Digital policy in the agricultural sector of Kazakhstan - implementation deficit

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Abstract

Digitalization of the agriculture sector is one of Kazakhstan's most intractable policy challenges. Nevertheless, digitalization needs amongst farmers reliant on subsidies have remained high during the policy implementation period 2018-2022. This reflects a persistent but complex 'implementation deficit' as evidenced by the regional managers' failure to meet the digital policy targets set by decision-makers and contradictions between the type of digital solutions installed and policymakers' plans. To illuminate the factors which have shaped the implementation deficit, this dissertation draws on Matland's model on the influence of conflict and ambiguity on policy implementation. The research uses qualitative interpretive research to explore the digital implementation issue via semi-structured interviews, documentary analysis, and participant observation.

The dissertation reveals that digital policy is associated with highly ambiguous policy goals, policy implementation mechanisms, and high conflict of goals. This is not surprising because street-level bureaucrats of the hierarchical administration system covertly sabotaged the bottom-up approach of the decision-makers due to a lack of policy capacity. The opposition of values between decision-makers and the street-level bureaucrats has shaped the scale and nature of the digital policy implementation deficit. The key contribution of the research is that it extends Matland's model in the application to the developing countries context. Namely, this dissertation uncovers the incompatibility of the "bottom-up" approach in developing countries' contexts associated with highly hierarchical administration systems and the dominance of informal institutions given low policy capacity. In addition, the dissertation research highlights competing for goals between the "bottom-up approach" of decision-makers and the need for the "quick

progress" of street-level bureaucrats. The dissertation's findings question the appropriateness of the "bottom-up approach" in the condition of poor policy capacity of the street-level bureaucrats, lack of an evaluation system, and tunnel vision in the public manager's workplace.

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Preface

"Everyone sees what you appear to be. Few experience what you are"

Niccolò Machiavelli, The Prince

This dissertation is written during a challenging time of lockdown due to COVID 19 and the war in Ukraine led by the totalitarian dictator of Russia. This dissertation is written during years when we have adapted to these challenging times. I am pleased to share this journey with you, given the increasing importance of governance, public engagement, and accountability. First and foremost, I would like to thank everyone who has contributed to bringing this dissertation to life. I am especially grateful to my supervisor, Professor Colin Knox, for all his support, constructive comments, and conversations about my thesis and energy, especially during self-isolation and self-doubt. I also want to acknowledge and thank Riccardo Pelizzo and Stefanos Xenarios for their expert research assistance. I would like to thank my father, family, and friends for their amazing and continuous support. I would like to thank my beloved friends who inspired me and contributed to this research with their wisdom, unconventional support, and acceptance. Finally, I would like to devote this dissertation to all public managers who have served for the last 30 years and have addressed tremendous challenges by contributing largely to independent Kazakhstan's state formation. Wherever you are in the world, I hope you find this dissertation greatly contributes to the development of public policy and public management science in transition and developing countries. Stay safe and take care. Stand with Ukraine.

Introduction

If the persistent stereotype of the policy implementation deficit based on the western literature is hopefully waning, at least in the scholarly literature, the publications containing more detailed information on the specifics of implementation deficit within developing and transition countries are still difficult to come by. For a too long time, the issue of implementation deficit has been overlooked in Kazakhstan, and the dissertation thesis is targeted to raise understanding of the implementation deficit issue. Moreover, given the rise of social media, a greater demand for public service accountability among the general public, and the pressure of pandemic restrictions' consequences on the economy, there is a growing public sensitivity to the ongoing reforms' effectiveness in Kazakhstan.

The purpose of this dissertation study is twofold. The first aim is to understand the main factors that result in a large gap between stated goals at the policy formulation stage and their actual implementation of digital policy in the agriculture sector. The second aim is to equip policymakers with the strategies to encourage the stakeholders, including private farms, to participate in the implementation of digital policy in the agriculture sector. This dissertation thesis aims to contribute to addressing this gap through the examination of the implementation of digital policy in the agriculture sector of Kazakhstan during the period from 2018 to 2022. The key question of interest in this dissertation is how digital policy is implemented in the agriculture sector of Kazakhstan. Does the dynamic between the key stakeholders, including farmers, decision-makers, and the street-level bureaucrat, result in the implementation deficit Implementation deficit is defined as public managers' failure to meet the digital policy targets set by the central government and contradictions between the digital policy components delivered and the decision-makers’ plans. To explore the factors that have shaped these outcomes, the dissertation uses Matland's (1995) ideas on the impact of conflict and ambiguity on policy

implementation. The dissertation reveals that policy goals and implementation mechanisms have remained ambiguous.

According to the "Digital Kazakhstan" Policy (further referred to as the" digital policy"), digital policy in the agriculture sector has been implemented in two directions, digital transformation of the agriculture sector itself and the technological transformation of public service in this sector (ITU, FAO, 2020). Therefore, this dissertation focuses on the digital transformation of the agriculture sector direction, which includes the following components: (i) Automation of traceability of agricultural products; (ii) Implementation of precision farming; (iii) Creation of online trade platforms.

The significance of the implementation deficit of digital policies in the agriculture sector is driven by two sources: (i) the importance of understanding shortfalls of public policy implementation in developing countries such as Kazakhstan, (ii) the importance of the agriculture sector for economic, social, and environmental development of Kazakhstan. In addition, competing policy goals and ambiguity regarding goals, means, and technologies associated with the implementation of digital policy bring implementation issues of this policy as a perfect match for a detailed research subject of interrelation between decision-makers (central government authorities) and street-level bureaucrats (regional public managers) in the contentious sector of agriculture. Street-level bureaucrats refer to public managers at Oblast and audan (region) level. Decision-makers refer to public managers of the Ministry of Agriculture.

The importance of shortfalls in public policy implementation in developing countries is associated with the policymakers' focus on outputs or outcomes (Knox, C., 2008), (O'Connor, K., Janenova,S., Knox,C., 2019), (Knox,C., Janenova,S., 2022). Namely, public managers at the top and bottom levels dismiss the implementation process, which could uncover barriers to effective implementation. Therefore, firstly it is essential to explore the interrelation between central government authorities (decision-makers) and regional public managers (street-level

bureaucrats) in the context of the policy implementation. In the same vein, exploring the implementation process using the interaction between public managers and key stakeholders (including farmers, the IT industry, and academia) brings a better understanding of the factors influencing the implementation deficit.

The agricultural sector in Kazakhstan is an essential sector for the economic and social development of the country. Therefore agriculture was selected as one of four major economic sectors mentioned in the digital policy of Kazakhstan, including natural resources, oil and gas, and energy sectors. However, it should be noted that being the 9-the largest country in the world in terms of territory, Kazakhstan has a vast territory suitable for agriculture which has been utilized only up to half of its potential. Currently, Kazakh farmers use only 50% of their resources or almost 60 million hectares of grassland (including sheep and dairy production). However, there is a potential for growth coming from expansion and productivity growth as Kazakhstan has circa 130 million hectares of land suitable for grazing (Petrick, M., Gotz, L., 2019), (Petrick, M., Oshakbaev, D., and Wandel, J., 2014), (Oshakbayev, 2018).

Secondly, 46 % of the population lives in rural areas which underlines the importance of the agriculture sector for the wellbeing of citizens of the country as the main source of income (OECD., 2019). In addition, the agriculture sector is a highly subsidized sector which means it poses a burden on the country's budget regarding government spending and tax collection. As a result, taxpayers impose growing pressure on the efficiency of funds allocation.

Thirdly, the agriculture sector is an essential sector for food security. Yet, despite an abundance of land and labor force concentration in rural areas, agriculture has not utilized the full benefits of the sector to date. As a result, production volume lagged behind consumption, leaving Kazakhstan a net importer of agricultural products. Furthermore, low labor productivity and low competitiveness of agricultural products stemming from low efficiency of the agriculture sector, has resulted in low export competitiveness of the agriculture sector and a big

share of the import, which imposes risks on food security (Petrick, M., Oshakbaev, D., and Wandel, J., 2014), (Gridneva,G. A, Kaliakparova,G. Sh., 2019), (OECD 1. , 2019).

Unfortunately, the agriculture sector has been inefficient as it has been lagging regarding performance. This reflects deep-seated structural and institutional problems such as (i) significant spatial dispersion of production and high transaction costs, (ii) outdated and depreciated infrastructure, (iii) constraints on access to land, (iv) poor technology and services, and(v) access to finance.

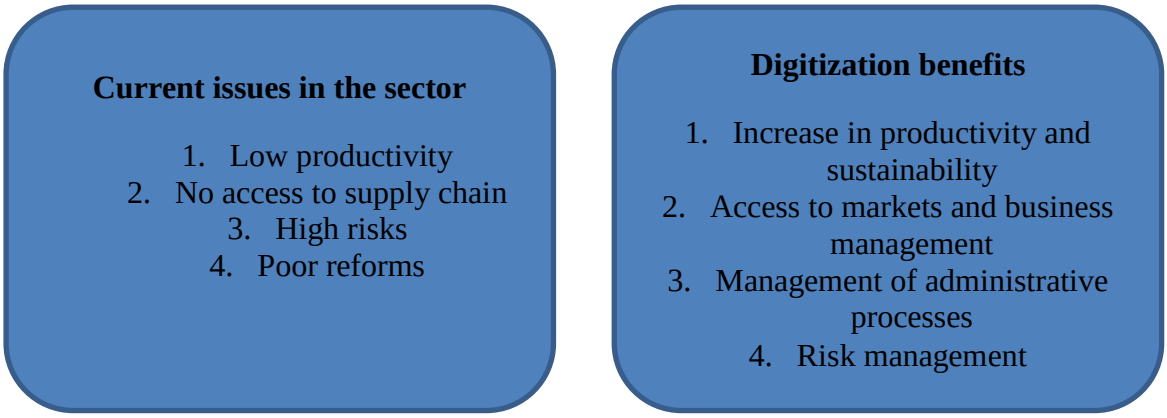
Despite numerous government policies, the agriculture sector is associated with main issues in public policy rooted in restructuring policies such as (i) poor privatization and liberalization programs (Wengle, 2020), (ii) lack of "proper institutions" and rent-seeking (Visser,o., & Spoor, M., 2001), (iii) poor "incentives and reformed institutions" (World Bank, 2007), and (iv) lack of flexible public support to specific rural producers (Wengle, 2020), (Petrick, M., Wandel, J., Karsten, K., 2011).

Currently, there are three types of agricultural farms: (i) large–scale farms, (ii) small-scale farms, and (iii) household farms (Petrick, M., Wandel, J., Karsten, K., 2011), (Oshakbayev, 2018), (OECD., 2019). Large-scale farms comprise 45 percent of the market share, while small-scale farms, including households, represent 55 percent. At the same time, asymmetrical public support of large-scale farms versus small-scale farms is highlighted by scholars as one of the main issues bringing disparity in agriculture sector development, imposing a risk to wellbeing of the rural population and value chain development (OECD., 2019), (Petrick, M., Gotz, L., 2019), (Oshakbayev, 2018).

As agriculture is becoming more knowledge-intensive, it is widely acknowledged that agriculture strategies assist governments to allocate financial and human resources more efficiently and addressing challenges of the agriculture sector holistically, including ICT benefits, generating new revenue streams, and improving the welfare in rural communities

(ITU,FAO, 2020). Furthermore, it is widely admitted that digital technologies, including smart equipment and applications and data analytics, assist (i) in meeting policy challenges in the agriculture sector, (ii) innovation of goods and services, (iii) optimization of processes and business models (OECD, 2017). Namely, digital technologies in the agriculture sector enable farmers and industry players (i) to improve agricultural productivity and sustainability, (ii) to improve access to markets and business management, (iii) to improve management of administrative processes, (iv) to manage better risks. Furthermore, digital policies enable governments to address policy challenges via (i) overcoming information gaps and asymmetries, (ii) reduction of policy-related transaction costs, and (iii) providing both producers and consumers with different preferences and incentives to work better together (ITU, FAO, 2020).

Figure 1. The challenges of the agriculture sector and Digital policy response

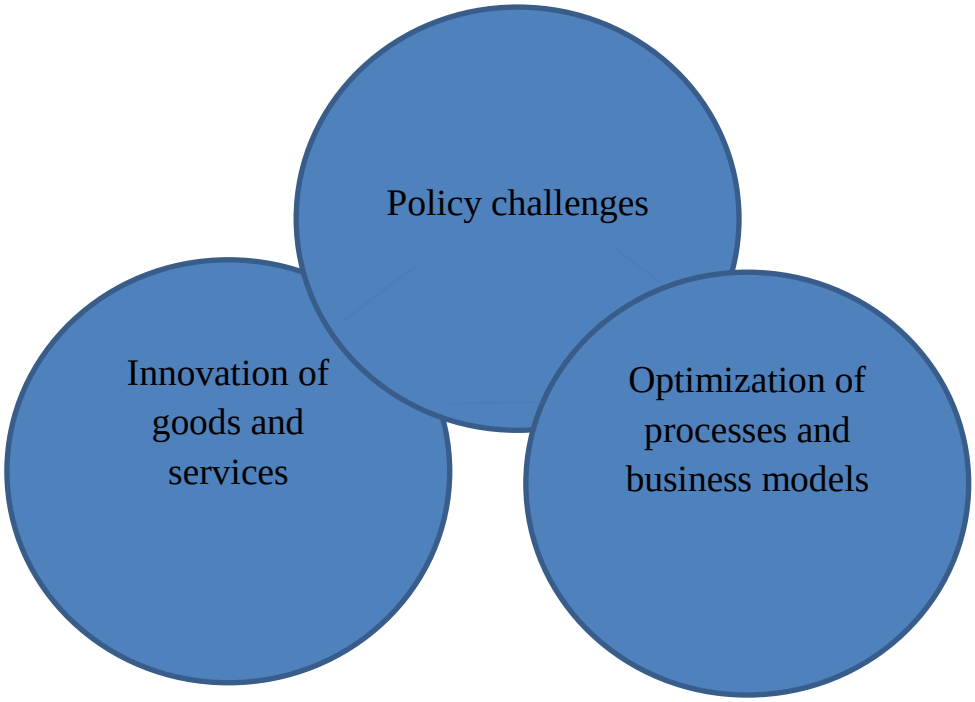


It is also widely acknowledged that digital technologies have the potential to mitigate challenges relevant to the structural features of the agriculture sector. Firstly, given the high reliance on subsidies in the agriculture sector in general, precision technologies and automation systems have the potential to enable the government to design and implement more "big data-driven" policies and to evaluate policy performance more robustly (Gridneva,G.A, Kaliakparova,G.Sh., 2019), (OECD 2. , 2019), (ITU, FAO, 2020). Secondly, digital technologies can increase the productivity of the agriculture sector via innovation, restructure the value chain,

and mitigate risks related to this highly cyclical sector, given the continental climate constraints of the country. Thirdly, digital technologies can optimize business processes and models and facilitate participation in the global value chain (OECD 1. , 2019), (OECD 2. , 2019), (ITU,FAO, 2020).

Figure 2. Benefits of digital policies

I

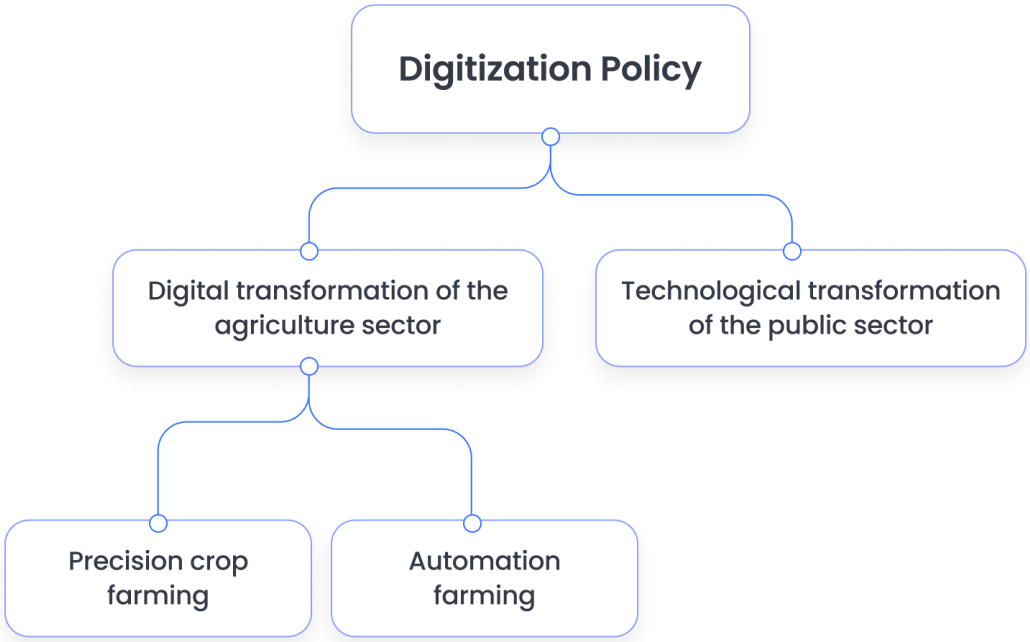


At the same time, it is widely acknowledged that digital technologies may have three potential issues. Firstly, delegation of decision-making to computers within the policy cycle might endanger transparency, oversight, and responsibility. Secondly, the limitations of data, models, and algorithms are widely acknowledged, which is becoming ever more prominent as governments and industries increase their reliance upon them. Thirdly, it risks the creation of new information asymmetries or a "digital divide" between those who can access or use digital tools and those who cannot (OECD 2. , 2019), (ITU, FAO, 2020).

