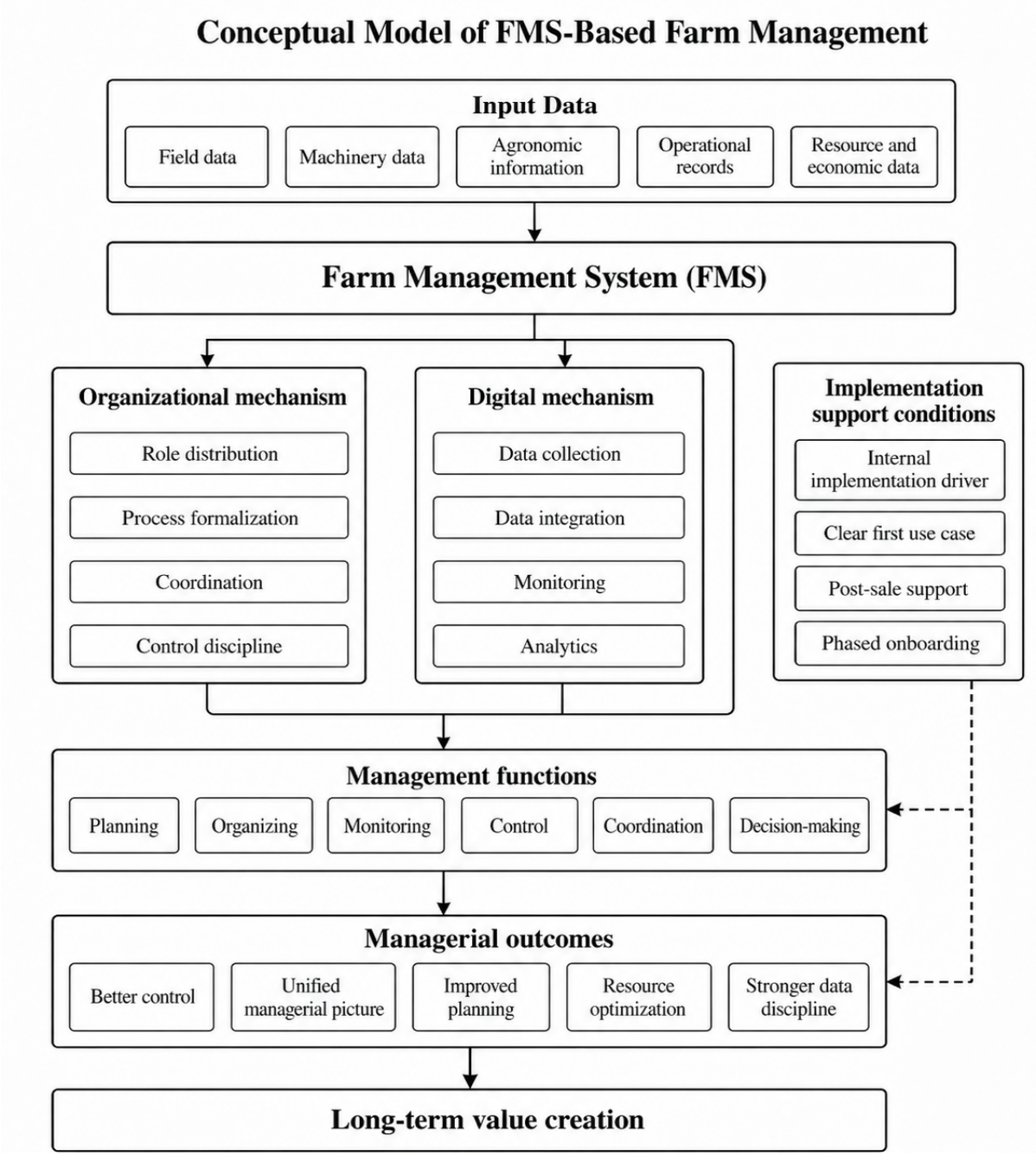


Figure 4.2 Conceptual Model of FMS-Based Farm Management. Source: Developed by the author.

At the center of this model is the understanding that FMS adoption is not a one-time decision and does not end with purchase, testing, or technical connection. Instead, it is a step-by-step process in which the farm moves through several transitions: from initial interest to decision, from decision to implementation, from implementation to regular use, and finally to long-term value creation.

Therefore, FMS adoption should be understood as a staged process. It starts with initial interest, moves to the decision to implement the system, continues through the practical implementation stage,

and reaches its full value only when the system becomes part of regular use and begins to generate long-term managerial benefits.

Each transition has its own risks and conditions. At the stage of initial interest, the key factors are a clear pain point, examples from other farms, trust in the source of information, and the first understanding of value. At the decision stage, the owner or director, economic feasibility, resource allocation, and a concrete reason for change become important. At the implementation stage, the decisive factors are an internal driver, training, process adaptation, data discipline, and technical integration. At the regular use stage, the system has to survive seasonal workload, user fatigue, partial use of functions, and the need for continuous support. Only after this can FMS begin to create long-term value through accumulated history, better planning, resource control, and higher-quality managerial decisions.

The first integrative conclusion is that FMS adoption is more of an organizational and managerial process than a purely technological one (R1, farm owner; R6, implementation manager). In the studied cases, the problem is not only whether the farm has access to software. A more important question is whether the farm can support the system with its own structure: assign a responsible person, change routines, formalize data, explain the value to the team, and keep the process active after launch. Therefore, even a high-quality system does not guarantee results if it enters an environment without internal responsibility and discipline of use.