To tap into the benefits and opportunities of digital technologies for innovation, growth, and social prosperity, the GoK has been focused on an integrated policy framework related to digital transformation (ITU,FAO, 2020). Namely, under the program "Digital Kazakhstan" for 2018-

2022, the GoK focused on the digitalization of agriculture in three areas, as outlined below. The program mostly focused on the role of the Ministry of Information and Communication (further referred to as "MIC").

Figure 3. Key components of digital policy



Precision crop farming technologies include electronic mapping of land, precise meteorological data, sensors, and space monitoring. Automation farming technologies envisage automotive monitoring and management of livestock and crop farming. Overall, the policy is aimed to create 3000 advanced farms, 40 digital farms, and 500 basic farms. The Ministry of Agriculture defined three levels of farms, depending on the stage of digitalization– (i) digital farms, (ii) advanced farms, and (iii) basic farms. A Digital farm is defined as a farm using new technologies and without human operation. The Ministry of Agriculture aimed to establish digital farms in every district to replicate the hands-on experience of digital technologies across the country. An advanced farm is defined as a farm at the preliminary stage of digitalization with available infrastructure systems. A basic level farm is defined as a farm with no technological infrastructure and capacity available in its operation (Gridneva,G.A, Kaliakparova,G.Sh., 2019).

Basic level farms envisaged only digitalization of all croplands data in the dataset of the Ministry of Agriculture, including data on agrochemical soil conditions.

However, the policy has been implemented partially, with only one component of the policy implemented to date (Skalei, 2019), (Yensebayev, 2020).

To address the implementation deficit issue, this dissertation uncovers two study areas to explore the body of knowledge as a guideline for analyzing (i) key concepts of digital transformation in the agriculture sector and (ii) the key concepts of implementation theory. Based on the literature review, the dissertation thesis revealed a research gap that requires attention to serve as the basis for this research paper. A research gap was identified based on three dimensions: (i) lack of problem awareness, (ii) under-researched area, and (iii) lack of empirical support.

The dissertation research uses digital transformation concepts to uncover the values driving key stakeholders to implement or not implement the policy. In addition, digital transformation concepts are used as lenses to explore the competing goals of digital policy from decision-makers and street-level bureaucrats levels. The literature review revealed that digital policy in the agriculture sector had been addressed mainly from a social-economic perspective. Limited studies address public policy challenges related to digitalization in the agriculture sector in developing countries. Most studies focus on either conflict of interests between the affected or target groups (Janc, K.,Czapiewski, K.,Wójcik,M.,2019., 2019), (Klerkxa,L., Jakkub, E., and Labarthec, P. , 2019), decision-making process in digital policymaking (Gil-Garciaa,J.R, Dawesa, S.S., and Pardoa,T.A., 2018), (Dunleavy,P., Margett,H., 2015), digital transformation in general in developed countries (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021), (Brunetti, F, Matt, D.T., Pedrini,G., Orzes, G., 2020).

Dunleavy and Gil Garcia (XXX) explored the domination of technology companies in the decision-making process from public policy in general. They criticized that citizenry interest has

been left out of the agenda, especially regarding wicked problems of big data and algorithms (Gil-Garciaa,J.R, Dawesa, S.S., and Pardoa,T.A., 2018), (Dunleavy,P., Margett,H., 2015), (Brunetti, F, Matt, D.T., Pedrini,G., Orzes, G., 2020). Scholars argue that there is a need for a holistic and multifaceted approach to promoting the digitalization of the economic sector (Brunetti, F, Matt, D.T., Pedrini,G., Orzes, G., 2020).

There is a growing Kazakhstani scholarship that explores digital transformation of public services from a public policy perspective (Janenova, 2010) , (Janenova, S. & Kim.P.S. , 2016), (Kassen, 2017), (O'Connor, K., Janenova, S., Knox,C., 2019). However, the specificity of the digital transformation of the agriculture sector from a public policy and public administration perspective has not been studied, especially in the context of developing countries such as Kazakhstan. Previous research on the agriculture sector mostly concentrated on the effect of digitalization at organizational or individual levels (Gridneva,G.A, Kaliakparova,G.Sh., 2019), (Vorobiev, A.E. , Tcharo,H. , 2018).

Implementation theory scholarship has a broad and deep investigation history associated with an ongoing debate on applying the top-down or bottom-up model to analyze implementation deficit or success in public policy. It should be noted that these scholarships contributed largely to the study of the context of developed countries. By comparison, empirical research on the interaction of the bottom-up and top-down approaches in developing and transition countries with unitary state forms and highly hierarchical administration structures remain negligent (Matland, 1995), (O'Toole, 1986), (Knox, 2008). Therefore there is an imminent need for further empirical research of top-down and bottom-up scholarship approaches in the context of developing countries.

Top-down or bottom-up model scholarship contributed to the research of (i) the key unit of analysis, (ii) the policy process, and (iii) character of the implementation process. Key top-down model scholars, including Pressman and Wildavsky, Sabatier and Mazmanian, Berman have

stressed the importance of the policy design and structuring of the policy and decision-makers or policy designers and neglected the role of street-level public managers (Mazmanian,D.A. and Sabatier,P.A. , 1981), (Pressman,J., Wildavsky, A., 1984). In contrast to the top-down model, bottom-up model scholars, including Lipsky, Elmore, Hjern, and Hull, have stressed the importance of the context of the policy and behavior of street-level public managers (Elmore, 1979), (O'Toole, 1986), (Lipsky, M., 1980) (Hill ,M.J.,Hupe,P.L., 2009), (Hill, 1997). Finally, the hybrid implementation scholarship contributed to the development of implementation theory by focusing on the communication problems in a multiple actor world. Hybrid model scholars introduced collaboration problems or management of a bargaining process as a key unit of analysis (Hill,M., Hupe,P., 2003), (Goggin, 1986), (Goggin,M.L.,Bowman,A.O.M., Lester,J.P., O'Toole,L.J., 1990), (Matland, 1995).

The unique feature of the dissertation research is that the digital transformation of the agriculture sector requires a horizontal approach to public policy with the involvement of key stakeholders as well as a strong engagement and policy capacity from public managers both at the decision-maker and street-bureaucrats level (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl, J., O., 2021), (Hill, M. and Hupe, P., 2009), (Goggin, 1986). At the same time, the public administration system of Kazakhstan is associated with a highly vertical hierarchical administration system (Knox, C., 2008), (Van der Wal, Z., Mussagulova, A., Chen.Ch., 2020).

Building on the implementation theory framework by Matland (further referred to as "Matland's model"), the dissertation research uses Matland's model to define processes and factors associated with the implementation deficit in the digital policy of the agriculture sector in Kazakhstan. The model is used as a lens to explore competing policy goals and ambiguity regarding goals, means, and technologies associated with the implementation of digital policy in the agriculture sector of Kazakhstan. The dissertation will focus on the relationship between top-down and bottom-up approaches to policy implementation in the context of digital policy in developing countries. The dissertation uncovers that a permissive policy approach of

Kazakhstani decision-makers encouraging bottom-up development does not work in developing countries' contexts due to the institutional structure, in particular the highly hierarchical administration system. The dissertation examines the appropriateness of developing standard approaches in the digital transformation, which leads to a restructuring of the whole value chain of the agriculture sector. Given the poor policy capacity of public managers, digital transformation policies in developing countries require well-defined capacity-building mechanisms developed by decision-makers (or central-government authorities) for street-level bureaucrats (regional managers) to follow; otherwise, the policy implementation results in symbolic implementation.

The inability of public managers to manage competing goals and ambiguity erodes public service capacity and exacerbates the problem's intractability, spurring a vicious cycle of waste of funds and noncooperation. The effects of this are more likely to be magnified in times of austerity as a result of the current lockdown in Kazakhstan due to the global pandemic, which has squeezed economic opportunities. Moreover, understanding implementation deficit might help uncover the issues that hamper the development of productivity and competitiveness of the agriculture sector in general. Hence, by exploring implementation deficit, one can develop a better understanding of (i) the determinants of implementation deficit, and (ii) public managers can be equipped with strategies to encourage private farms to participate in digital policy in the agriculture sector.

Based on the literature review and the application of the theoretical framework, the researcher came up with the following main research question for this dissertation research:

- To what extent has digital policy in the agriculture sector failed?

Two sub-research questions envisage the following to uncover the main question:

- What have been the roles of key stakeholders in the implementation process?

- How do key stakeholders, including central government, street-level bureaucrats, and farmers, describe their decision to implement (or not implement) digital policies /technologies?

By addressing these questions in the Findings and Discussion sections, the dissertation expands the original Matland framework by conceptualizing different logics driving digital policymaking in transition countries and developing countries like Kazakhstan. There is a critical need for a broader understanding and addressing of barriers to policy implementation in developing countries contexts. The dissertation research contributes to still mostly explorative literature on digital policy implementation by demonstrating that the context of policymaking is essential for its implementation, a factor that has remained underexplored in the literature.

The dissertation research brings several interesting contributions to the body of knowledge of public policy studies in the following ways.

The first contribution of this research is that it extends Matland's model to apply an experimental approach to the novel technology-involved policies in developing countries. Namely, experimental implementation is not applicable to decrease the technology ambiguity in developing countries' contexts due to (i) lack of an evaluation system, (ii) a frequent rotation of top management, and (iii) lack of expertise at the level of middle-level managers.

The second contribution of this research is that it extends Matland's model in terms of adding a dynamic perspective. Matland suggests that the experimental model should move to administrative implementation. The research reveals that due to political pressure to report on "the quick progress" and the lack of an evaluation system engraved in highly hierarchical administration systems, the policy implementation remains at the status-quo or can move to symbolic implementation in developing countries contexts.

The third dissertation's main contribution envisages that the bottom-up approach does not apply to digital policy implementation in developing countries without a capacity-building mechanism engraved in the policy. Due to the lack of analytical and political skills of the regional public managers in the sector, the digital policy resulted in a low stakeholder engagement. At the same time, stakeholder engagement is the main component for implementing policies associated with the social-economic structure change as the digital transformation of the agriculture sector. Due to inertia, regional public managers focused on managerial skills to effectively use the state resources or the investment subsidies leading to the digital disparity. In the same vein, the regional public managers tend to rely on a top-down approach and covertly sabotage the policy implementation by using data manipulation and ignoring the power of their discretion.

The fourth contribution of the dissertation is that it extends Implementation theory scholarship by suggesting that the bottom-up approach is not an adequate approach to policy implementation in developing countries' contexts without enhancing the policy capacity of the street-level bureaucrats and acknowledging the role of informal institutions. Namely, this research's main contribution is that the digital policy implementation is not realistic in a highly hierarchical system with a strong impact on informal institutions. In the same vein, the research extended the definition of local coalitions under Matland's model. It claims that a key driver of the local coalitions depends not on professionals but the level of influence of informal institutions, given weak policy capacity and poor stakeholder engagement practice by the public managers.

The key contribution of the research is that it extends Matland's model in terms of the definition of conflict of goals in the developing countries context. Namely, the dissertation argues that the policy goals conflict is not based on the professionals' interpretation of the goals but rather on the different values of the street-level bureaucrats and the decision-makers in a hierarchical administration system. In the case of digital policy, the decision-makers aimed at the

social-economic structure change leading to the digital transformation of the agriculture sector. At the same time, the street-level bureaucrats have targeted "quick progress." In the same vein, the dissertation research explores the role of conflicting goals leading to the digital divide. Aimed at "quick progress," regional public managers focused on the large-scale farms to address food security and the export increase. Consequently, small-scale farmers have remained outside of the radar of public managers and failed to tap opportunities for digitalization. The dissertation stresses that the Kazakh government should reassess its subsidy provider role and enhance its role as a creator of enabling environment for farmers to participate in digital policy implementation.

The dissertation thesis is organized in the following way. The first chapter of the dissertation provides a literature review with a brief overview of the history of the development of implementation theory, including top-down and bottom-up model scholarship, concluding with hybrid scholarship. In the second section of the literature review, the dissertation provides an analysis of scholarship which focuses on digital policies in the agriculture sector, discussing main concepts of digitalization and sector-specific issues in the implementation of policies. Finally, the third section uncovers the development of Kazakh scholarship in the policy implementation area.

The second chapter of the dissertation develops the theoretical framework based on Matland's model of implementation theory. Matland’s model will be utilized in this dissertation thesis to address the implementation deficit issue in developing countries and the implementation process. The chapter briefly introduces and justifies the use of Matland's model and describes key concepts of the policy implementation process under this model. In addition, the chapter provides an insight into concepts of digital transformation and informal institutions to uncover the main factors hampering the implementation of digital policies.

The third chapter covers the methodology section. The methodology section will cover an overview of a rationale to use an interpretive qualitative research method in this dissertation thesis. Specifically, the chapter provides details of epistemological and ontological positions in the dissertation research approach. Qualitative research is the most instrumental research approach to utilize for the analysis of the implementation deficit of digital policy in Kazakhstan, given that the goal of the study is to understand the ways key stakeholders constructed their understanding of the policy and how they implemented their perceptions in their specific contexts (Glesne, 2006), (Guba, E.G., Lincoln, Y.S., 1994). Based on the interpretive paradigm, the dissertation focuses on intersubjectively of understandings and meanings built socially and through experience. Since the dissertation researcher and the object of the dissertation research are linked, subjectivist epistemology and relativity ontology are core approaches in the dissertation thesis. The dissertation thesis applies a case study methodology to uncover the behavior, unveil the motivation of the behavior, and how this motivation and behavior impact the policy implementation (Denzin, N. K., Lincoln, Y. S., 2005), (Morse, 1994). Key stakeholders include decision-makers, street-level bureaucrats, farmers, the IT industry, and business and science experts. A qualitative research design of the dissertation thesis envisages circa 30 in-depth semi-structured interviews with key stakeholders, including decision-makers and governance actors. The dissertation thesis is based on both thematic analyses as well as content analysis. The dissertation research subject is an explorative study on a novel phenomenon. Thus thematic analysis methods are used to interpret the data. Both approaches are instrumental in distilling key stakeholders' actual behavior, attitudes, or real motives under research. The limitation of the qualitative approach is a lack of a value-free framework. To ensure consistency in methods, the data were coded and themes were defined in the data by the dissertation researcher, and the analysis was then discussed with a supervisor. A careful description of steps and processes used in data analysis has the potential to address a high degree of clarity of the conceptual framework and method of analysis applied.

The fifth chapter provides findings based on semi-structured interviews and an analysis of the primary and documentary data. The findings are designed to uncover the context of the implementation deficit in digital policy in the agriculture sector of Kazakhstan. The fifth chapter is designed to define the main context of agriculture sector development and explore if the structural issues of both the public administration and agriculture sector hindered the implementation of digital policy. First, chapter V outlines that more fundamental issues, including institutional and cultural settings both in the agriculture sector and public management area, and the issues impeding the development of the agriculture sector and the implementation of digital policy. This chapter sheds light on the fact that the agriculture sector requires more basic radical surgery rather than an overlay of digitalization to solve the existing issues. Secondly, Chapter V analysis focuses on the public management context, which plays a crucial role in the agriculture sector and which is associated with a paternalistic approach in a highly hierarchical public administration structure. Chapter VI provides a discussion of the findings. Final Chapter VII concludes with major contributions of the dissertation research and lessons for large-scale policy initiatives.

I. Literature Review

This literature review is organized around key concepts explored in this dissertation. In the first section, the dissertation presents a brief overview of implementation theory development, starting with a summary of a top-down and bottom-up model scholarship and concluding with hybrid studies in implementation theory. In the second section, the dissertation provides arguments that focus on digital policies in the agriculture sector, including main concepts on digitalization and highlighting main sector-specific issues found when implementing policies. The third section provides key concepts of policy capacity and governance theory. Furthermore, finally the dissertation provides an overview of the scholarship exploring policy implementation in the Kazakhstani context.

1. Implementation theory

This literature review of the implementation theory scholarship primarily focuses on the evolution of the scholarship in the study of policy implementation and how it has discovered and defined the key determinants of policy implementation. In addition, the literature review provides insights into why critical public policy goals are not implemented as intended, utilizing the theoretical and empirical studies done thus far to inform and support this research. This insight has proven to be essential for developing the dissertation's theoretical framework and has provided the context within which to understand and address the causes of the deficits in policy implementation of the digital policy project that this study has identified.

To take advantage of the theoretical framework's utility in addressing the dissertation's research question, the researcher has focused on identifying key elements of implementation theory that have been proven to impact policy roll-out. A literature review of the implementation theory scholarship provided in the dissertation has enabled the researcher to unpack the key units of analysis and identify those elements that apply to this specific research study. In addition, by comparing the top-down and bottom-up approach scholarship, the dissertation has been able to apply and tailor the theory to reflect how the implementation is impacted by the complex interactions of players within a highly hierarchical administration system found in developing countries Kazakhstan. Finally, the literature review focuses on hybrid scholarship, which focuses on uncovering the cooperation and public engagement issues when "wicked" and multifaceted issues impede the successful implementation of policies to bring about economic and social

change in society. Finally, the literature review entails empirical studies on why policies are not implemented as intended under Matland's model (Matland, 1995).

To delimit the scope of the study, the dissertation provides a definition of policy implementation and policy implementation deficit based on the established scholarship—which was a challenging task given the contentious conceptualization of two terms because of the conflict between Top-Down versus Bottom-Up scholarships.

Implementation theory scholarship has strived to address why and how policies deviate from their intended outcomes by providing frameworks for consideration that apply in various contexts (Signé, 2017). Based on the implementation theory scholarship, there are various definitions of implementation based on whether the scholar belongs to a top-down or bottom-up model approach. Pressman and Wildavsky suggested that implementation is defined as the ability of the government to forge subsequent links in the causal chain to obtain the desired results (Pressman and Wildavsky 1973). Mazmanian and Sabatier define implementation as "the carrying out of a basic policy decision, usually incorporated in a statute but which can also take important executive orders or court decisions" (Mazmanian and Sabatier, 1983, p.553). This dissertation uses the definition provided by Wanderman and associates (2008). They defined implementation as the model that can help uncover "what" needs to happen, be it the creation of an intervention to respond to a specific problem or the type of practices best suited for intervening based on specific contexts. In other words, implementation means "'how" these things "happen."

Secondly, it is recognized that policy implementation deficit is a more contentious concept in implementation theory and goes well beyond the simple definition of the implementation process. Scholars of top-down, bottom-up, and hybrid approaches have explored the concept of policy implementation success and/or deficit. However, despite numerous studies, the definition of the policy success or failure is challenging due to intractable methodological issues. Therefore, there is no consensus on the definition of policy failure or policy success, and the policy failure phenomenon lacks explicit conceptualization (McConnell, 2015).

It should be noted that the burgeoning literature on policy implementation, including top-down, bottom-up, and hybrid scholarships, mostly focus on the explanation of factors that result in the implementation gap and paid little attention to the nature of failure per se (Barrett, S., Fudge, C., 1981; Mazmanian & Sabatier, 1981). The founders of the implementation theory, Pressman and Wildavsky (1973), did not define policy implementation deficit but defined the roots of the policy implementation deficit. In a study of an unemployment reduction program for

ethnic minority groups in Oakland, Pressman and Wildavsky (1973) blazed a new trail, introducing several core concepts that differentiate implementation research from its precursor, the case study (Pressman and Wildavsky 1973). Specifically, they argued that policy implementation deficits stem from flawed ideas, inefficiencies, or adverse chance circumstances impacting implementation. Furthermore, Pressman and Wildavsky (1973) suggested that successful implementation is hindered by the "complexity of joint action" in conjunction with the many nodes inherent in the decision and veto process.

Some scholars associate the concept of implementation deficit with the implementation process, which frequently leads to symbolic effects (Hoppe et al., 1987)—or even nondecisions which are sometimes recorded as constituting policy implementation success (Bachrach and Baratz 1963; Marsh, D., A. McConnell., 2010). In their work, Dupuis and Knoepfel (2013) related implementation deficit to the outputs of a policy that contribute to symbolic problem-solving. Hogwood and Gunn (1984) have defined a policy implementation deficit as a policy that has not been implemented as intended. They also argued that policy failure constitutes an unsuccessful implementation where the policy may be enacted. However, circumstances are such that the policy fails to achieve the desired results and outcomes (Hogwood, B. W., Gunn, L. A., Archibald, S., 1984). Hogwood and Peters (1985) used a medical metaphor to define policy failure: i.e., a type of pathology. Namely, they assume that policy failure equates to a not healthy condition that may be subject to different diagnoses from different experts. Dunleavy (1995) defines policy failure as significantly and substantially costly failures of omission or commission or by the government (Dunleavy, 1995). Other scholars have provided more ad hoc definitions, such as benefits and the non-achievement of policymaking goals.

Walsh (2006) suggests that the implementation deficit happens when the decision-makers responsible for introducing new policies conclude that the current policy no longer achieves the political and program goals they prefer (Sharman, 2006; Walsh,2006). However, this perspective that sees decision-makers as assessing the implementation result has been challenged by scholars advocating for the pluralistic nature of the social sciences. Namely, the pluralistic nature of the social sciences, which is based on post-positivist methods and frameworks, emphasizes the role of perceptions in envisioning failure as a political act. Therefore, some scholars have argued that implementation failure tends to be constructed by those stakeholders whose social power allows them to articulate such a view and succeed in securing a dominant failure narrative (Signé, 2017).

It should be highlighted that the key implementation scholars, including top-down and bottom-up model scholars, have had an ongoing debate regarding metrics of the implementation deficit. For example, top-down model scholars treat legislative objectives as a metric defining policy implementation success or failure versus a policy implementation deficit (Mazmanian & Sabatier, 1983; Sabatier, 1986). While bottom-up approaches also use legislative objectives to assess policy success or failure, they explain that the gap between legislative (top-down) objectives and resources changes the very nature of implementation. Consequently, bottom-up model scholars tend to reject the legislative objective as a standard for evaluation and claim that street-level bureaucrats should develop their standards for policy success (Winter, 2012).

It is worth noting that, based on the findings of the literature review discussed above, methodological difficulties in defining policy failure stem from 3 sources: different perceptions, differing benchmarks, and grey areas (McConnell, 2015). From this argument, differing perceptions mean that what one individual perceives as a failure may be viewed by another as "not a failure" or maybe even a "success" For example, one stakeholder might perceive the implementation of the digital policy as a failure in terms of the sector's digital transformation. At the same time, another key stakeholder might perceive the policy as successful in utilizing the subsidies. Secondly, there is no universal agreement on failures being defined by breach of a universally agreed X benchmark, given multiple and often conflicting evaluation measures (McConnell, 2015). Therefore different benchmarks might result in an ambivalent definition of the policy failure or success. Thirdly, the grey area of the policy definition is rooted in the assumption that failure is rarely “all or nothing.” Namely, there are various shades of grey where judgment is needed regarding the interpretation and significance that should be given to shortfalls, lack of evidence, and conflicts (McConnell, 2015). Finally, McConnel stresses that judging the policy's success or failure is challenging because of the extent or level of meeting the policy goals or objective set at the outset. The main reason is that the targets might constantly alter, as illustrated by the shifting mandates for digital policy in Kazakhstan addressed in this dissertation. As a result, original goals might be met, added goals might fail to achieve, or perhaps, a goal might be partially fulfilled.

Given the methodological concerns of defining the implementation deficit, the dissertation research uses the definition of implementation deficit provided by McConnel. As such, implementation deficit relates to a policy that fails, even if it is successful in some minimal respects because it does not fundamentally achieve the goals that proponents set out to achieve. Opposition is great, and support is virtually (McConnell, 2015).

Main Concepts of the Implementation Theory

Despite the long history of dissonance in implementation theory scholarship, scholars have agreed that implementation is too complex and wicked a problem to be subject to a single theory (Winter, 2011). Scholars also agree that isolating specific variables is problematic for operationalizing policy implementation concepts. Moreover, implementation is intertwined with other parts of the policy process. Hence, implementation research is associated with (new) governance, policy design and instruments, network studies, street-level bureaucracy, management, principal-agent studies, performance, regulatory enforcement, and others (Winter, 2011; Signé, 2017).

Recognizing these theoretical realities, this dissertation begins with a brief discussion of key factors influencing the implementation deficit from the perspective of Top-Down, Bottom-Up, and Hybrid model approaches. Then the dissertation thesis will provide both theoretical and empirical insights into the Matland model under Hybrid model scholarship that is utilized as the basis for the theoretical framework of this study.

The literature review of two basic models, top-down and bottom-up approach models revealed that the scholars defined over three hundred critical variables to impact the policy implementation's success or failure. In this regard, both models were weak in demonstrating parsimony. It is widely acknowledged that the problem with the lack of parsimony of variables is that the more factors that are included in theoretical models, the less they are capable of defining the most crucial and relevant factors (OToole, 2000; Hill, M., and Hupe, P., 2009; Goggin, 1986). At the same time, both models have their advantages and analytic power that have proven instrumental in understanding the implementation of digital policy in the agriculture sector of Kazakhstan. Therefore, given their utility for an explanation, both models should be taken into account in the analysis, if for no other reason than their ability to explain the highly hierarchical administration system on the one hand and horizontal cooperation needs for key stakeholder engagement on another side. Furthermore, both are needed to fully understand the impact of a factor on a complex socioeconomic change such as digital transformation. Hence it is critical to understand the difference between the two approaches.

Unit of Analyses

The first difference between the two scholarship approaches stems from their different conceptualization of the unit of analysis. Top-down model scholars use decision-makers as the

central authority as a key unit of analysis. The top-down model approach represented by Van Meter and Van Horn (1975), Nakamura and Smallwood (1980), and Mazmanian and Sabatier (1983) has posited that policy implementation should conceptualize the hierarchical delivery of policy intentions as being defined by decision-makers or policy designers with some centralized authority over the process. Key variables in the implementation of the policy include the ability of decision-makers to produce clear objectives and control over the process. As a result, top-down model scholars tend to develop a prescriptive course of action for the decision-makers. Subsequently, top-down model scholars focus on analyzing the compliance of the different administration units with the statute provided by the policy designers concentrating at the top level (Mazmanian, & Sabatier, 1981; Pressman, & Wildavsky, A., 1984). With a highly hierarchical administration system in Kazakhstan, policymakers tend to design policies based on the top-down approach.

Unlike the top-down approach, those espousing a bottom-up approach envision the implementation of digital policies involving uncertainties, risks, and interaction with numerous stakeholders—which often can be outside the control of the hierarchical administration system. Therefore, the bottom-up model scholarship offers an interesting insight that acknowledges these risks and uncertainties. Namely, bottom-up model scholars represented by Lipsky (1871), Ingram (1977), Elmore (1979), and Hjern and Hull (1982) have argued that the key units of analysis in the policy implementation process are street-level bureaucrats and target groups. Furthermore, bottom-up model scholars tend to consider implementation as the negotiation process within a network of the implementers, including the centralized authority, street-level bureaucrats, and affected or target groups. Consequently, bottom-up model scholars posit that a key variable in policy implementation should be the problem-solving strategies of the street-level bureaucrats. In other words, the policy capacity of the local public managers is the key factor that influences why policies are not implemented as intended. As a result, bottom-up scholars tend to focus on network analysis and street-level bureaucrat behavior concentrating on the local implementation policy (Lipsky, 1980; Pülzl & Treib, 2017). Furthermore, bottom-up scholars have stressed in their work that the street-level bureaucrats often have high autonomy and discretion for policy implementation outside the decision-maker's control.

Stages versus Cycles

The second source of difference between top-down and bottom-up model scholars stems from the conceptualization of the policy process. Top-down model scholars focus on the stage

approach assuming that policymaking can be divided into several defined stages. Hence the top-down model scholars neglect the policy cycle process as a whole process and dismiss the interaction and interdependence of two stages of the policy cycle—i.e., policy implementation and formation.

In contrast, bottom-up model scholars argue that policy implementation cannot be separated from the policy because they focus on how policies are defined, shaped, implemented, recycled, or redefined (Pülzl, H., Treib, O., 2017). At the same time, bottom-up scholars have acknowledged the interdependence of the policy formulation and policy implementation stages when involved actors can influence the policy implementation results from the starting point. Namely, Elmore (1979) contributed to the Bottom-up model scholarship by introducing the methodology for analyzing implementation issues called the "backward mapping concept." Elmore argued that the analysis should start from a specific policy problem and then should explore the actions of the local public agencies and affected groups by the policy.

Furthermore, Hjern and Porter (1981) argued that scholars should acknowledge the multi-actor and inter-organizational character of the policy implementation. Therefore, in the bottom-up model, scholars tend to stress that the key stakeholders can influence policy implementation at any stage of the policy, including policy formulation and implementation stages. However, in the case of Kazakhstan, as provided in the analysis in the discussion section, the key stakeholders are rarely involved in the policy formulation or implementation stage, which makes the bottom-up approach model less instrumental in the analysis of the policy implementation the top-down approach.

Table 1. Factors contributing to implementation deficit

Top-Down	Bottom-Up
Compliance with the statue in the vertical structure	Communication in the micro-level and macro-level
The ability of the decision-makers to structure and design the policy	The ability of the street-level bureaucrats to navigate the context of the policy

Compliance versus Process

The third difference between the Top-Down and Bottom-up models derives from their divergent conceptualization of policy implementation as a process. Top-down model scholars

argue that policy implementation is an apolitical and purely administrative process as the policy implementation is "delivering the basic policy decision" by decision-makers. According to the top-down model scholars, decision-makers have the power to define clear policy goals, and they are capable of overseeing implementation processes by hierarchically guiding processes. Top-down model scholars, including Pressman and Wildavsky, Sabatier and Mazmanian, and Berman, stressed that implementation is successful when policy design and structuring compliance are key elements. Therefore the behavior of street-level public managers shall be controlled by decision-makers or policy designers (Mazmanian & Sabatier, 1981; Pressman & Wildavsky, 1984).

In contrast, bottom-up model scholars argue that defining an unequivocal policy goal and control process is impossible. Hence the stress on the importance of the discretion of street-level bureaucrats and the political nature of the process. Bottom-up model scholars focus on problem-solving local actors rather than hierarchical guidance (Pülzl & Treib, 2017).

Summary

As a result of these differences, bottom-up and top-down model scholars have divergent approaches to addressing implementation deficits. Top-down model scholars consider policy implementation as prescribing standardized bureaucratic procedures to ensure that the policy is executed in compliance with the statute and regulation. In other words, the top-down model scholars highlighted the importance of compliance with the statute (including prescribed procedures, timetables, and restrictions) that is developed by decision-makers in the hierarchical chain of the administration as one of the key factors positively influencing the successful policy implementation (Sabatier P., 2007). In addition, Sabatier and Mazmanian stressed that decision-makers could ensure effective implementation via appropriate policy design and sound structuring of the implementation process (Mazmanian & Sabatier, 1981). Based on this assumption, Sabatier and Mazmanian further developed three main factors that determine the success of the policy implementation: tractability of the problem, the ability of public managers to structure implementation, and non-statutory variables affecting implementation (Mazmanian,D.A. and Sabatier,P.A. , 1981), (Pressman, J., Wildavsky, A., 1984).

On the other hand, Bottom-up model scholars, including Lipsky (1980), Elmore (1979), Hjern, and Hull, 1982), stressed that implementation is successful when the context of the policy and behavior of street-level public managers are taken into account (Elmore, 1979), (O'Toole,

1986), (Lipsky, M., 1980) (Hill, M.J., Hupe, P.L., 2009), (Hill, 1997). According to bottom-up model scholars, failures in policy implementation are rooted in the inability of the local level public managers to adapt or customize the policy freely to the local context. Therefore the bottom-up model scholars argue that it is important to understand g the goals, strategies, activities, and contacts of the actors involved in the micro implementation process.