The second conclusion is that digitalization in small and medium-sized farms often already exists, but remains fragmented (R1, farm owner; R2, agronomist; R8, distributor representative). Most farms do not start from zero. They already use some tools, such as Excel, GPS monitoring, satellite maps, messengers, machinery platforms, or accounting software. The problem is not the complete absence of digital tools. The problem is that these tools do not always form one management logic. Data exist, but they are scattered. Systems exist, but they are not always integrated. Information is collected, but it is not always transformed into decisions. Therefore, for this segment, FMS adoption often means not simply adding another program, but gradually building a more connected digital ecosystem.

The third conclusion concerns the value of FMS. For respondents, the system is valuable not because it is modern or innovative by itself, but because it can provide better control, reduce the human factor, optimize resources, increase process transparency, and create a unified managerial picture. All these benefits eventually need to be translated into clear economic language: fewer losses, lower costs, better profitability, faster response to problems, and more efficient use of machinery, fertilizers, seeds, and crop protection products. This means that for the small and medium-sized farm segment, successful FMS positioning should not start with abstract digitalization, but with concrete managerial value.

The fourth conclusion is that regular use is a more difficult and more important indicator than initial implementation (R2, agronomist; R7, distributor representative). A farm may become interested in the system, attend a presentation, receive a demo, pass a trial period, or even connect to the platform, but this does not mean that FMS has become part of real management. True adoption begins when the system enters repeated processes: planning, control, data entry, analysis, reporting, and decision-making. It is at this stage that the main barriers usually appear: lack of time, absence of a responsible person, weak integration, overload of functions, user skepticism, and insufficient support.

The fifth and central conclusion is that readiness for FMS is not always a precondition; it can partly develop during implementation (R4, farm owner; R6, implementation manager). In the studied cases, farms do not always enter the process fully prepared. They may lack an ideal structure, digital skills, integrated data, or clearly formalized processes. However, the implementation of the system itself often creates a new demand for these things: it becomes necessary to assign responsibility, collect data, clarify roles, discipline record-keeping, train people, and revise the logic of control. In this way, FMS not only requires organizational readiness but can also become a mechanism for gradually developing it.

This conclusion is especially important for small and medium-sized farms. If full readiness is required before the start, many potential users may never begin implementation. A more realistic approach is a staged entry model, where the farm starts with a limited but understandable use case, receives support, gradually builds data discipline, and only later expands functionality. In this logic, FMS becomes not only a tool for already “ready” farms, but also a way to move gradually toward more mature management.

The sixth conclusion is connected with the role of the internal implementation driver. Across all respondent groups, one idea appears directly or indirectly: the system needs a person who “holds” it (R1, farm owner; R6, implementation manager; R8, distributor representative). This may be the owner, an agronomist, an implementation manager, a digital specialist, or another responsible person. This role is not only about technical setup. The person has to support the discipline of use, explain the value, help other employees, control data quality, and prevent the system from stopping after the first difficulties. Without such an internal driver, FMS can easily become formally connected but practically inactive.

The seventh conclusion concerns farm scale. Although this sample does not allow strong typologies by farm size, the interviews show an important tendency: as farm scale grows, manual management gradually becomes less effective. When the number of fields, machines, operations, people, and parallel decisions increases, the need for systematization becomes stronger. This is why FMS is especially important for farms that have already outgrown intuitive manual control but do not yet have

the complex management infrastructure of a large agricultural holding. In this intermediate segment, the system may create the greatest practical value.

The eighth conclusion concerns external support and the entry scenario. The findings show that for small and medium-sized farms, it is especially important not to overload the beginning of implementation with too many functions. A more productive logic is gradual implementation: FMS should enter the farm through one or several pain points that the farmer already understands. These may include fuel control, machinery monitoring, field history, yield maps, or planning of applications. If the first use case brings a clear result, the farm has a better chance of moving to broader use. If the system looks too complex from the beginning, it may be postponed before it shows its real value.

Overall, the integrative interpretation shows that FMS in Ukrainian small and medium-sized farms should be understood as an organizational and digital tool for management transformation. Its implementation depends not only on price, functionality, or technical availability. It also depends on whether the farm has an internal driver, whether the system can be embedded into real processes, whether the team can work with data, whether there is support after launch, and whether management is ready to see value not only in the short term but also in the long term.

This integrative interpretation also provides the basis for assessing the study's hypotheses in Chapter 5. The findings suggest that the transition from initial interest to regular and value-creating FMS use depends on the interaction of organizational and digital conditions. Some of these conditions may exist before implementation, while others may develop during the implementation process itself. This is why the hypotheses are assessed not as statistically measurable relationships, but as qualitative propositions supported or limited by recurring patterns in the interview data.

To synthesize the main mindset patterns identified across the interviews, Figure 4.3 presents a mindset map of FMS adoption.