Bottom-up model scholars largely contributed to implementation studies by introducing the skills of individuals in the local implementation structure. They argue that a skillful public manager, capable of customizing a policy to local conditions, is one of the key variables to successful implementation. Furthermore, street-level bureaucrats' discretion is a key factor in the policy implementation under the bottom-up model (Lipsky, M., 1980). Street-level bureaucrats' discretion encompasses the practices enabling public managers to cope with daily public policy issues if given autonomy and discretion. In this regard, the bottom-up scholars emphasize the importance of developing policy capacity when implementing the policies.

In addition, bottom-up model scholars contributed to scholarship by introducing two levels of institutional settings in the policy implementation: macro-level and micro-level—thereby adding to theory the importance of context at the local level when assessing implementation efforts. Whereas decision-makers produce the policy at the macro implementation level, street-level bureaucrats react to the macro-level policies, develop their plans, and implement them at a micro implementation level. Bottom-up model scholars have emphasized that implementation problems originate from the interaction of a policy with a micro-level institutional setting. Hence context plays a key role, resulting in the varied implementation of national policies. Bottom-up model scholars stress contextual factors and their dominance, which they argue policy designers cannot control.

The bottom-up scholars tend to define implementation deficit as an ambiguity of intent and unpredictability of response (Bergen, 2005). Bergen, in particular, has theorized that the independent variables influencing the policy implementation include: the clarity of policy guidance, the extent to which it coincided with professional values, local practices, and policies, and (4) the personal vision of street-level bureaucrats. The bottom-up scholars see implementation deficit as dependent on both degrees of the vagueness or interpretive discretion allowed by policy wording and the degree of the willingness by the street bureaucrats to take advantage of and use the policy for their own practice needs (Van Meter & Van Horn, 1975; Lipsky, 1980).

Van Meter and Horn (1975)argued that regional public managers might not comply with the policy because of two dimensions. First, the degree of organizational changes required to implement the policy might not be acceptable for street-level bureaucrats. Second, the degree of consensus over its goals and objectives may be unclear. In other words, the implementation deficit generally finds its origins in cases where there is required large change and low goal consensus (Van Meter & Van Horn, 1975). Van Meter and Van Horn have introduced six variables that explain why policies are not implemented as intended: a) policy statements and objectives that elaborate on overall goals; b) resources that facilitate policy administration; c) effective communication and enforcement activities that minimize deviation; d) the characteristics of implementing agencies burdening implementation capacity; e) economic, social and political conditions; and f) the disposition of implementers is affected by their understanding of the policy, the response of street bureaucrats to the policy (acceptance or rejection), and/or the intensity of the response (Bergen, 2005), (Van Meter & Van Horn, 1975).

In sum, each scholarship has its advantages and weakness. The practical advantage of the Bottom-up model scholars is that they utilize a flexible strategy that customizes the policy to the local context, policy goals, or changes that comply with the values of implementing key stakeholders (Hill & Hupe, 2003; Elmore, 1979; Hill & Hupe, 2009).

The weakness of the bottom-up model scholarship is that street bureaucrats often have a limited level of autonomy, especially in authoritarian regimes such as Kazakhstan. In other words, the street-level bureaucrats do not have full discretion as claimed by the bottom-up scholars. In contrast, decision-makers in authoritarian regimes can structure the goals and strategies of street-level bureaucrats because of the rigidity of their authority. For example, in highly hierarchical administration systems such as Kazakhstan, decision-makers can define the institutional structure and the available resources and, therefore, influence the policy implementation.

The practical advantage of the top-down model is that it is well placed to define the policy implementation in hierarchical and centralized administrative structures. Furthermore, top-down model scholars strive to develop generalizable policy advice due to their identification of consistent behavior patterns across different policy fields. Therefore top-down model scholars have tended to focus on variables that might be controlled at the central level. Subsequently, recommendations of the scholarship tend to be practical, requiring minimal required change (Sabatier & Mazmanian, 1981), reduction of the number of actors and control units (Pressman & Wildavsky, 1984), and clear and consistent objectives (Mazmanian& Sabatier, 1981), and

assigning policy implementation to the public agencies sympathetic with the policy's objectives (Van Meter & Van Horn, 1975; Sabatier, 1986).

Weaknesses of the top-down model study arise from several sources. First, top-down model scholars consider implementation problems from high-level managers, including the head of governments and public agencies, and ignore the perspective of mid-and lower-level public managers, who tend to be subject to contentious and pressing issues in their relationships with other key stakeholders. As a result, the top-down model approach mostly uses hierarchical chain control and well-defined policies as the key variables of implementation success (Lipsky, 1980). The concept of implementation deficit of the top-down model scholars mainly serves for the functionality of the administrative structure (Hupe, 2011).

Second, top-down model scholars consider the implementation process as an apolitical process based on the Weberian dichotomy in which policy managers are insulated from politics and focus on the administrative practices in implementation. Realistically, however, governments increasingly operate in an interconnected environment where the change in socioeconomic structures entails active involvement of the key stakeholders outside of the administration system of the government. This was certainly the case in implementing the digital policy in Kazakhstan.

Hybrid Model approach

The hybrid model approach was developed by Sabatier (1986), Elmore (1979), Matland (1995), DeLeon (1999), O'Toole (2000), and Goggin and associates (1990) as a response critique to the debate between top-down and bottom-up scholars. First, hybrid scholarship contributed to implementation scholarship by addressing the conceptual weaknesses of the debate between top-down and bottom-up model research. Namely, hybrid scholars neglect the normative aspects of the debate and focus on empirical arguments for conceptualizing the implementation process, including central steering and local autonomy. Second, hybrid scholarship emphasizes control variables as ambiguity and control that define what model shall be applied (top-down or bottom-down).

Hybrid model scholars assume that modern society has been more pluralistic than homogeneous. Therefore they argue that the top-down model’s prescriptive of a generalizable solution is not realistic to address the implementation issues. Namely, various stakeholders increasingly demonstrate essential differences in values and perspectives that undermine and bewilder the possibility of clear and agreed solutions (Head & Alford, 2013). Therefore, hybrid

model scholars suggest looking at implementation from the perspective of governance impact on the policy implementation. The scholars strive to comprehensively understand the multiple levels of action and diverse variables that influence implementation. The governance approach was instrumental in stressing the multi-layered structural context, including multiple social actors in the negotiation, implementation, or service provision.

Unlike top-down model scholars that focus on getting the message right, hybrid implementation scholarship emphasizes addressing communication problems in a multiple actor world. In other words, setting collaboration problems or management of a bargaining process is often the core focus of the hybrid model scholars (Hill & Hupe, 2003; Goggin, 1986; Goggin, Bowman, Lester, O'Toole, 1990; Matland, 1995).

To address the management of a bargaining process, hybrid scholars introduced various concepts such as the advocacy coalition framework (Sabatier & Jenkins Smith, 1988, 1993; Sabatier, 2007), backward mapping (Elmore (1980), communications model (Goggin et al.,1990) and Matland's model on ambiguity and conflict (Matland, 1995).

The advocacy coalition framework posits the following assumptions: belief systems are more important than institutional affiliation, and actors may be pursuing a wide variety of objectives, which must be measured empirically (Sabatier, 2007). As the bottom-up model scholar, Sabatier argues that the policy problem is the starting point of analysis and stresses the importance of defining the actors' strategies involved in this problem. In addition, Sabatier argues for the importance of policy learning and recognizes the importance of exogenous social and economic factors that influence policy implementation. The limitation of the advocacy coalition scholars is that they have neglected the social and historical context of the policy problem. According to discourse analysts, discourses define the perception of the actors. Hence, their perceptions influence the political elite's interpretation of social events (Pülzl & Treib, 2017).

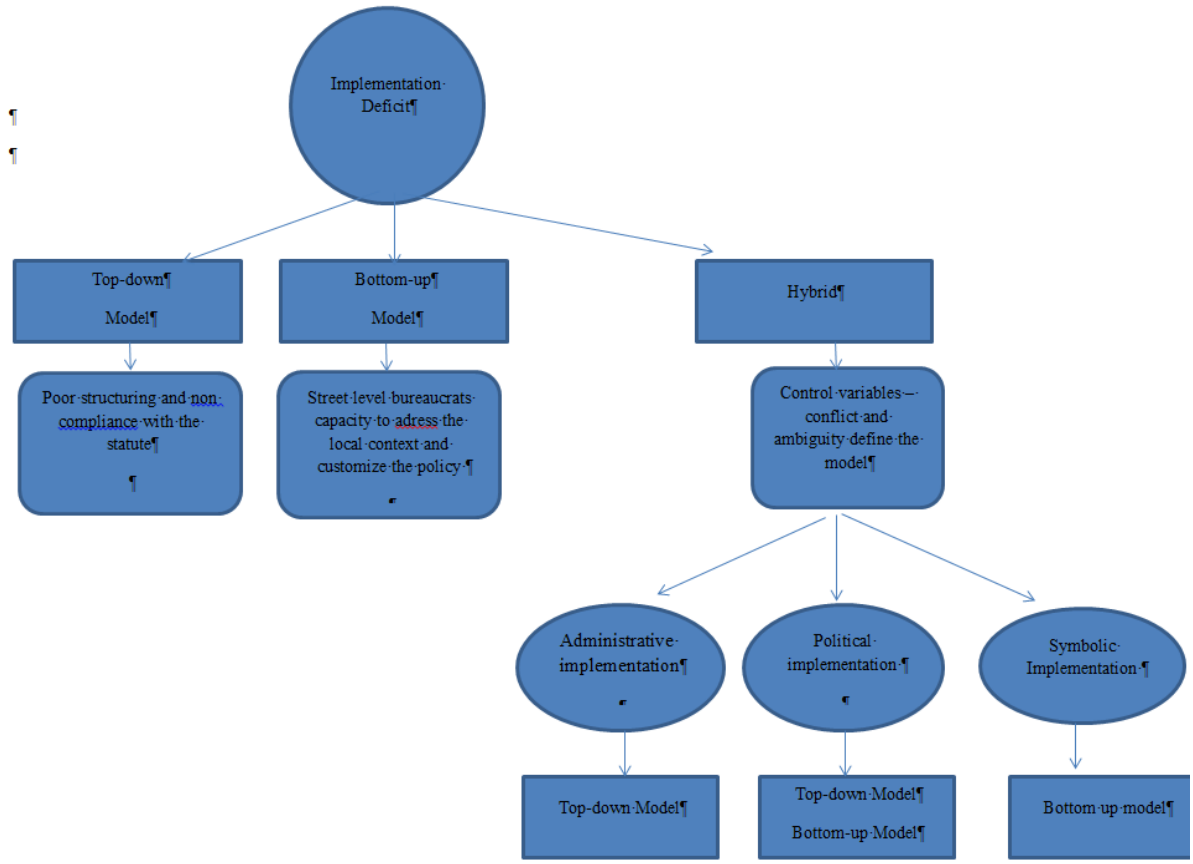
Elmore further developed the hybrid study by introducing concepts of "backward mapping" and "forward mapping." Elmore (1980) defines backward mapping as "backward reasoning from the individual and organizational choices that are the hub of problem to which policy is addressed, to the rules, procedures, and structures that have the closest proximity to those choices, to the policy instruments available to affect those things, and hence to feasible policy objectives (Elmore, 1979). In other words, Elmore argued that policymakers should consider the policy instruments and available resources for policy change. According to Elmore, the decision-maker should define the incentive structure for implementers and target groups. In

contrast to backward mapping, forward mapping has the assumption that organizational units in the implementation process are linked in an essentially hierarchical relationship (Matland, 1995).

Goggin and associates (1990) introduced a communications model focusing on what affects the acceptance or rejection of messages between layers of government. These researchers mainly contributed to the scholarship with their argument that the capacity of the key stakeholders to ensure policy implementation should be treated separately from the control of compliance of the key stakeholders with the provided policy goals (Hill & Hupe, 2003). The authors introduced three clusters of variables that impact policy implementation: incentives and constraints at the top level (central authorities); incentives and constraints from the bottom level (local authorities); and state-specific factors defined as decisional outcomes and state capacity (Matland, 1995). Coggin and colleagues argue that despite consensus, policy objectives are inevitably transformed from top to bottom at multiple layers. Hybrid model scholars have also emphasized the key role of public managers in the hierarchical system of policy administration. Like bottom-up scholars, the hybrid model scholars argue that given the range of institutionalized hierarchies, the thicker the hierarchy (meaning, the more layers of the organization regarding implementation in bureaucratic apparatus), the more important the managerial competence and professionalism of public managers have become essential for the successful implementation (Hill & Hupe, 2003; Goggin, 1986). Therefore the hybrid model scholars emphasize governance skills as key variables in implementation success—including managerial competence and professionalism—which tend to compensate for the lack of goal clarity of the policy implementation (Sabatier, 1981; Hill & Hupe, 2003).

Among all the hybrid model scholarship models, Matland’s model stands out as a result of using control variables to address the taxonomy issue and key variables influencing policy implementation, ignored by top-down and bottom-up model scholars. Namely, the main contribution of Matland's model in hybrid research is that it provides instruments—control variables to understand and solve implementation problems. Despite the plethora of studies, previous theoretical studies of top-down and bottom-up scholars have failed to identify the conditions under which policy recommendations will be applicable.

Figure 4. Implementation theory framework



The theoretical significance of Matland's model is in the introduction of the concept of four types of policy implementation based on the control factors. These include administrative implementation (low conflict—low ambiguity); political implementation (high conflict—low ambiguity); symbolic implementation (high conflict—high ambiguity); and experimental implementation (low conflict—high ambiguity) (Matland, 1995). At the same time, Matland emphasizes the dynamic nature of policy implementation. One type can be transformed into another type of implementation based on the magnitude of factors' influence details, discussed in the theoretical framework chapter.

The typology mentioned above of implementation under Matland's model demonstrates a practical advantage of the model. Namely, incremental knowledge added by Matland's conceptualization of control factors can guide whether to use either a top-down or bottom-up model approach in the analysis of implementation success or failure (Matland, 1995; OToole, 2000). Matland assumes that policy implementation occurs at two levels: at the macro implementation level, including central authorities (decision-makers) developing a policy; and at

the micro implementation level, including regional and local authorities (street-level bureaucrats) reacting to the macrolevel plans, developing their programs, and implementing them (Matland, 1995). So, the strength of either the top-down or bottom-up approach is defined by the strength of these levels.

According to Matland, top-down models are better placed to stress command, control, and uniformity and fail to consider various contexts of the implementation process. Therefore the administrative and political implementation types are subject to top-down model analysis (Matland, 1995; Pülzl & Treib, 2017). In contrast, the bottom-up model is better placed to stress the tolerance for ambiguity and opportunities for the local-level actors to maneuver and can foster innovation. Therefore bottom-up model analysis better frames both experimental and symbolic implementation processes. At the same time, in the case of the symbolic implementation, Matland (1995) has a caveat and claims that neither a top-down nor bottom-up approach is perfectly placed to deal with substantial conflict and ambiguous policy (Matland, 1995).

Matland's model has its limitations as it does not explain why implementation happens and does not provide a prediction of how the implementers might behave in the future. Namely, the scholars criticized that Matland's model mostly focuses on the process and output of the policy (Winter, 2003; Paudel, 2009). In addition, Matland's model has been criticized for using compliance as a conceptual criterion for implementation that is inherently aligned with a top-down and state-centered bias that tends to underestimate the wicked nature of the policy and interdependence of the stakeholders (Heidbreder, 2017; Choi & Walker, 2018). To address this issue, the dissertation uses the policy capacity concept to address the top-down and state-centered bias of the model. This is discussed in the third section of this chapter.

Despite these critics, Matland's model remains instrumental in assessing the implementation process across varied contexts. Therefore, implementation scholars have further developed Matland's model by providing empirical studies in two major areas: the role of context in terms of the institutional context and structure (Jensen, Johansson, & Lofstrom, 2018; Heidbreder, 2017); and capacity building factors (Choi et al., ?; Heidbreder, 2017; Schultz, 2020; Lotta, Coelho, & Brage, 2021). Also, to address the criticism of the lack of prediction power (how the implementers might behave in the future), scholars further developed the Matland's model by exploring the future behavior of public managers and capacity building (Hudson, 2006; Heidbreder, 2017; Choi & Walker, 2018; Garashi, Steinke, & Schafheutle, 2021; Schultz, 2020; Lotta, Coelho, & Brage, 2021).

Hudson was the first researcher who tried to explore the subject of how the implementers might behave in the future using Matland's model, who with their colleagues emphasized that policy support and capacity building are key factors contributing to the policy implementation success or deficit (Hudson, B., Hunter,D., Peckham, S., 2019).