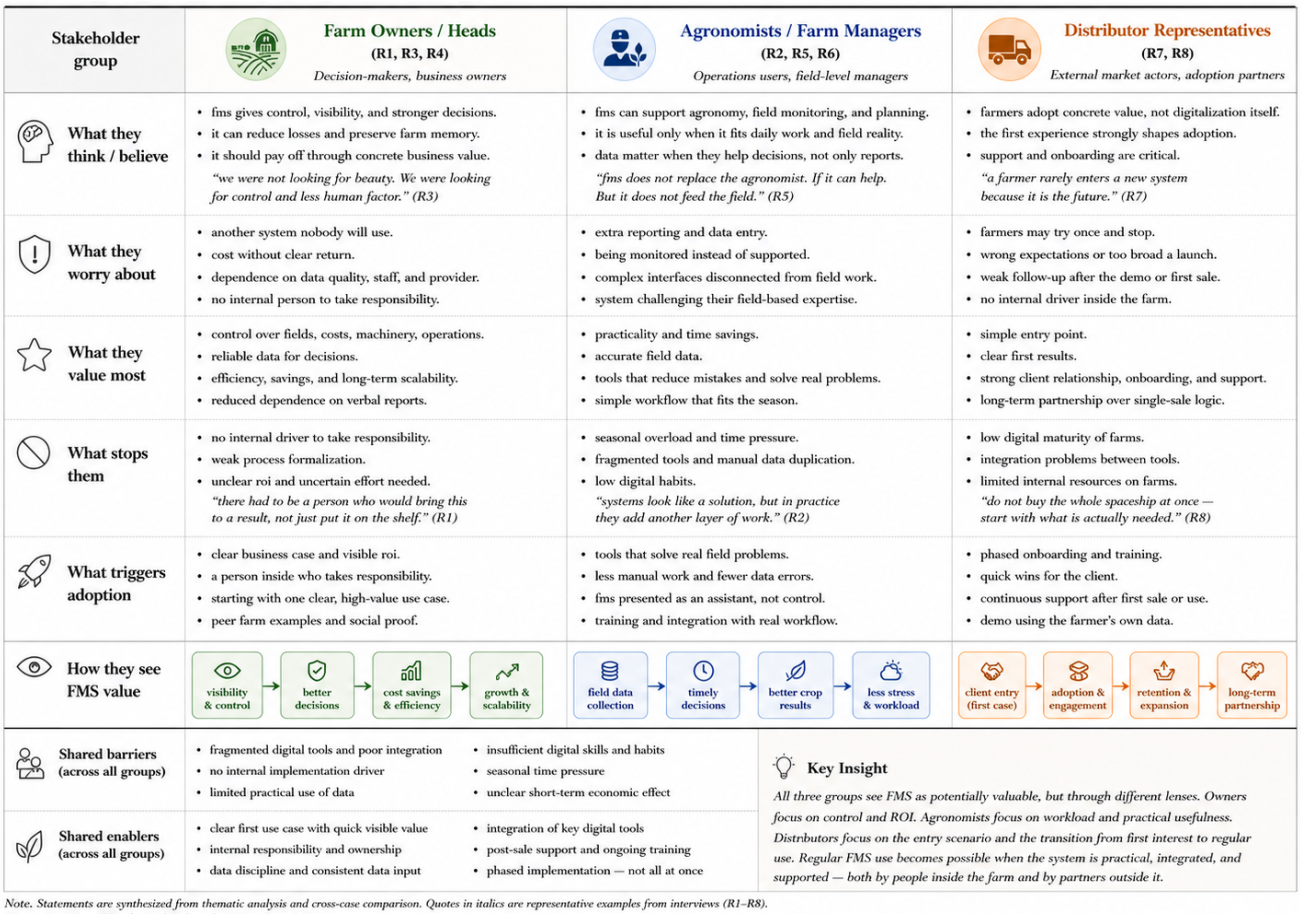


Figure 4.3 Mindset Map of FMS Adoption. Source: Developed by author.

Thus, the uneven adoption of FMS in the studied segment cannot be explained simply as a "digitalization gap." It is better explained by the different abilities of farms to complete the full path from interest to regular use. Where the system remains a separate product, it quickly loses power. Where it becomes part of the management logic, it gradually creates new processes, new data discipline, and a new quality of decisions. This is the main finding of the analysis: FMS not only requires farm readiness, but can also be one of the tools through which this readiness is gradually created.

CHAPTER 5. RECOMMENDATIONS AND CONCLUSIONS

5.1 From findings to practical recommendations

The findings of this study show that Farm Management System adoption in Ukrainian small and medium-sized farms cannot be explained only by the availability of technology or by the general willingness of farmers to digitalize their businesses. The adoption process is shaped by a combination of organizational and digital conditions. These include the structure of decision-making, the presence of an internal implementation driver, the level of process formalization, the availability and practical usefulness of data, the ability to integrate different systems, and the capacity of the farm team to use digital tools regularly.

For this reason, the practical recommendations in this chapter are based on one central idea: FMS adoption should be treated not as a one-time software purchase, but as a gradual organizational and digital change process. A farm may become interested in a system, attend a demonstration, or even connect a platform, but this does not mean that the system has become part of regular management. The real value of FMS appears only when the system enters daily routines, supports planning and control, accumulates useful historical data, and helps the farm make better decisions over time.

The findings also show that readiness for FMS should not be understood only as a precondition that must fully exist before implementation. In many small and medium-sized farms, full readiness may not exist at the beginning. Farms may lack formalized processes, data discipline, digital skills, or clear role distribution. However, FMS implementation can itself create demand for these elements. When a farm starts using the system, it often needs to assign a responsible person, clarify internal processes, improve data recording, and introduce new management routines. Therefore, FMS can be not only a tool for already mature farms, but also a mechanism through which managerial maturity is gradually developed.

This is especially important for the practical value of the study. The results may be useful not only for farms themselves, but also for FMS providers, agricultural distributors, AgTech companies, and implementation consultants. These actors need to understand that farmers do not adopt systems only because they are modern or technologically advanced. They adopt them when they see concrete managerial or economic value: better control, lower losses, more transparent operations, better planning, and less dependence on fragmented communication or the memory of individual employees.

Thus, the recommendations in this chapter are organized around three practical levels. First, recommendations are offered for small and medium-sized farms that are considering FMS

implementation or already use such systems partially. Second, recommendations are provided for FMS providers, distributors, and consultants who support adoption in the market. The final section summarizes the main conclusions of the study and suggests directions for future research.