Table 2. Types of the policy failure

Type of policy failure	Mode of policy support
Overly optimistic expectations	Implementation preparation: better policy design
Dispersed governance	Prioritization and tracking: better policy monitoring
Inadequate collaboratipolicymakinging	Implementation support: better policy impact
Vagaries of the political cycle	Implementation review: better policy learning

Empirical studies within Implementation Theory

The growing number of studies provides empirical evidence that the combined top-down and bottom-up approaches have resulted in a significant change in policies in developed countries (Bentur & Sternberg, 2019). Therefore, Bentur and Sternberg (2019) and Coleman (2021) agree that a hybrid approach, based on the synergy between top-down and bottom-up approaches, is a fundamental contribution to understanding policy implementation.

In a study of policy implementation in the healthcare system of Israel, Bentur and Sternberg (2019) found that the synergy between top-down action, such as legislation and directives issued by the Ministry of Health, and bottom-up action in the health organizations, were key factors in the implementation of an advanced care planning policy (Bentur, N., Sternberg, S., 2019). Bentur and Sternberg empirically showed that parallel development of top-down and bottom-up initiatives is critical in policy implementation. The top-down approach entailed legislation implemented and successfully incorporated into clinical practice in their work. Simultaneously, the bottom-up approach was instrumental in encouraging communication between staff, patients, and families around end-of-life decisions in practice (Bentur, N., Sternberg, S., 2019)

In exploring New Care Models (NCM) Vanguard program implementation in England, Coleman and associates (2021) argued in their study that "bottom-up" approaches solely do not lead to well-defined frameworks for others to follow. During a three-year implementation period

of the Vanguard program, the policy was unable to successfully compile the lessons from 50 different local approaches to generate replicable solutions. Specifically, they argued that the experimental approach did not work due to a lack of an evaluation mechanism and political pressures at work requiring rapid demonstration of progress(Coleman, A., Billings, J., Allen, Checklnad. K., Mikelyte,R, Croke, S., Machines, J. , 2021).

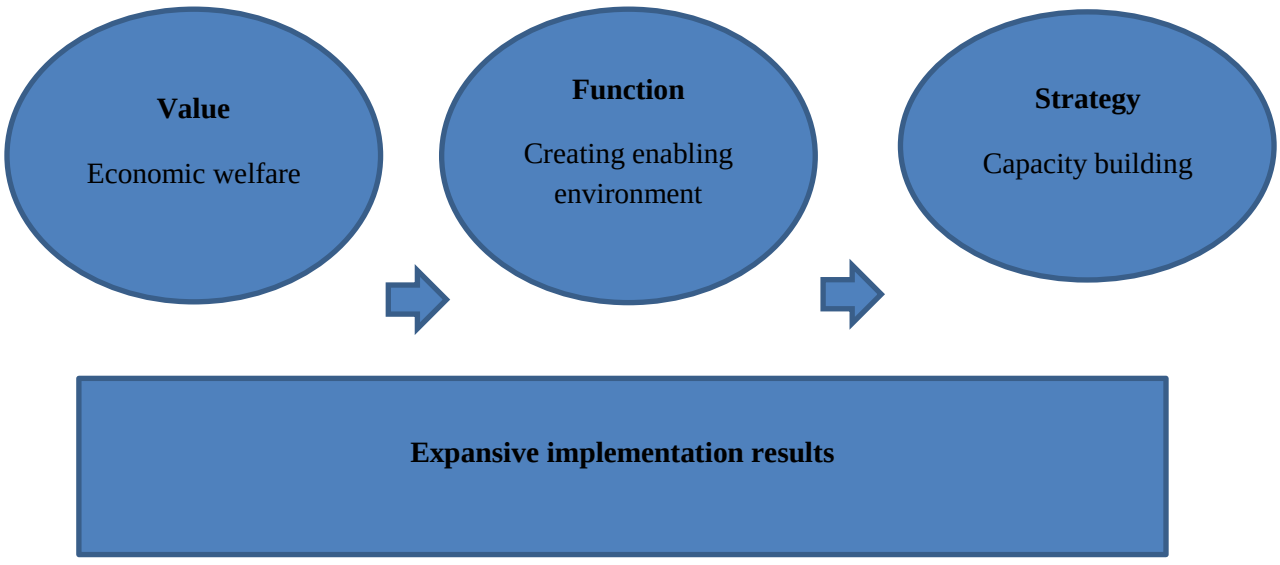
In a study of Switzerland's implementation of regional development policy, Witter, Sager, and Huegli (2022) advocated that more top-down guidance is required when horizontal cooperation is a condition for policy success. Namely, they posited that cooperation at the horizontal level is key for policy implementation. However, it cannot be a voluntary initiative since the voluntary cooperation of subnational units is unlikely due to competition between cantons in Switzerland. Subsequently, the government should employ some top-down intervention to overcome the self-interest and competitive behavior that arises when voluntary arrangements. Therefore, Witter et al. (2022) argued that hierarchical steering remains crucial in achieving policy goals.

An increasing body of literature on policy implementation highlights policy implementation's complex, diverse, dynamic, and vulnerable nature. Therefore, one clear message coming out of the implementation literature is a key factor in the policy's success or failure: i.e., context and stakeholder engagement. First, scholars proffer a perspective that local context is key to successfully implementing policies. Moreover, there is some consensus that policies should be adaptive to offer a range of mechanisms and institutional arrangements given the diversity of contexts and the need for flexibility in responding to high levels of uncertainty and ambiguity. Second, scholarship has identified that focusing on key stakeholder engagement in policy implementation is crucial in ensuring legitimacy (Sowman & Sunde, 2021). Moreover, it is crucial to seek alignment of various key stakeholders' values and principles to advance policy implementation with an eye toward a common understanding and vision of the policy. Therefore, alignment of the values and principles is considered a necessary precondition for success (Sowman, M., Sunde, J., 2021).

As discussed in this section, there are many models for policy implementation and several different models that conceptualize policy failures. Based on the literature review, this dissertation demonstrates that Matland’s model is well suited to analyze what matters for successful digital policy implementation in Kazakhstan, given its ability to use control variables to assess bottom-up or top-down policy interventions.

In an empirical analysis of migration policy in Germany, Schultz (2020) defined capacity building as a key factor in the implementation process. The capacity-building mechanism is seen as a strategy for building public support by creating conditions for increased educational opportunities, including interventions for building skills of both public managers and increasing key stakeholder buy-in. Schutz associated capacity building in terms of aligning the nature of policy to the values held by public managers in a given policy. Schultz argued that diverse public policies based on diverse values should have diverse strategies for building policy support and capacity-building mechanisms during the policy implementation process. Namely, Schultz argues that strategies like economic welfare or regulatory control can result in more expansive or restrictive implementation outcomes (Schultz, 2020). More succinctly, the scholars argue that there should be a link between the function of the government and the capacity-building strategies. For example, public managers should employ a steering mode of operation or administrative implementation if the government function is based on a regulatory control approach for policy implementation. On the other hand, if the government function is based on economic welfare, public managers are best served by creating an environment mode of operation.

Figure 5. Capacity building strategy – Expansive implementation



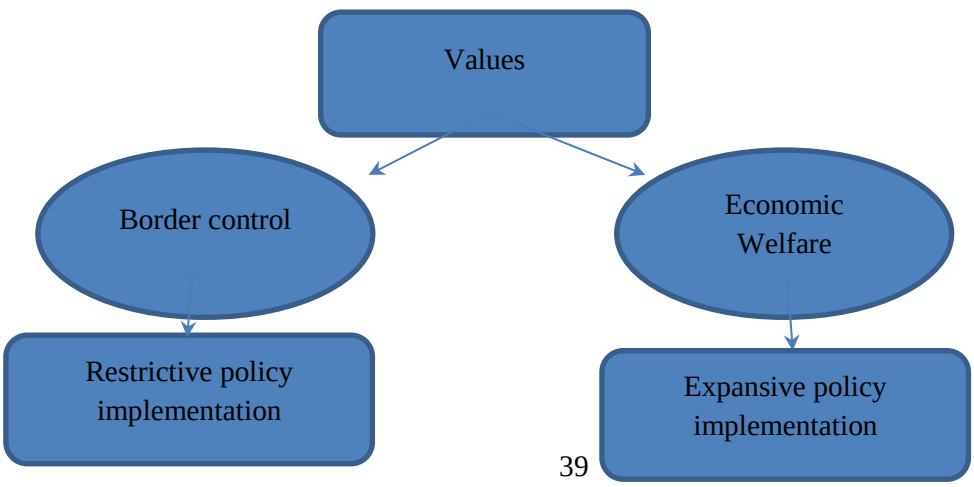
In the empirical analysis of the healthcare system in Arab countries, Garashi and associates (2021) also supported the importance of capacity building in policy implementation. However, they consider it within the framework of administrative policy implementation. They proposed that the main function of the government is to ensure the compliance of agriculture sector players with regulations that address health safety. Garashi and colleagues stressed that

compatibility of policies with local capabilities (in all three countries), stakeholders' agreement on policy goals and means (in Jordan and Oman), and a gradual approach to policy implementation (Jordan) were key factors in the successful implementation of policy. However, these researchers' limitation of the study was that they associated policy success with the policy's administrative implementation. Namely, the high proclivity of the scholars to the top-down approach undermined policy implementation, exacerbating the wicked and intertwined nature of the implementation process itself. In addition, the reliance on administrative implementation relinquished the innovation opportunities provided by the experimental or symbolic implementation process.

In contrast to Garashi, who focused on the top-down approach in using Matland's model, the main contribution of Schultz was that she expanded the original Matland model by conceptualizing different values of street-level bureaucrats as a driving force in the policymaking process. Namely, two logics were seen as driving internal migration policy: i.e., economic welfare and regulatory control logic were shown as having diverse implications for policy implementation. Based on the empirical research, Schultz argued that the more conflictive and hence ambiguous the policy, the more important is the role of the street-level bureaucrats. Schultz stressed that the policy's value is crucial for policy implementation. She noted that differences in logic, such as economic welfare or regulatory control logic, can result in expansive or more restrictive implementation results. In addition, policy implementation is linked to the broader migration policy context. As a result of this focus, Schultz emphasized the role of the values and assumptions of street-level bureaucrats in their discretion level.

The weakness of Schultz's research findings is that they cannot make causal claims as to why certain offices employ one or the other logic. However, the research sheds light on the role of values and logic in the decision-making of public managers.

Figure 6. Values and capacity building strategy



In an empirical analysis of policy implementation in the education sector in Hong Kong, Choi et al. (2018) also stressed that capacity building is a key factor influencing why policies are not implemented as intended. In a detailed case study of Hong Kong's attempts to implement eight reforms in two schools, the scholars indicated that policy support in the form of capacity building or teacher development ("TD") was one of the crucial factors in policy implementation within the education sector. Choi and associates analyzed the role of street-level bureaucrats, assessing the following aspects: a) the importance of their decisions on how to interpret the reform or policy text; b) their power to decide what characteristics of the reform shall be implemented; and c) in what way based on their discretionary power. They found that customizing the TD provision to perceived reform characteristics contributes to teachers' positive perceptions of and experience with reforms.

Choi et al. strongly emphasized the role of the government in creating a favorable environment in the policy implementation process, using a strategy of capacity building for all types of policy implementation. Furthermore, Choi et al. criticized the compliance approach of Matland's perspective of implementation mechanisms as being normative, coercive, and remuneration mechanisms. Therefore, Choi and associates proposed introducing the capacity building component in the policy design as a separate fourth implementation mechanism.

As Schultz, Choi et al. also stressed the importance of the values of the street-level bureaucrats. They recommended customizing policy support intervention to align with the perception and beliefs of the teachers on educational policy in Hong Kong.

Based on the level of ambiguity and conflict, Choi et al. introduced capacity building as a mechanism for policy implementation, consisting of the following typology: a) Informative; b) Negotiatory; c) Experiential; and (d) Experiential as well as Negotiatory. Choi et al. suggested that the government should support the teachers with low conflict and low ambiguity perceptions in policies through informative TD. Informative TD was associated with initial positive perceptions of the policy by the teachers. In contrast, teachers with a high level of ambiguity and low level of conflict were not swayed by a one-off TD; the researcher found it is not adequate for understanding the goals and means of the policy and could result in a lack of competence, emotional cost, waste of resources, and superficial implementation. Therefore Choi and colleagues suggested introducing hands-on experience with contextualized support within the experiential TD framework. It was also noted that policies with a high level of conflict but a low level of ambiguity require the engagement of the stakeholders in the negotiation process. Choi et

al. suggested, in this case, applying negotiatory TD to address the emotional unrest associated with the adoption of pedagogic change, changing pedagogic beliefs and identities. They suggested using a combination of experiential and negotiatory TD to implement high ambiguity and high conflict policies

Figure 7. Scholarship development under Matland's model

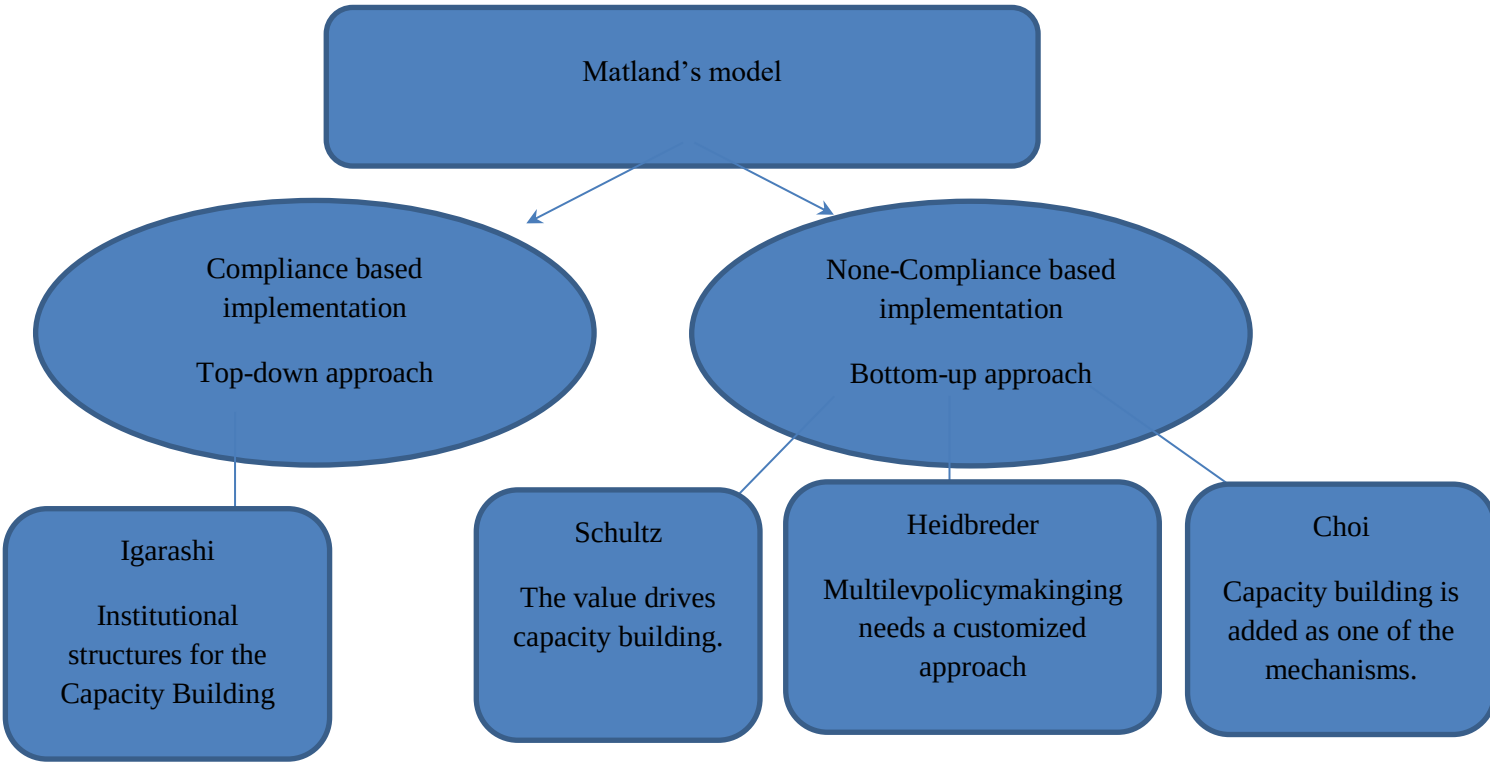


Table 3. Capacity building typology of Choi et al.

	Ambiguity low	**Ambiguity high**
Conflict low	**Informative TD** Provides factual or theoretical knowledge and trains basic, straightforward skills **(talks and information sharing seminars)**	**Negotiatory TD** Focuses on communication, persuasion, and negotiation **(open discussion and consultation)**

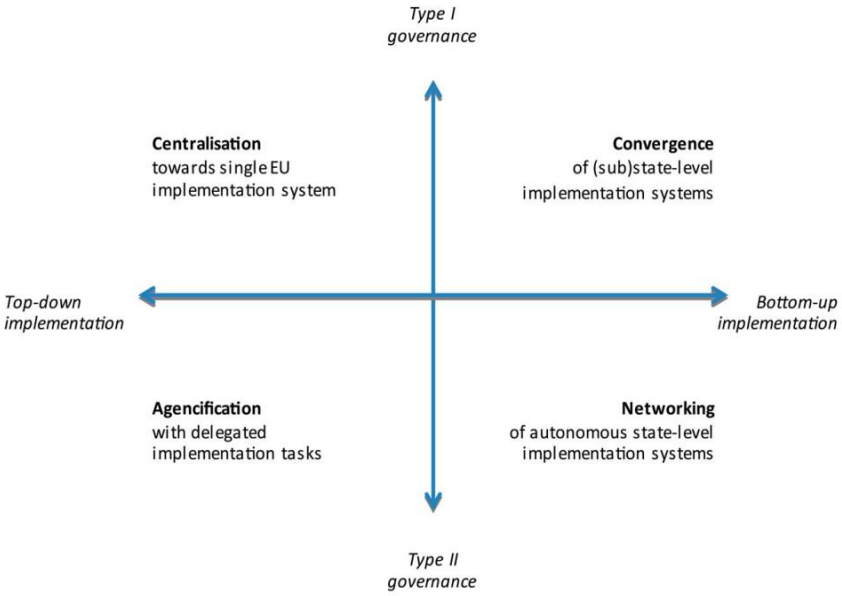
Conflict high	**Experiential TD** Involves interaction, collaboration, and reflection assisted by peers and mentors. **(workshop, mentoring scheme, and peer support group)**	**Experiential and Negotiatory TD** It aims to change attitudes and beliefs and develop complex knowledge and skills. **(consultations combined with workshops)**

The practical implication of the findings of Choi et al. was centered on the preparation stage of the policy implementation. Choi et al. argued that initial degrees of ambiguity and conflict surrounding a policy should be assessed prior to implementation via stakeholder surveys or focus group interviews. This approach will enable the policymakers to build the legitimacy of the policy and identify the type of policy support needed and the structural issues of the policy. They also argued that a customized approach based on the specificity of each school should be a priority as the one-size-fits-all approach does not work.

In an empirical study of policy implementation in EU institutions, Heidbreder contributed to policy implementation scholarship by introducing specific strategies suitable for policy implementation. While Matland focused on policy implementation within one country domain, the main contribution of Heidbreder was that she proffered a multilevel approach to policy implementation. Namely, in multilevel implementation, the policies are formulated on the supranational level but are implemented and enforced at the lower national levels. Heidbreder criticized Matland's implementation strategies based on compliance logic, including mechanisms of coercion, remuneration, or bargaining. In contrast to Matland, Heidbreder elaborated four implementation strategies in multilevel settings suitable for multilevel governance systems: centralization, identification, convergence, and networking.

Heidbreder stressed that **networking** is a more effective response to particular implementation failures linked to information exchange or interface management in high conflict or high ambiguity policies. Choi et al. also paid attention to the context-specific nature of the policies and the personalized nature of the policy support of street-level bureaucrats. Choi et al. also stress that it is essential to bring negotiation a priority to break the inertia of professional teachers and manage the demands of the policy initiators and managers. Finally, Choi et al. stress that staff with different backgrounds (young or more senior teachers) within the same school experienced individual reforms differently. Therefore, a discussion of TD in a reform context should integrate this personalized nature of TD needs.

Figure 8. Implementation strategies in the multilevel governance system



Prepared by Heidreder(2017)

Jensen et al. (2018) contributed to Matland's model by synthesizing the project-based management scholarship implementation theory. In an analysis of the literature review relating to the role of the project organizations in the policy implementation process, Jensen highlighted that the institutional context is the key variable explaining why the policies are not being implemented as intended (Hill & Hupe, 2014; Hupe, 2011). Jensen and colleagues emphasize in their work that the project organizations do not operate with autonomy. Hence it is essential to 'fit' the existing governance structure by building congruent mechanisms for interaction, coordination, and integration between the project organization and those public institutions the project organization depends on to fulfill its implementation task. They highlight the importance of project organizations creating and managing relationships. As argued, if public managers fail to use engagement or congruence mechanisms, the organization, in turn, will fail to implement the policy and, as such, will remain isolated from the existing governance system. Jensen and associates also raised the issue of "fitting" the capacity of governmental institutions to “steer” or govern societal development. Consequently, the researchers stressed the importance of capacity building through collaboration and learning, both needed to facilitate implementation.

In a Brazilian study of health policy implementation of frontline workers (including nurses and social workers) during the COVID-19 pandemic, Lotte et al. (2021) argue that capacity-building mechanisms and guidance of decision-makers constitute the main factors influencing why the policy is not implemented as intended. Lotte and associates posit in their work that multilevel systems create high ambiguity and space for high discretion by street-level bureaucrats. Therefore, policies lacking regulation, coordination, and adequate support, including resources, might lead to inaction for street-level bureaucrats with high discretion (Lotta, Coelho,& Brage, 2021). In other words, in contrast to Matland's argument, Lotta and colleagues argue that high ambiguity does not always stimulate innovations. Instead of becoming entrepreneurs or taking control in emergency contexts, public managers in high risk, high ambiguity, and lack of support in regulatory environments can lead to a high propensity for non-enactment. In other words, high levels of discretion associated with the ambiguity of regulation and decentralized implementation often result in inaction during the policy implementation process. In the Brazilian case, for example, the role of social workers was negligent during the Covid 19 pandemic. At the same time, nurses had higher capacity-building opportunities and, therefore, could adapt their work to a challenging environment during a pandemic more readily than their social work counterparts.

From a perspective of utility, the literature review revealed that Matland's model (1995), when looking at the impact of conflict of goals and ambiguity of goals and means, is quite useful in conceptualizing the concept of implementation deficit. This is certainly true for conceptualizing digital policy in the agriculture sector of Kazakhstan, given that it has both top-down and bottom-up characteristics. Namely, Kazakhstan has a highly hierarchical administration system and new governance challenges when attempting to bring about the digital transformation of the agriculture sector on another side.

In distilling the main factors influencing the policy implementation, this dissertation has analyzed top-down and bottom-up models—key factors influencing policy implementation. This research has revealed that the polemic debate on applying either the top-down or bottom-up model to analyze implementation deficit or success remains an open question. Each model has its advantages and has proven instrumental for the author in identifying the appropriate unit of analysis and process. For example, this research has found that Matland’s model enabled the author to use either a top-down or bottom-up approach to analyzing implementation success or failure (Matland, 1995; OToole, 2000). In addition, the literature review revealed that Matland's model also has great utility in providing a theoretical framework for this policy implementation analysis as it relates to development or reform (Choi et al., 2018; Schultz, 2020).

The literature review has revealed that most of the empirical studies on the analysis of Matland's model are concentrated in the area of healthcare (Garashi, Steinke, Schafheutle, 2021; Coleman, Billings, Allen, Checkland, Mikelyte, Croke, Machines, 2021; Lotta, Coelho, Brage, 2021), migration (Schultz, 2020), social and welfare policy (Hudson, 2006), public education policy (Choi & Walker, 2018; Hordern, 2015) and institutions (Heidbreder, 2017), (Jensen, Johansson, & Lofstrom, 2018). Unfortunately, no studies were found for the agriculture sector policy implementation in developing or transition countries. Moreover, most studies are concentrated on the western hemisphere, except for studies on healthcare implementation in developing Arab countries (Garashi, Steinke, & Schafheutle, 2021) and Brazil (Lotte et al.).

Using empirical studies of Matland's model, the dissertation found that capacity building and values are key factors in the policy implementation process (Hudson, 2006; Choi & Walker,2018; Schultz, 2020). Moreover, in a Brazilian study of health policy implementation during the Covid 19 pandemic, Lotte et al. (2021) argued that policies that entail innovation requirements should be based on the guidance of the central authorities and capacity-building mechanisms. Otherwise, the policy implementation will result in a policy implementation deficit. These findings imply that the bottom-up approach is still essential in innovation-related studies. However, given authoritarian regimes and developing country contexts, the bottom-up approach is more instrumental in analyzing policy implementation in developing countries contexts.

Heidbreder (2017), Lotte et al. (2021), Choi et al. (2018), and Jensen et al. (2018) have highlighted that the capacity-building factor is a key factor in the implementation process from an institutional perspective. In case of high conflict and high ambiguity policies, scholars propose to use network building as a strategy to build up relationships between key stakeholders as a key factor in implementation success or failure. Namely, scholars criticize the compliance approach for its use of implementation mechanisms such as coercion, remuneration, and bargaining, which do not meet conceptual needs given the complexity of the policies. Therefore, scholars propose the introduction of the capacity building component in the policy design as a fourth implementation mechanism (Heidbreder, 2017; Choi & Walker, 2018; Lotta, Coelho, & Brage, 2021).

In addition, the literature review uncovered the assumption that the more ambiguous the policy is, the greater the space for bureaucratic discretion (Matland, 1995; Hupe & Hill, 2007). Bottom-up scholars argue that high discretion increases creativity and innovation (Matland, 1995; Lipsky, 2010). However, higher discretion might undermine policy implementation and result in public managers' inaction or action paralysis (Matland, 1995; Lotta, Coelho, & Brage, 2021). In order to avoid this kind of problem, discretion should be manageable and accountable (Lotta, Coelho, & Brage, 2021). Therefore the willingness of public managers to implement policies depends on their capacity (Hudson, Hunter, & Peckham, 2019; Heidbreder, 2017; Choi & Walker, 2018; Garashi, Steinke, & Schafheutle, 2021), which is a necessary factor but not a sufficient condition for successful policy implementation. Heidbreder (2017) and Choi et al. (2018) contributed to the scholarship by introducing the implementation mechanisms. These hybrid scholars highlighted the institutional context as the key variable influencing why the policies are not implemented as intended. While Choi et al. proposed to include capacity building as the instrumental mechanism in the implementation, Heidreder focused on networking mechanisms.

2. The digital policy and digital transformation

In comparison, literature focusing on the digital policy in the agriculture sector has been tackled widely from a social-economic perspective. However, there is limited research on the specificity of digital policy in the agriculture sector from a public policy and public administration perspective. The lack of studies in Kazakhstan indicates that this topic is understudied or neglected. Although studying the implementation of digital policies in the agriculture sector has been under the attention of numerous scholars, there is an urgency for more research to address diverse issues related to implementation from a public management and public policy perspective. Moreover, most literature on digitalization of the agriculture sector was conducted in Western hemisphere countries, and no systematic types of research have encompassed transition countries in the region of Central Asia--historically agricultural

countries—where agriculture is the source of food security and income. Therefore, understanding the digitalization of the agriculture sector in Kazakhstan could bring valuable insights into key factors in implementing the policy within a developing country context.

Finally, the analysis of the previous research of scholars on the agriculture sector has revealed that scholars have mainly focused on the effect and capacity-building aspects of digitalization of the agriculture sector at the micro-level (organizational or individual levels) instead of the institutional origin issue. For example, limited studies of digitalization of the agriculture sector have focused on the role of institutional context, including the formal structure, systems of decision-making, and underlying interpretive schemas, including the core values, beliefs, and ideology.

While there are a plethora of analyses regarding digital policies in the framework of e-government initiatives, none were identified that conducts an empirical analysis of how public policy makers and different stakeholders in developing countries manage the implementation of digital policies in the agriculture sector.

A limited scholarship looks at the implementation challenges of digital technologies in the agriculture sector in general from a public policy perspective. A scholarship led by Dunleavy (2015) focused on the impact of digital technologies on the public sector in general. Dunleavy and Garcia et al. (2018) criticized the public administration and public policy decision-making process for being dominated by technology companies. In comparison, citizenry interest has been left out of the agenda, especially regarding wicked problems of big data and algorithms (Dunleavy & Margett, 2015).

The key contribution of Gil Garcia et al. (2018) and Dunleavy (2015) was to bring up a need for an integrated and holistic government accessible to all citizens. Gil-Garcia recognized the increasing role of political leadership in shaping digital government and further developed the scholarship by emphasizing the importance of new decision-making processes and new

concepts of citizenship. Dunleavy et al. argued that governments rely more on IT for critical functions (financial); however, its capabilities for defining, developing, and operating these critical systems are decreasing. Brunetti et al. (2020) further developed Duneavy's concept of citizenship and acknowledged a multifaceted set of strategic actions required by key stakeholders in digitalization.

Brunette et al. identified three main pillars driving digitalization: culture and skills, infrastructure and technologies, and ecosystem. The first pillar includes three strategic fields of action: digital education, talents, and digital culture. The second pillar includes the need for information, interaction, and artificial intelligence as key strategic fields of action. The third pillar highlights investing in medium- to long-term visions, partnerships, and life quality. In other words, Brunetti and associates stressed the importance of a holistic approach and avoiding standalone interventions to tackle the digital transformation from a systemic perspective. A practical implication is that it highlighted the importance of developing digital culture and skills prior to investing in digital infrastructure and technology. The downside of the study was that it focused on a moderately innovative macroregion such as Tyrol–Veneto in Italy, a region that surpasses most developing and transition countries' innovation levels. Brunetti et al. recommended that public administration mainly invests in digital education and partnerships, taking a more proactive role in providing digital skills to students and employees. In addition, Brunetti et al. emphasized the importance of the availability of financial resources to encourage the digital transformation processes. Both Brunetti et al. and Fielka et al. (2019) recognized on importance of the engagement of the key stakeholders in the digitalization process. Fielkia et al. recognized uncertainty around the policy implications of digital technologies in the context of the agricultural industry of Australia. Scholars have postulated that negotiation and raising awareness among key stakeholders is key to mitigating risk and increasing the flexibility of transition pathways. Both Fielka et al. and Brunetti et al. have stressed that stakeholder engagement (via creating new channels as "table talks") is essential in digital transformation.

Scholars agree that the digital transformation in the agriculture sector leads to drastic changes in agricultural values and means of production (Fielka et al., 2019). These changes will include social-economic changes, like the industrial revolution, the green revolution, or neoliberal restructuring.

As provided above, many studies address the challenges related to the implementation of digital technologies in the agriculture sector via the social aspect from a developed country's perspective. These studies include empirical research related to the exploration of social responses to smart farming in Canada and the United States, Australia and New Zealand (Klerkxa, L., Jakkub, E., and Labarthec, P., 2019) and Europe (Klerkxa, Jakkub, & Labarthec, 2019; Janc, Czapiewski, & Wójcik,2019); (Knierim et al., 2019).

The developed country literature on the digital policy in the agriculture sector from the socioeconomic perspective highlights the divergent drivers of digital policy in general. In comparison, some researchers follow the top-down model perspective as Knierim et al. (2019). Others focus on the bottom-up model approaches. Namely, Knierim and associates have emphasized the government's leading role in the rolling out of the digital policy. Vik et al. and Bronson argued the role of the affected or target groups as local communities ((Klerkxam Jakkub, & Labarthec, 2019; Vik, Stræte, Hansen, & Nærland, T., 2019)) and large-scale vertically integrated corporations in the implementation of digital policies in the agriculture sector (Bronson, 2018). Knierim et al. have contributed to the scholarship by emphasizing the steering role of the government in digital policies in the agriculture sector. The authors have posited that due to a lack of information, training, and access to consultative advice on precision farming, farmers are not in a good position to assess digital policies' realistically technological pros and cons and have been resistant to digital policies. At the same time, Knierim and associates have acknowledged the level of high ambiguity in using the technologies in the agriculture sector by the key affected group—i.e., farms.

By contrast, Vik et al. (2019) have followed the bottom-up model approach and stressed that the implementation of digital policies in the agriculture sector of Norway was driven mostly by the local community. Namely, the local community invested in milking robots to improve residents' quality of life, as digital technologies reduced physical work and enabled a flexible workday. The authors stressed that the government did not push for digital policies or structural changes but rather adopted the digital policy to the local community's needs. Vik et al. emphasized that the successful implementation of digital policies in Norway is associated with farm-level strategies, political adaptations, and technological characteristics.