5.2 Recommendations for small and medium-sized farms

For small and medium-sized farms, the main practical task is to connect FMS implementation with a specific operational problem from the beginning. First, farms should begin FMS implementation with a clearly defined operational problem. The system should not be introduced in an abstract way, such as “we need digitalization.” A more effective approach is to start with one or several specific pain points. These may include fuel control, machinery monitoring, field history, records of fertilizer or crop protection product application, yield maps, land bank control, or planning of field operations. When the first use case is clear, the farm team can better understand why the system is needed and what practical value it can create. This also reduces the risk that FMS will be perceived as an additional administrative burden without visible benefit.

Second, farms should appoint an internal implementation driver. This is one of the most important conditions identified in the study. FMS does not work by itself. Someone inside the farm must be responsible for the system: launching it, maintaining data discipline, helping other employees, communicating with the provider, and making sure that the system does not stop after the first difficulties. This person may be the owner, director, agronomist, farm manager, digitalization manager, or another employee with enough authority and motivation. Without such a person, even a technically strong system may remain underused.

Third, farms should implement FMS gradually and avoid overloading the team at the beginning. For small and medium-sized farms, a full launch of all modules may create unnecessary complexity. A staged approach is more realistic: the farm may start with one function that directly addresses a current problem and then add other modules after the team becomes familiar with the system. Whenever possible, the first setup, data preparation, and training should also be planned outside the most intensive periods of the agricultural season. If the system is introduced during the peak of sowing, spraying, or harvesting, employees may not have enough time or attention to learn new routines. A gradual and well-timed implementation helps reduce resistance and allows the farm to build internal capacity step by step.

Fourth, farms should treat data discipline, integration, and realistic time expectations as part of the implementation process. The value of FMS increases when data are collected regularly and consistently over several seasons. Field history, application records, yield results, machinery routes, and operational records become more useful when they can be compared across years. Therefore, the farm

should not evaluate the system only by the first months of use. Some benefits may appear quickly, such as better fuel or machinery control, while deeper benefits, such as better planning, more accurate agronomic decisions, and movement toward precision agriculture, require time and continuity. Farms should also check integration before choosing a system: what data can be imported, what data can be exported, whether the system connects with machinery platforms, whether historical data can be preserved, and how much manual work will be required. Accumulated records also help preserve organizational memory when key employees leave the farm.

Fifth, farms should clearly explain to agronomists and operational staff that FMS is not designed to replace their expertise. This is especially important because agronomists may perceive the system as additional control, reporting, or a challenge to their professional judgment. Inside the farm, the system should be positioned as a tool that supports agronomic expertise, not as a substitute for it. Digital data can highlight problems, store history, and help compare decisions, but they still require interpretation by people who understand the field. This message can reduce professional skepticism and help employees see FMS as an assistant rather than a threat.

In summary, small and medium-sized farms should approach FMS adoption as a gradual and managed process. The system should start from a real operational need, have an internal responsible person, be introduced step by step, and be supported by data discipline, integration logic, and realistic expectations. This approach increases the chance that FMS will not remain a separate digital product, but will become part of everyday farm management.

5.3 Recommendations for FMS providers, distributors, and implementation consultants

The second group of recommendations is addressed to FMS providers, agricultural distributors, AgTech companies, and implementation consultants. The findings of this study show that these actors play an important role in introducing farms to digital solutions, explaining their value, and supporting the transition from initial interest to regular use. However, the study also shows that the market often focuses too much on product presentation and not enough on the real implementation journey inside the farm.

First, FMS providers and distributors should communicate concrete managerial value rather than abstract digitalization. Many farmers are not motivated by the idea of technology for its own sake. They are more likely to respond to specific problems: uncontrolled fuel use, weak machinery visibility, lack of field history, scattered records, poor coordination, or difficulty understanding what is happening across the farm. Therefore, communication should start with the farm’s pain point, not with the full list of platform functions.

Second, providers should adapt communication to different groups inside the farm. Owners and directors are usually interested in control, return on investment, transparency, cost reduction, and risk management. Agronomists and farm managers are more concerned with workload, practicality, field reality, and whether the system will help or complicate their work. Distributors and external consultants focus on entry scenarios, objections, social proof, and support. If the same message is used for all groups, adoption may slow down because each group sees the system through a different practical perspective. Relevant examples from farms of similar size can also reduce uncertainty and strengthen trust.

Third, providers should design onboarding as a staged process. A common mistake is to present FMS as a large platform with many modules and complex functionality. For small and medium-sized farms, this may create fear that implementation will be too difficult. A better approach is to help the farm select one or two starting use cases and show value quickly. During onboarding, providers should also help define an internal implementation driver: who inside the farm will be responsible for the system, who will enter or control data, who will communicate with the provider, and who will explain the system to other employees. If there is no answer to these questions, the probability of regular use decreases.

Fourth, post-sale support, integration, and data migration should be treated as part of the product, not as optional services. The findings show that farms often need the most help after the demo or purchase, when they start adapting the system to real processes. At this stage, they need support with setup, data entry, team training, role distribution, integration, and first use cases. Providers should clearly explain what can be imported, what can be connected, what cannot be integrated, and what manual work will still be needed. Honest communication about integration is better than promising a universal solution that the system cannot actually provide. Without strong follow-up support, FMS may remain formally connected but practically inactive.

Fifth, providers should address agronomist skepticism directly and explain the time logic of value creation. FMS should not be presented as a tool of control over agronomists or as a replacement for their expertise. Its value is different: the system generates, structures, and stores additional information that helps users see problems faster, compare decisions, reduce the risk of missed signals, and support professional judgment. Providers should also explain that some benefits can appear quickly, while others require data accumulation over several seasons. For example, machinery monitoring and fuel control may produce visible value faster, while historical analysis, yield comparison, precision agriculture, and deeper planning require longer use. This helps prevent early disappointment and unrealistic expectations.

Finally, companies that consult or support FMS implementation should treat adoption as a customer segmentation issue. Not every farm is at the same stage. Some farms are only becoming familiar with digital tools; others have tested several systems; some already use partial functionality; and some

need help moving from partial use to regular use. Providers and consultants should segment farms not only by size or land bank, but also by digital maturity, internal capacity, current tools, presence of an implementation driver, and openness to process change. This approach can improve sales, onboarding, support, and long-term retention.

These recommendations are especially relevant for companies that sell, implement, or consult on FMS solutions. The practical value of this study is that it helps such companies understand not only what farmers say during the first conversation, but also what conditions determine whether the system will survive inside the farm after the first contact. Therefore, FMS providers and distributors should focus not only on convincing farms to try the system, but also on helping them move toward regular and sustainable use.

5.4 Conclusions and suggestions for future research

This capstone project examined the organizational and digital conditions that affect Farm Management System adoption in Ukrainian small and medium-sized farms. The central research question was: *What organizational and digital conditions affect Farm Management System adoption in Ukrainian small and medium-sized farms?* To answer this question, the study used a qualitative exploratory design based on semi-structured interviews with farm owners and heads, agronomists and farm managers, and distributor representatives.

The study found that FMS adoption is shaped by a combination of organizational and digital conditions. Organizational conditions include centralized decision-making, the presence or absence of an internal implementation driver, workload and seasonal pressure, limited process formalization, and the need to redesign farm routines. Digital conditions include fragmented tools, limited interoperability, weak practical usability of data, lack of accumulated historical data, and insufficient digital skills. These conditions do not operate separately. In practice, they overlap and influence each other. For example, the absence of a responsible person is an organizational problem, while the absence of a person who can work with data and digital systems is both an organizational and a digital problem.

The study also found that the main challenge is not only initial adoption, but the transition to regular use. Farms may show interest in FMS, attend demonstrations, test platforms, or use selected modules, but still fail to integrate the system into daily management. This means that FMS adoption should be understood as a staged process: from initial interest to decision, from decision to implementation, from implementation to regular use, and from regular use to long-term value creation. The system creates its strongest value when it becomes part of repeated routines, data discipline, planning, control, and decision-making.

A key conclusion of the study is that readiness for FMS does not always exist before implementation. In many cases, readiness is formed during implementation itself. When a farm starts using FMS, it may be forced to clarify roles, assign responsible people, improve data recording, formalize processes, and develop new management routines. Therefore, FMS can be both a tool that requires readiness and a mechanism that helps build readiness over time. The findings also show that different actors understand FMS adoption differently. Owners and directors usually focus on control, visibility, economic usefulness, and return on investment. Agronomists and farm managers pay more attention to workload, practicality, field reality, and the risk that the system will become additional reporting. Distributors and external actors focus on the entry scenario, objections, social proof, and the difficulty of moving from first interest to real use. These differences are important because successful adoption requires communication and support that reflect the specific needs and concerns of each group. The practical conclusion is that FMS implementation should be gradual, supported, and connected to a specific farm problem. Farms should not try to implement all functions at once. Providers should not sell FMS only as a modern technology. Both sides should focus on concrete value, internal responsibility, phased onboarding, data discipline, and long-term support. This is especially important in the Ukrainian context, where many small and medium-sized farms already use some digital tools but still face fragmentation, limited integration, and uneven digital maturity.

The findings make it possible to assess the main hypothesis and three supporting hypotheses that guided this study. Since the research design is qualitative and exploratory, the hypotheses were not tested statistically. Instead, they were assessed through thematic coding, cross-case comparison, and interpretation of interview findings. Table 5.1 summarizes the assessment.

Table 5.1. Hypothesis Assessment Summary

Hypothesis	**Assessment**	**Key evidence**
H0: If small and medium-sized farms develop stronger organizational and digital conditions during or before FMS implementation, they are more likely to move from initial interest to regular and value-creating use of the system.	Generally supported	Farms with internal driver, clearer roles, and data discipline showed stronger movement toward regular use. Conditions can develop during implementation, not only before.

H1: Farms are more likely to reach regular FMS use when they have an internal implementation driver, clear responsibility, and more formalized management processes.	Generally supported	Absence of responsible person was the most frequently cited barrier across all respondent groups. Systems remained inactive without internal ownership.
H2: Fragmented digital tools, weak system integration, limited data use, and insufficient digital skills reduce the likelihood of regular FMS use.	Generally supported	Farms described scattered tools, manual data transfer, and data that exist but are not used in decisions. Integration problems appeared across all cases.
H3: FMS readiness can develop during implementation when the system is introduced through a clear use case, supported by internal responsibility and post-sale support.	Supported as a qualitative finding	Several respondents described readiness forming through implementation itself. Phased entry and post-sale support were identified as critical enabling conditions.

H0 is supported by the overall pattern of findings. Across the interviews, farms were more likely to move from initial interest to regular and value-creating FMS use when organizational and digital conditions were stronger or gradually developed during implementation. The most important organizational conditions included internal responsibility, clearer role distribution, and more formalized routines. The most important digital conditions included data discipline, system integration, practical use of data, and sufficient digital skills. Critically, the findings also show that these conditions do not always need to exist fully before implementation begins. In several cases, farms that started with weaker conditions were able to gradually develop stronger routines, clearer responsibilities, and better data practices through the implementation process itself. This finding is important because it suggests that FMS adoption is not only a consequence of prior readiness, but can also be a driver of readiness development.

H1 is supported by the findings. The interviews consistently showed that farms with an internal implementation driver — a person responsible for launching, maintaining, and developing the system — were more likely to reach regular FMS use. Without such internal ownership, systems tended to remain formally connected but practically inactive. This pattern was especially visible in cases where

respondents described FMS as something that "needs a person to carry it" (R1, R6). The findings also show that clearer role distribution and more formalized management processes create a more stable environment for the system to function. When processes are informal and responsibilities are unclear, the system loses traction after the initial launch phase and requires repeated external push to stay active.