A range of studies looks at the local community's resistance to the adoption of Digital policies from the perspective of broader socio-cultural implications of digital agriculture, with a focus on farmer identity (Knierim et al., 2019). For instance, Knierim et al. have stressed that the reluctance of farmers to adopt digital policies is driven by the ignorance or lack of required skills to use digital technologies. On the other hand, Wiseman et al.(2019) argue that farmers' resistance to adopting digital policies, including sharing data, is rooted in a lack of transparency and clarity regarding privacy, trust, and liability in the commercial relationships governing digital agriculture. They found that farmers lack trust in third parties (technological companies which provide digital services)—who collect, aggregate, and share their data (Wiseman, L., Sanderson, J., Zhang, A., Jakku, E., 2019), (Wiseman, Sanderson, Zhang, &, Jakkub, 2019; Klerkxa, Jakkub, & Labarthec, 2019).

Wiseman et al., and Reagan, emphasized the role of privacy concerns in the decision-making process, which is caused by the ambiguity of technology, policy goals, and policy means. Both authors emphasized that the government should consider much required legal and regulatory frameworks to mitigate this risk and vulnerability of the digital system regarding privacy (Regan, 2019). Also, Regan identified a list of risks perceived by the key stakeholders in the agriculture sector, including an inequitable distribution of risks and benefits within the farming community, consumer rejection of technologies, adverse socioeconomic impacts of

increased farmer-technology interactions, and ethical threats derived from the collection and sharing of farmers' data (Klerkxa, Jakkub, & Labarthec, 2019). Regan found that resistance of the local community is linked with ambiguity related to potential risks and suggested that all the key stakeholders should be actively involved in the solutions-oriented decision-making process in the development and implementation of digitalization programs. Regan discovered that such an approach empowers farms and local communities and results in increased legitimacy and ownership of the program, leading to better policies (Regan, 2019). The scholars agree that the acceptance level of digital technologies is subject to the diversity of producer characteristics and farming types. Namely, Janc et al. (2019)and Knierim et al. (2019) argue that large-scale farms are more likely to support digital policies than small-scale companies.

Based on a literature review of the developed countries' scholars, no consensus would allow for the parsimony of success factors in implementing digital policies. However, there is a common understanding that the implementation of digital policies is not contextually neutral. Therefore, to facilitate the implementation process, there is a pressing need to understand ambiguity regarding technology, privacy, and conflicting interests of the key stakeholders, including affected target groups, the decision-makers, and street-level bureaucrats. Unfortunately, limited studies address the challenges related to digital technologies in the agriculture sector in developing countries. Most studies focus on either conflict of interests between the affected or target groups (Janc et al., 2019) or a positive role of technology companies in risk management related to climatic or financial risks (Klerkxa, Jakkub, & Labarthec, 2019).

Janc et al. (2019) highlight conflicting values between digital technologies and the local community resulting in the "digital divide" regarding access and capabilities to use ICT. Namely, Janc et al. (2019) stress that the social structure of the Polish agriculture sector contradicts the individualistic approach of digital technology, which erodes the institutions' associated local ties of blood and neighborliness.

3. Policy capacity Concept

The concept of policy capacity is important in theoretical and empirical inquiry in exploring digital policy implementation in Kazakhstan's agriculture sector. The research dissertation uses the concept of policy capacity not to develop a new theory but to utilize evidence-based and theory-informed insights to explore what is an essential factor for steering the digital transformation process in the agriculture sector. The policy capacity concept enables scholars to understand and address the issues and challenges arising from the digital transformation of the agriculture sector. The big tech corporations and farms in advanced countries have gained great wealth and power from the technologies. However, many institutions and communities in developing countries can only adapt at an incremental pace and subsequently get left behind. Understanding the policy capacity enables the researcher to understand the missing factors inhibiting society and government from transitioning to a new digital economy paradigm. The new digital paradigm can bring not only new improvements to society but also can bring a new digital gap or digital divide. The digital gap or digital divide can emerge from cleavages between the potentials of the technology on the one hand and the realities of everyday institutions in terms of laws, regulations, or sectors being structured on the other hand. This gap shall be considered the faultline, and therefore the governments should strive to close such gaps via understanding new governance instruments and enhancing the policy capacity.

The policy capacity concept is a part of the governance concept which has been promptly emerging in public policy literature. Given a need for new modes of governance for achieving improved coordination in the interconnected and multifaceted policy domain, scholars defined three forms of mechanisms of the governance with the key stakeholders: hierarchical or legal, market, and network, which vary based on the types of relations between key stakeholders involved in the policymaking (Bouckaert, G., Peters, B.G., Verhoest, K., 2010), (Peters, Policy capacity in public administration, 2015), (Capano, G., Howlett, M., & Ramesh, M, 2015).

Under the governance concept, given the dominance of the Weberian approach, hierarchical or legal mechanisms entails well-defined goals, rules, tasks, control, and accountability. Market mechanisms are based on performance management and focus on improving competition and exchanges. In market mechanisms, organizations and individuals are encouraged to compete for resources. Finally, network mechanisms entail assumptions of reciprocity, shared values, collective learning, voluntary cooperation, and partnerships among organizations (Bouckaert, G., Peters, B.G., Verhoest, K., 2010), (Peters, Policy capacity in public administration, 2015).

Along with the diversity in the governance mechanism, modes of governance also entail diverse skills (Howlett, M., Ramesh, M, 2015). Given the impact of social forces on policymaking, the concept of policy capacity was systematized by a growing number of scholars (Howlett, M., Ramesh, M, 2015), (Ramesh, M., Wu, X., He, A.J., 2013), (Wu, X., Howlett, M., Ramesh, M., 2018). In a broad sense, policy capacity is considered the ability of the government to make choices of resource distribution (Lasswell, 1951), (Painter, M., & Pierre, J., 2005), (Fukuyama, 2013) to introduce strategic directions after assessing the context ((Howlett, M., Ramesh, M, 2015), to propose alternative policy pathways (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021), and to make intelligent and quick collective choices, to set strategic directions (Painter, M., & Pierre, J., 2005), (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021). Subsequently, the concept of policy capacity refers to the knowledge and skills required for addressing policy challenges and effective communication of these challenges together and jointly with the key stakeholders (Howlett, M., Ramesh, M, 2015). In other words, the concept of policy capacity provides a systematic way to define government capabilities.

In this research study, the definition of “policy capacity” refers to the concept proposed by Wu et al., who defined policy capacity as the set of skills, competencies, and resources across

government agencies to perform all policy functions (design, implementation, monitoring, and evaluation) (Wu, X., Howlett, M., Ramesh, M., 2018).

Wu et al. (2015) contributed to the growing body of literature by introducing a framework to conceptualize policy capacity at multiple levels of governance (Wu, X., Howlett, M., Ramesh, M., 2018). In other words, Wu et al. contributed to the conceptualization of policy capacity in a more nuanced way, referring to diverse types of capabilities within and outside public organizations (Wu, X., Howlett, M., Ramesh, M., 2018), (Wu, X., Howlett, M., Ramesh, M., 2018). Nevertheless, Wu, Howlett, and Ramesh introduced a holistic and integrated conceptual formulation of policy capacity that identifies three elements of capacity at three levels (Howlett, M., Ramesh, M, 2015).

Namely, Wu et al. introduced three types of competencies (analytical, operational, and political) into the context of three levels of analysis (individual, organizational, and systemic) (Wu, X., Howlett, M., Ramesh, M., 2018). Wu et al. argue that different modes of governance require different types of competencies at the individual, organizational, and system levels (Peters, Policy capacity in public administration, 2015). Individual-level includes a level of policymakers, decision-makers, and implementers. The level of organizations entails an agency or a program. Moreover finally, the systemic level entails the whole government or the macro-level institutional and structural contexts (Wu, X., Howlett, M., Ramesh, M., 2018). In practice, public managers have to acquire specific skills that enable the relationships, the use of instruments, and the effective operation of the modes of governance (Wu, X., Howlett, M., Ramesh, M., 2018). Howlett and Ramesh (2015) stressed that patterns of relationships of public managers and their capabilities used in the policymaking process impact the variability of modes of governance. Furthermore, Wu et al. defined nine capacity types having unique analytical and practical characteristics. The policy capacity concept relies on a nested logic, with the different levels interacting and affecting each other.

Policy capacity as an analytical concept has been further marshaled in vast research studies across geographic contexts and policy domains (Tenbensel, T., Raj Silwal, R., 2022), (Bakır, C., & Çoban, M.K., 2019), (Howlett, M., Ramesh, M, 2015), (Karo, E., Kattel, R., 2018), (Daugbjerg, C., Fraussen, B., Halpin, D., 2018), (Bali, A.S., Ramesh, M., 2021).

A broad body of empirical analysis of policy capacity scholarship is divided into two main research areas in terms of the unit of analysis of the policy capacity concept. The first group of scholars focused on the policy capacity of the public managers at all scales of government. Namely, policy capacity has been defined as a catalyst for enhancing the effectiveness of inter-agency relationships. Most scholars agree that public managers have the resources to implement the policy and be active players in policymaking and policy implementation. However, these public managers face a number of challenges in utilizing those resources in policy implementation (Peters, Policy capacity in public administration, 2015).

Firstly, scholars highlight the tension between politicians and public managers (Peters, Policy capacity in public administration, 2015). Peters argues that public managers struggle to use resources when challenged by other political actors with somewhat stronger claims for legitimacy. Furthermore, politicians are reluctant to provide public managers with any authority. Therefore it is critical to have policy capacity to implement the policies effectively in such a context. Moreover, public managers need to have the expertise and the information available within the bureaucracy (Peters, Policy capacity in public administration, 2015). Public managers who operate in the policy domain with strong think tanks, political parties with research offices, and an effective parliament may be less successful in shaping policy than one with lesser capacity when it can have a virtual monopoly on policy advice (Peters, Policy capacity in public administration, 2015). Peters somehow positions other key stakeholders as an antagonist to the operation of the public managers and proposes using the policy capacity to address this tension between the public managers and other key stakeholders. Peters argues that public managers should have technical knowledge of the context. The context includes the knowledge of key

stakeholders and conditions in the policy domain. Subsequently, street-level bureaucrats have high discretion in implementing the policies given changing conditions of the context, which can influence the policy cycle (Peters, Policy capacity in public administration, 2015).

Secondly, one of the main challenges in policy implementation includes the horizontal and vertical coordination of the key stakeholders in the policy implementation. The principal internal challenge of coordination envisages linking the street-level bureaucrats with the top ‘‘decision-making’’ levels system. There is a tension that the street-level bureaucrats might have their own views and use their discretion in the policy implementation, which might differ from the goals intended by the decision-makers (Peters, Policy capacity in public administration, 2015). On the other hand, each public manager might want to be a drummer and take control of policy implementation according to his or her own view, which might differ from the initial policy goals (Peters, Policy capacity in public administration, 2015).

Asmorowati et al. analyzed the tensions between decision-makers and regional public managers resulting from decentralization based on the implementation of social safety net policy in Indonesia during pandemic Covid 19 (Asmorowati, S., Schubert, V., Ningrum, A.V., 2020). Namely, Asmorowati et al. argue that the human factor, individuals negotiating and navigating complex and problematic systems and processes, is key to successful policy implementation (Asmorowati, S., Schubert, V., Ningrum, A.V., 2020). Asmorowati et al. argue that notwithstanding the dominance of national government in policy design, the implementation of social welfare policy and social safety nets rests with local governments. Consequently, notwithstanding decentralization, local autonomy, and optimal policy capacity are key factors for the implementation, the policy capacity of the regional public managers is essential in the implementation rather than 'systems' and 'processes .'Asmorowati et al. stress that the human factor is a key factor in the thinking, design, and implementation of systems and processes in the case of Indonesia's COVID-19 social safety nets (Asmorowati, S., Schubert, V., Ningrum, A.V., 2020). Namely, Asmorowati et al. argue that human agency is not about framing decentralization

and local government autonomy but rather how individuals frame decisions to act. In other words, the values of the public managers in terms of their sense of social or moral imperatives, such as reaching vulnerable people through social safety nets, are key in the policy implementation (Asmorowati, S., Schubert, V., Ningrum, A.V., 2020).

The second group of scholarship refined the role of other key stakeholders in the broader policy capacity concept definition. Namely, scholars argue that policy capacity implies the integrative capacity of governments to orchestrate policy goals and instruments across not only agencies but also layers of governance (Bressers, H.T.A., & Plettenburg, L.A., 1995), (Rayner, J., & Howlett, M., 2009), (Sajadi, H., & Hartley, K., 2021). Most scholars agree that the policy capacity goes beyond the government and includes many key stakeholders, including the public and private actors involved in the policy process. Namely, policy capacity refers to the collective capacity of all stakeholders involved in policymaking, formal and informal institutions. Hence the capacity of the key stakeholders involved in the policy process directly impact the government's own capacity to perform in diverse policy sectors such as financial, education, transport, health sector and other sectors (Painter, M., & Pierre, J., 2005), (Tiernan, A., & Wanna, J. , 2006), (Wu, X., Howlett, M., Ramesh, M., 2018).

In the Dutch case of examination of environmental policy, Bressers and Plettenburg (1995) defined numerous stakeholders that comprise the policy capacity setting based on social capital, collective social norms, and external policy constraints and opportunities (Sajadi, H., & Hartley, K., 2021), (Bressers, H.T.A., & Plettenburg, L.A., 1995). In a Canadian study of integrated land management, Rayner et al. argue that in the context of governments with a relatively high level of policy capacity, but with lack of policy capacity at key stakeholder levels, the governments would fail to develop coherent and consistent multi-sectoral and multi-level policy regimes and encounter with implementation failure (Rayner, J., & Howlett, M., 2009).

In a study of Iranian policy responses during the COVID-19 pandemic, Sajadi and Hartely stress that management efforts, community-based and proactive approaches, targeted economic stimulus, and a clear policy vision for crisis resolution are key factors in the policy implementation (Sajadi, H., & Hartley, K., 2021). Sajadi and Hartley also argue that policy capacity and public engagement is a critical factors in policy implementation during uncertainty and rapid onset of crisis response in resource-constrained settings. (Sajadi, H., & Hartley, K., 2021).

In a study of policy capacity in post-handover Hong Kong, Cheung found that Hong Kong's policy capacity was eroded by a mismatch between the capacities of legal governance systems and emerging policy challenges and social conflict. Notwithstanding the dominance of the politics-bureaucracy dichotomy canons in public administration and public policy literature (leading to the prevalence of the policy capacity concept that focuses on mechanical and operational elements), Cheung argues that policy capacity should operate in a broader social and political contexts. Daugbjerg et al. developed Cheung's argument further by exploring different modes of policy engagement, taking into account the policy capacity of the interest groups (Daugbjerg, C., Fraussen, B., Halpin, D., 2018). Daugbjerg et al. argue that the links between policy context and organizational factors are critical for understanding the development and value of these capabilities. Daugbjerg et al. stress that policy capacity building of interest groups is mostly a dynamic process shaped by policy context and the relationships between government and interest groups (Daugbjerg, C., Fraussen, B., Halpin, D., 2018).

In the Chinese study of the implementation of health reform, Ramesh argues that inadequate attention to strategic interactions among government and key stakeholders, including medical service providers, and the limited understanding of incentives shaping their preferences and behavior, was critical in policy implementation. Namely, in the transformation in health governance, the government failed to ensure control of the emergence of profit-oriented services. This ignorance promoted medical service providers to exploit market failures to advance their

pecuniary interests at the expense of users, thus undermining the entire health system (Ramesh, M., Wu, X., He, A.J., 2013). Ramesh et al. emphasize that the government should strengthen capacity at the level of the regional public managers and the key stakeholders as the medical service providers, insurance companies, and users. Namely, decision-makers need to enhance their governance capacity and play a larger role in steering provincial and municipal governments (Ramesh, M., Wu, X., He, A.J., 2013).

Based on these two approaches in policy capacity scholarships, Tenbensel and Raj Sijwal further developed the usage of the policy capacity types under different mechanisms and highlighted the dynamic nature of the policy capacity concept (Tenbensel, T., Raj Silwal, R., 2022). Namely, Tenbensel and Raj Sijwal use the System Level Measures Framework (SLMF) in New Zealand, focusing on health systems improvement by fostering network governance at the local level (Tenbensel, T., Raj Silwal, R., 2022). In their findings Tenbensel et al. highlighted on research gap in understanding what is required to stimulate the policy capacity necessary for network governance (Tenbensel, T., Raj Silwal, R., 2022). Tenbensel argues that local histories of inter-organizational play a crucial role in shaping health policy capacity. Therefore, efforts of decision-makers in ensuring local or regional policy capacity should require a different set of policy skills and capacities that goes beyond the more traditional reliance on authority and control (Tenbensel, T., Raj Silwal, R., 2022).