H2 is supported by the findings. Respondents across all three groups repeatedly described fragmented digital tools, weak integration between systems, limited practical use of data, and insufficient digital skills as barriers to regular FMS use. A particularly important finding is that the problem is not always the absence of data. In most cases, farms already have some data — NDVI readings, yield records, machinery routes, fuel reports — but these data are scattered across different tools, poorly integrated, or not transformed into regular managerial decisions. As one respondent noted, "the data exist, but they are not brought together" (R3). This pattern of data fragmentation without data-driven management represents a core digital barrier that reduces the practical value of FMS and limits the likelihood of regular use.

H3 is supported and represents one of the main analytical contributions of the study. The interviews suggest that FMS readiness does not always fully exist before implementation begins. In several cases, farms with weaker initial conditions — limited process formalization, unclear role distribution, fragmented digital tools — were able to gradually develop stronger routines and data practices through the implementation process itself. This was especially visible when farms started with a single clear use case, had a responsible person internally, and received consistent post-sale support from the provider or distributor. The finding challenges the assumption that full organizational and digital readiness must precede adoption. Instead, it suggests that staged, supported implementation can itself be a mechanism through which readiness is built. For small and medium-sized farms, where full readiness may rarely exist in advance, this has important practical implications: the entry point matters more than the starting level of readiness.

Overall, the assessment of the four hypotheses confirms the main argument of the study: FMS adoption in small and medium-sized farms is not only a technological decision. It depends on whether the farm can develop — before or during implementation — the organizational and digital conditions needed for regular use. These conditions include internal responsibility, process formalization, data discipline, system integration, practical data use, digital skills, and implementation support. The strongest value of FMS appears when the system becomes part of everyday management rather than remaining a separate digital tool.

The study has several limitations. The sample is small and purposive, so the findings are not statistically representative of all Ukrainian farms. The study is based on self-reported interview data,

which may reflect personal interpretations and selective emphasis. The inclusion of distributor representatives adds a valuable market perspective, but it also means that part of the analysis reflects external observations rather than only internal farm experience. Finally, the study is context-specific and should be interpreted within the Ukrainian agricultural environment.

Future research could develop this topic in several directions. First, a larger sample could be used to compare farms by size, region, crop specialization, and level of digital maturity. Second, quantitative research could test how strongly different organizational and digital factors influence FMS adoption across a broader group of farms. Third, future studies could focus specifically on post-adoption use and follow farms over several seasons to understand how regular use develops over time. Fourth, comparative research could examine differences between small farms, medium-sized farms, and large agricultural holdings. Finally, future studies could analyze how FMS adoption influences financial performance, resource efficiency, and the adoption of precision agriculture technologies.

In conclusion, Farm Management System adoption in Ukrainian small and medium-sized farms should be understood not as a simple technological choice, but as an organizational and digital transformation process. FMS creates value when it helps farms move from fragmented tools and informal routines toward more structured, data-supported, and scalable management. The organizational and digital conditions that most strongly affect FMS adoption in the studied farms are internal responsibility, process formalization, data discipline, system integration, digital skills, perceived economic value, and implementation support. The main finding of this study is that FMS not only depends on farm readiness, but can also help gradually create this readiness through staged implementation, internal responsibility, and regular use.

APPENDIX A. INTERVIEW QUESTIONS

The following semi-structured interview questions were used to guide interviews with farm owners and heads, agronomists and farm managers, and agricultural distributor representatives. The questions were adapted during the interviews depending on the respondent's role, practical experience, and level of familiarity with Farm Management Systems.

1. How are management decisions usually made in your farm or in the farms you work with?

Possible follow-up probes:

- Who usually initiates decisions about new digital tools?
- Who makes the final decision?
- Are responsibilities clearly assigned during implementation?

2. What digital tools, platforms, or systems are currently used for farm management, field monitoring, machinery control, or data collection?

Possible follow-up probes:

- Are these tools connected with each other or used separately?
- Which tools are used regularly, and which are used only occasionally?

3. Have any new digital tools or Farm Management Systems been implemented or tested recently? If yes, what problem were they expected to solve?

Possible follow-up probes:

- Was the system fully implemented, partially implemented, or only tested?
- What was the first practical use case?
- Who was responsible for implementation inside the farm?

4. How are farm data used in managerial or operational decisions, such as planning, field operations, crop monitoring, input use, or machinery control?

Possible follow-up probes:

- Are data used mainly for observation, reporting, or real decision-making?
- Can you give an example of a decision that was changed because of digital data?

5. What are the main organizational barriers to implementing Farm Management Systems in small and medium-sized farms?

Possible follow-up probes:

- Is there a person responsible for implementation and regular use?
- Do unclear roles or informal processes make implementation more difficult?

- Does seasonal workload affect the ability to use the system?

6. What are the main digital or technical barriers to implementing Farm Management Systems?

Possible follow-up probes:

- Do systems integrate with each other, or is data transfer mostly manual?

- Are digital skills sufficient inside the farm?

- Is the system easy enough for daily use?

7. How do economic considerations influence the decision to adopt or reject Farm Management Systems?

Possible follow-up probes:

- What kind of value should the system show to be considered useful?

- Is the decision evaluated through one season, one campaign, or a longer period?

8. What role do distributors, consultants, suppliers, or external partners play in introducing or supporting Farm Management Systems?

Possible follow-up probes:

- Do external actors mostly introduce the system, provide demos, or support implementation?

- Is post-sale support sufficient after the first contact or trial?

- What kind of onboarding helps farms move from interest to regular use?

9. In your opinion, what additional issue is important for understanding why farms adopt or do not adopt Farm Management Systems?

APPENDIX B. THE CODEBOOK

Table B.1. Codebook for qualitative analysis of FMS adoption conditions

Core Dimension	Analytical Code	Operational Definition
Organizational conditions	Centralized decision-making	Final decisions regarding the adoption or use of FMS are concentrated in the owner, director, or a narrow circle of key actors.
	Limited process formalization	Farm processes are partly structured but not formalized enough to support stable system-based management.
	Internal implementation driver	The presence or absence of a specific person responsible for launching, maintaining, and developing the system after the initial setup.
	Workload and seasonal pressure	Employees, especially agronomists and operational staff, perceive work with FMS as an additional burden during the season.
	Process redesign through implementation	The implementation of FMS requires or stimulates changes in routines, responsibilities, and managerial logic within the farm.
Digital conditions	Fragmented digital environment	Data and operations are distributed across several programs, spreadsheets, messengers, and disconnected tools.
	Absence of a universal platform	Respondents directly indicate that no single FMS covers all agronomic, technical, and economic needs.
	Integration problems	Systems exchange data poorly; migration, synchronization, or connection between tools requires additional work or cost.
	Low practical usability of data	Data exist, but they are not consolidated into one picture and are not transformed into quick and consistent decisions.

Core Dimension	Analytical Code	Operational Definition
	Digital skill deficit	Farms lack people with sufficient skills to work with systems and data.
Adoption logic and value perception	Control as a core value	FMS is perceived as a tool for better control over resources, field operations, timing, fuel, and execution.
	Economic usefulness	The decision to adopt depends on visible value in reducing costs, optimizing resources, improving productivity, or reducing losses.
	Unified managerial picture	FMS is valued for its ability to give the manager a holistic view of the farm instead of fragmented information.
	Short-term evaluation logic	Farms often evaluate technologies through one season, one sowing campaign, or a quickly visible result.
	Long-term value creation	FMS creates value gradually through accumulated data, better planning, continuity, and higher-quality future decisions.
From adoption to regular use	Initial interest without full implementation	Farms attend demos, test systems, or express interest, but do not move to stable use.
	Partial implementation	Farms use only selected modules, functions, or areas of the system.
	Gap between access and regular use	Having access to the system does not mean that it is embedded in daily managerial routines.
	Dependence on accumulated data history	Farms are reluctant to change systems because valuable field history and records have already been accumulated in the current platform.

Core Dimension	Analytical Code	Operational Definition
External actors and tensions	Distributors as initiators	Distributors, suppliers, consultants, colleagues, and industry events play an important role in the first introduction to digital solutions.
	Weak post-sale support	External actors often explain or sell the system well, but do not provide enough support during actual implementation and regular use.
	Agronomist skepticism	Agronomists may perceive FMS as additional reporting, a challenge to established approaches, or an indirect sign of doubt in their expertise.
	Field intuition versus system logic	Respondents contrast practical agronomic judgment with digital recommendations, visualizations, or system logic.
	Readiness formed during implementation	Some organizational weaknesses are not only barriers before adoption but are gradually addressed during actual system implementation.

APPENDIX C. ANALYTICAL EVIDENCE TABLE

Table C.1. Analytical Evidence Table

Analytical theme / code	Supporting evidence from interviews	Respondent code	Used in section
Centralized decision-making	Final decisions about FMS adoption are usually made by the owner or director, even when the initiative comes from an agronomist or manager.	R1, R3	4.3, 4.4
Limited process formalization	Farm processes may exist in practice, but they are not always formalized enough to support stable system-based management.	R1, R3	4.3
Process redesign through implementation	Digitalization was described not only as connecting software, but as restructuring processes and responsibilities inside the farm.	R1	4.3, 4.5
Internal implementation driver	Respondents emphasized that the system needs a specific person who will be responsible for launching, maintaining, and developing it.	R1, R6, R8	4.3, 4.5
Lack of responsible person	The absence of a responsible person was described as one of the reasons why a system may remain unused after the initial setup.	R1, R2	4.3, 4.5
Fragmented digital environment	Farms often use a combination of Excel, messengers, satellite tools, GPS monitoring, machinery platforms, and accounting software instead of one integrated system.	R1, R2, R7, R8	4.3, 4.5
Absence of a universal platform	Respondents noted that no single FMS fully covers all agronomic, technical, economic, and operational needs.	R2, R4, R6	4.3, 4.4
Integration problems	Systems often do not integrate well with each other, so data have to be transferred, duplicated, or consolidated manually.	R2, R6	4.3, 4.5

Analytical theme / code	Supporting evidence from interviews	Respondent code	Used in section
Low practical usability of data	Data may exist, but they are not always brought together or transformed into regular managerial decisions.	R3, R7	4.3
Digital skill deficit	Some farms lack people who can work confidently with systems, data, settings, and interpretation.	R1, R6, R8	4.1, 4.2, 4.5
Control as a core value	FMS was associated with better control over resources, fuel, field operations, timing, machinery, and execution.	R1, R3, R7	4.2, 4.3
Economic usefulness	Respondents connected FMS value with lower costs, fewer losses, better profitability, and more efficient resource use.	R1, R3, R4	4.2, 4.5
Unified managerial picture	FMS was valued as a way to give the manager a more complete picture of the farm instead of fragmented information.	R1, R3, R6	4.2, 4.5
Short-term evaluation logic	Farms often expect visible results within one season, one sowing campaign, or the first months of use.	R2, R3, R7	4.2, 4.4
Long-term value creation	Respondents noted that stronger FMS value appears after several seasons of accumulated data and field history.	R2, R4, R6	4.2, 4.5
Initial interest without full implementation	Some farms attend demos, test systems, or discuss FMS, but do not move to stable use.	R3, R7, R8	4.2, 4.5
Partial implementation	Farms may use only selected modules or functions instead of the full system.	R2, R4, R6	4.2, 4.4
Gap between access and regular use	Access to the system does not automatically mean that FMS becomes part of daily routines.	R2, R6, R7	4.2, 4.5

Analytical theme / code	Supporting evidence from interviews	Respondent code	Used in section
Dependence on accumulated data history	Farms may hesitate to change platforms because valuable historical records have already accumulated in the current system.	R2, R4	4.2
Workload and seasonal pressure	FMS-related tasks may be perceived as additional work, especially during the agricultural season.	R1, R2, R5	4.3, 4.4
Agronomist skepticism	Agronomists may see FMS as useful, but also as additional reporting, external control, or a challenge to their field-based expertise.	R2, R5	4.3, 4.4
Field intuition versus system logic	Respondents emphasized that digital tools can highlight problems, but they cannot fully replace field observation and agronomic judgment.	R3, R5	4.3, 4.4
External actors as initiators	Distributors, consultants, peers, field days, and industry events often introduce farms to digital solutions.	R3, R4, R7, R8	4.2, 4.3
Weak post-sale support	Respondents noted that external actors may present or sell the system, but not always support the actual implementation phase.	R1, R7, R8	4.2, 4.4
Staged entry model	Distributor representatives emphasized that farms should start with a limited number of useful functions rather than the full system at once.	R8	4.3, 4.5
Readiness formed during implementation	Some organizational weaknesses are not only barriers before adoption, but can be gradually addressed during the implementation process.	R4, R6	4.4, 4.5
External incentives for formalization	FMS may also serve as a signal of more structured and transparent processes for external stakeholders such as creditors, grant providers, or partners.	R7, R8	4.4

REFERENCES

Addorisio, R., Casolani, N., Maesano, G., Coderoni, S., Perito, M. A., Mattetti, M., & Canavari, M. (2025). Barriers and drivers of digital agriculture adoption: Insights from Italian farming stakeholders. *International Journal on Food System Dynamics, 16*(1), 1–12. https://doi.org/10.18461/ijfsd.v16i1O1

AGRISTATIS. (2025). *Ринок FMS в Україні* [FMS market in Ukraine] [Unpublished market report].

AgroHub. (2020). *Гід по системам Фарм Менеджменту 2020* [Guide to farm management systems 2020]. https://agrohub.ua/research/hid-po-systemam-farm-menedzhmentu-2020-ua2/

Akhnovska, I., & Bondarenko, R. (2025). Економічний вимір диджиталізації агропромислового комплексу України [Economic dimension of the digitalization of Ukraine's agro-industrial complex]. *Сталий розвиток економіки*. https://doi.org/10.32782/2308-1988/2025-57-107

Derkach, O. D., Mykhailichenko, Y. M., & Makarenko, D. O. (2021). Digital agriculture: The experience of Ukraine. *International Scientific Congress "Agricultural Machinery," 1*(8), 35–39.

Hrynevych, O., Blanco Canto, M., & Jiménez García, M. (2022). Tendencies of precision agriculture in Ukraine: Disruptive smart farming tools as cooperation drivers. *Agriculture, 12*(5), Article 698. https://doi.org/10.3390/agriculture12050698

Kopishynska, O., Utkin, Y., Sliusar, I., Galych, O., Kovpak, S., Liashenko, V., & Barabolia, O. (2024). Comprehensive management of agroecosystem productivity on the platform of specialized farm management information systems. In *Proceedings of the 28th World Multi-Conference on Systemics, Cybernetics and Informatics* (pp. 340–347). International Institute of Informatics and Systemics. https://doi.org/10.54808/WMSCI2024.01.340

Kushnir, N., Tsaruk, D., Shpak, V., Dobrovolskyi, A., & Didukh, R. (2024). Analysis of digitalization modern global trends and factors in the context of Ukraine's agricultural sector. *IOP Conference Series: Earth and Environmental Science, 1429*, Article 012006. https://doi.org/10.1088/1755-1315/1429/1/012006

Lazebnyk, L., & Voitenko, V. (2021). Digital technologies in agricultural enterprise management. *Financial and Credit Activity Problems of Theory and Practice, 6*(41), 203–210. https://doi.org/10.18371/fcaptp.v6i41.251440

Linde, N., Balian, A., Shabatura, T., Gryshova, I., Petrenko, O., & Shevchenko, A. (2024). Agricultural technologies as a tool for integrating artificial intelligence into the agricultural infrastructure of Ukraine. *Grassroots Journal of Natural Resources, 7*(3), s30–s51. https://doi.org/10.33002/nr2581.6853.0703ukr02

Nehrey, M., & Klymenko, N. (2024). Цифрова трансформація сільського господарства: Аналіз агротехнологічного ландшафту України [Digital transformation of agriculture: An analysis of the agro-tech landscape in Ukraine]. *Агросвіт, 5*, 61–68. https://doi.org/10.32702/2306-6792.2024.5.61

Shebanina, O., Burkovska, A., Petrenko, V., & Burkovska, A. (2023). Economic planning at agricultural enterprises: Ukrainian experience of increasing the availability of data in the context of food security. *Agricultural and Resource Economics: International Scientific E-Journal, 9*(4), 168–191. https://doi.org/10.51599/are.2023.09.04.08

Vakulenko, V., Myalkovskyi, V., & Xiaowei, L. (2023). Організація системи інформаційного забезпечення управління витратами сільськогосподарських підприємств [Organization of the information support system for cost management of agricultural enterprises]. *Економіка та суспільство, 57*. https://doi.org/10.32782/2524-0072/2023-57-45