Tenbensel et al. contributed to understanding that the policy capacity is a dynamic system that involves feedback loops between political, operational, and analytical elements of policy capacity. Namely, Tenbensel et al. advanced the findings of Howlett and Ramesh, who defined particular components of policy capacity as the Achilles heel (Howlett, M., Ramesh, M, 2015). The argument of Tenbensel et al. that the policy capacity can develop a clockwise or anti-clockwise sheds light on how to strengthen the policy capacity. (Tenbensel, T., Raj Silwal, R., 2022). Authors argue that the development of analytical capacity in the health sector requires the development of all three elements of policy capacity (Tenbensel, T., Raj Silwal, R., 2022).

Förster et al. explored South Africa's policy on introducing a biodiversity economy, including societal transformation by utilizing its unique biodiversity to develop natural products and biopharmaceuticals. Namely, the authors investigated using qualitative empirical evidence how and whether such transformation has materialized for different stakeholders in South Africa (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021). Förster et al. argue that transformation is a political and deeply context-dependent phenomenon that is dependent on the resources and capabilities of key stakeholders (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021). The authors argue that the policy capacity of the decision-makers is critical in the adaptation of the regulatory system and societal change.

The main contribution of Förster et al. is that they looked at the policy capacity concept in the area of the sector's transformation. Foster et al. argue that policy capacity building at the individual and operational level is critical to achieving the policy goals in the sector's transformation. Authors stress on importance of policy formation and implementation stage in understanding complex problem settings (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021). The sector transformation entails socially complex, highly contextualized, multifaceted, and interconnected processes (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021). Therefore the government should prepare the society for transformational change and start with the cognitive level of education at the level of individuals. In addition, based on all three capacities, the government should build sharing of knowledge to develop a set of skills the public managers, which should steer the transformation of the sector (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021).

A literature review of policy capacity scholarship also revealed the research gap on individual analytical capacity. Many scholars emphasize the importance of analytical (Howlett, M., Ramesh, M, 2015). Analytical capacity is defined as the ability of organizations to produce

valuable research and analysis on topics of their choosing. Subsequently, analytical capacity enables the policymakers to monitor and analyze conditions and forecast anticipated impacts of policy options.

The existing body of policy capacity literature mostly focuses on the analytical capacity system level (relationships of knowledge and research institutions with the government) and at the organizational level (resources and processes to collect, analyze, and disseminate information) (Sajadi, H., & Hartley, K., 2021), (Mukherjee, I., Coban, M.K., Bali, A.S., 2021). Straßheim (2020) and Bakir (2017) advocated for institutional, cultural, and discursive dynamics of the analytical capacity (Straßheim, 2020). Bakir urges that scholars should focus on the analysis of the ability of individuals to deploy distinct capacities framed by institutional factors shaped by organizational and systemic capacities (Bakır, 2017), (Bakir, 2020). Therefore Bakir focuses mostly on applying structures, institutions, and actors as an analytical frame in his studies of the implementation of financial policies in Turkey and other countries. Bakir argues that organizational capacities are critical in a crisis response scenario as they define key features of the setting, including hierarchies and interdependencies, where individual policymakers and analysts utilize their own capacities (Bakır, 2017). In other words, systemic capacities frame how organizations engage externally and function internally (Sajadi, H., & Hartley, K., 2021).

In an Iranian response to COVID 19 pandemic, Sajadi and Hartley make empirical analyses. They argue that policy capacity is not solely a technocratic issue but a socially, culturally, and politically embedded. In the transformation of the sector or society, as in the case of a pandemic, public managers encounter a sudden flood of contradictory information that provides data for analysis but, in reality, increases ambiguity about causes and solutions (Sajadi, H., & Hartley, K., 2021). Sajadi and Hartley argue that leaders address these challenges by hasty instinct and heuristics. Consequently, given leadership style, ideology, and political survival can conflict with the 'rational' approach. The research study highlights the relationship between political interests and scientific knowledge in managing pandemic consequences in the Iranian

case. Targeted at economic stability and continuity, the Iranian government focused on political capacity and ignored the role of analytical capacity in policy implementation. Given the authoritarian regime, Iran's response to the pandemic was also associated with a lack of connective capacity among agencies and sectors (Sajadi, H., & Hartley, K., 2021). As a result, the government focused on conflict resolution measures rather than preventive measures addressing the pandemic. In the Iranian case, contextual factors diminished the effectiveness of the policy capacity of the country, given the severely weakened economy as a consequence of international sanctions (Sajadi, H., & Hartley, K., 2021).

Focus on analytical capacity at the system, and organizational levels make a valuable conceptual contribution to advancing policy capacity framework by combining a context-specific organizational capacity that filters the implementation process and generates divergent outcomes across developing and developed countries. At the same time, there is an existing gap in the policy capacity scholarship regarding an understanding of analytical capacity at the individual level (Förster, J.J., Downsborough, L., Biber-Freudenberger, L., Mensuro, G.K., Börner, J., 2021), (Mukherjee, I., Coban, M.K., Bali, A.S., 2021), (Grimmelikhuijsen, S., Jilke, S., Olsen, A.L., & Tummers, L., 2017).

Namely, in a study on global indices, including World Governance Indicators, measure and assess governance, Hartley and Zhang (2018) argue that three levels of analysis omit the individual analytical capacity (Hartley, K., Zhang, J., 2018). In addition, there is an emerging number of behavioral and experimental studies in the public policy and administration area which explore cognitive biases, information processing, and individual behavioral perspectives (Grimmelikhuijsen, S., Jilke, S., Olsen, A.L., & Tummers, L., 2017). These studies include a combination of cognitive dimensions with individual analytical capacity in the context of policymaking related to analytical skills and resources and individual policy efforts and their fit within organizational and political contexts.

Policy capacity scholars have advanced in differentiation between modes of governance. Namely, the governance types shall be based on distinct relations between the public organizations and other key stakeholders (Bouckaert, G., Peters, B.G., Verhoest, K., 2010), (Capano, G., Howlett, M., & Ramesh, M, 2015). Furthermore, modes of governance imply different individual, organizational, and system skills to enable these relationships (Howlett, M., Ramesh, M, 2015); (Wu, X., Howlett, M., Ramesh, M., 2018). In the study of the impact of Smart Specialization in the EU, Guzzo and Gianelle argue that there is a need to upgrade the quality of governance and policy capacity and provide practical recommendations to promote change via policy capacity enhancement (Guzzo, F., Gianelle, C., 2021). Notwithstanding that most scholars exploring governance models have explored developed countries, especially OECD states, there is still a gap in scholarship analyzing cases from emerging countries, including transition countries. The complexity of the factors in developing countries that require coordination can be different from developed countries. Several scholars advanced the empirical studies in the developing countries on different governance modes and particular bureaucratic skills, and kinds of relationships with different stakeholders, including studies in Brazil (Cavalcante, P., Lotta, L., 2022), Iran (Sajadi, H., & Hartley, K., 2021) and others. These studies contributed to the scholarship by bringing valuable lessons about developing new coordination models, their results, and challenges in developing and transition countries.

In a Brazilian study, Cavalcante and Lotta argue that developing country governance has different modes considering a complex and dynamic governmental framework (Cavalcante, P., Lotta, L., 2022). First, Cavalcante and Lotta looked at two dimensions of the bureaucracy's performance: relationships and skills in their research. Cavalcante and Lotta stress that diverse policy sectors require particular governance modes (Cavalcante, P., Lotta, L., 2022). Secondly, diverse governance modes operate with distinct bureaucratic skills. Cavalcante and Lotta emphasized that infrastructure and manufacturing and services sectors are associated mostly with the private sector, security and citizenship with the public sector, and social/environmental

sectors with municipalities in a decentralized context. Therefore, the particular institutional arrangement is critical in understanding modes of governance built-in each sector. The case provides empirical knowledge about how modes of governance vary across sectors. This variation is explained by the sectors' dynamics and nature of policies (Cavalcante, P., Lotta, L., 2022).

In an Indian study of insurance policy implementation, Bali and Ramesh explore critical capacity deficits in operational dimensions (Bali, A.S., Ramesh, M., 2021). Bali and Ramesh argue that middle-income countries have similar policy capacity issues in health policy reforms (Bali, A.S., Ramesh, M., 2021). Bali and Ramesh stress that addressing policy capacity deficits in implementation is as critical as marshaling required resources, adequate policy design, and building political support (Bali, A.S., Ramesh, M., 2021). Bali and Ramesh explain that sophisticated health policy designs backed by broad political support may be undermined during implementation due to capacity gaps, especially operational or managerial capacity.

In conclusion, policy capacity and governance literature have advanced in exploring the impact of national contexts on a variety of settings concerning mechanisms and governance modes (Domorenok, E., Graziano, P., Polverar, L., 2021), (Bouckaert, G., Peters, B.G., Verhoest, K., 2010), (Capano, G., Howlett, M., & Ramesh, M, 2015), (Howlett, M., Ramesh, M, 2015). Scholars also advanced in exploring the impact of skills on the performance of modes of governance (Howlett, M., Ramesh, M, 2015), (Wu, X., Howlett, M., Ramesh, M., 2018).

Nevertheless, theoretical and empirical gaps exist in exploring the differentiation of key skills and governance modes in different policy sectors (Domorenok, E., Graziano, P., Polverar, L., 2021). It is widely acknowledged that policy sectors are different based on policy issues, features, coalitions, and stakeholders (Capano, G., Howlett, M., & Ramesh, M, 2015), (Domorenok, E., Graziano, P., Polverar, L., 2021). Therefore, there is a need to empirically test the variations in the modes of governance and skills for each sector. Scholars argue that

developing countries tend to focus on political capacity and ignore the role of analytical capacity in policy implementation (Sajadi, H., & Hartley, K., 2021). Moreover, the literature review revealed that the scholars greatly contributed to studying the analytical capacity at the organizational and system level. In contrast, the analytical capacity at the individual level needs further research. Therefore this dissertation study is crucial in contributing to developing the role of the policy capacity in the agriculture sector of Kazakhstan.

4. Kazakhstani scholarship on implementation theory

In general, the public policy scholarship in Kazakhstan is rising, covering different areas of the policy domain. At the same time, the policy implementation area was a limited investigation by scholars except for subjects related to implementation issues of public administration (O'Connor, K., Janenova, S., Knox, C., 2019), street-level bureaucrats' behavior in implementing ethics codes (Pelizzo, R., Knox, C., 2021) and bureaucratic performance in authoritarian states (Knox, C., Janenova, S., 2022). There is limited research done to assess of implementation of Digital policies in general in Kazakhstan, except for small scale desktop research based on quantitative analysis with a focus on implementation issues in the natural resource sector and agricultural sector (Gridneva,G.A, Kaliakparova,G.Sh., 2019), (Vorobiev, A.E. , Tcharo,H. , 2018).

Public policy scholars have widely used Matland's model. However, the model used in Kazakhstan has a limited application except for the research provided by O'Connor et al. (O'Connor, K., Janenova, S., Knox, C., 2019). O'Connor et al. contributed to implementation theory scholarship by explaining the implementation deficit of the digital transformation of public services or functioning of open government policy. The scholars stressed that the implementation of open government policy in Kazakhstan may have resulted from bureaucratic obstruction and symbolic implementation due to high ambiguity and high conflict of interest (O'Connor, K., Janenova,S., Knox, C., 2019). O'Connor et al. provided factors that create

bureaucratic obstruction at the top management and middle management levels of public service. At the top management level, O'Connor et al. highlighted the role of informal institutions and the confluence between the interests of the political and business elites who are resistant to the changes threatening the status quo. The contribution of O'Conner et al. is their focus on the role of the confluence of the business and political interests and the difference between top managers' agendas in regions. The scholars draw a lesson that the bureaucratic elite has perceived the open government as a threat. Therefore they subverted attempts to make their actions transparent and their activities accountable which caused the conflict of goals.

As provided above, the existing literature on the Kazakh public service in the policy implementation field focused on the role of the decision-makers. In comparison, the role of street-level bureaucrats and interaction issues between the decision-makers and street-level bureaucrats has still been poorly explored. This dissertation fills this gap by exploring the interaction between the decision-makers and street-level bureaucrats and its impact on the policy implementation gap at the local level.

The proposed dissertation research differs from the research mentioned above by O'Connor et al. focuses on bureaucratic obstruction as an important factor in policy implementation. Namely, the dissertation focuses on the policy capacity of public managers and its impact on the implementation of the policies. In addition, this dissertation contributes to the scholarship by more detailed research on the influence of informal institutions in the bottom-up approaches. Informal institutions in the Kazakhstan context were explored regarding clan politics (Collins, 2004), elements of center-periphery politics (Junisbai, 2010), and factors of the state formation (Siegel, 2018) in the political science area. However, no research was done regarding the influence of informal institutions on the behavior of street-level bureaucrats in implementation.

A literature review summary reveals that the scholarship is empirically biased toward developed countries, mainly North America, the E.U., Australia, and New Zealand. Therefore there is a need for a critical study on the implementation of Digital policies in the agriculture sector in developing countries. However, despite this plethora of empirical and theoretical studies on implementation issues of digital technologies in the agriculture sector, there are still many uncertainties about the key factors affecting the success or failure of implementation of digitalization studies in the agriculture sector.

In conclusion, the literature review unveils the gap in the dissertation research from three sources: i) neglect of spotting or overlooked area, (ii) lack of empirical support, and (ii) underresearched areas.

Firstly, based on the review of implementation theory, a strong bias exists in the literature toward empirical examinations of the digitalization of the agriculture sector in the western hemisphere countries from the social and economic perspective. Much less attention has been paid to studying public policy-related or management-related perspectives and remains under-researched. Literature review reveals that the past research partially has provided an insight into **why** the digital policy in the agriculture sector has been implemented. However, it has not provided an adequate insight into **how** the implementation deficit or success can occur regarding the digital policy in the agriculture sector. Therefore this dissertation thesis is aimed to study research. Namely, this research is targeted to answer how implementation could occur regarding the digital policy in the agriculture sector of Kazakhstan.

Secondly, a lack of empirical support was identified based on a literature review regarding the application of Matland's model. Most theoretical concepts and models that were supposed to capture the nature of policy implementation have had little empirical support in developing countries, including post-soviet and transition countries such as Kazakhstan. This

fact guides the dissertation thesis to study the extent to which current key concepts and models of policy implementation have been empirically supported in a given context.

Thirdly, based on a review of existing literature, the dissertation analysis reveals that the main variables affecting implementation deficit or success are an established area of research. However, the interrelation of top-down and bottom-up approaches in developing countries' contexts has been investigated less than in developed countries' contexts in the existing literature. Namely, how the bottom-up approaches work in a highly hierarchical administration system. This dissertation thesis addresses this gap in the literature by carrying out an analysis using the policy capacity concept and theoretical framework prepared by Matland (Matland, 1995)

Firstly, the research dissertation uses evidence-based and theory-informed insights into the policy capacity concept to explore an essential factor for steering the digital transformation of the agriculture sector associated with network governance. The literature review revealed that the policy capacity scholarship advanced in studying the analytical capacity at the organizational and system level. At the same time, there is a gap in research of analytical capacity at the individual level.

Secondly, disagreements between top-down and bottom-up scholars have at their very base disagreements over the definition of the policy implementation success. Top-down scholars argue against measuring success regarding specific outcomes tied directly to the policy and its structuring. The bottom-up scholars argue for a broader evaluation that envisages the policy with "positive effects" as a success without linking it with compliance with the statute. Hybrid scholars, namely, Matland, argue against measuring success based on context and level of the ambiguity and conflict level related to the policy. In this regard, the concept of the control variables developed by Matland is highly practical to identify under what conditions the top-down or the bottom-up model shall be used. Therefore Matland's model of using conflict-ambiguity as an initial measure to define key variables for the implementation of digital policies

in the agriculture sector of Kazakhstan might be a solid base for the theoretical framework of this research dissertation.

II. Theoretical Framework

A significant strength of this dissertation lies in its use of a theoretical framework adapted from the digital transformation, policy capacity, and policy implementation research scholarship to guide the study. Firstly, the study adopts digital transformation and policy capacity research as a theoretical lens to explore the concepts related to digital transformation in general and the role of public managers in digital policy implementation in particular. Secondly, the dissertation adopts Matland's model (1995) as a theoretical lens to provide an understanding of the implementation deficit of the digital policy in the agriculture sector of Kazakhstan. Matland's model (1995) of the impact of conflict of goals and ambiguity regarding goals and means are used by Matland as key factors that define appropriateness in using a top-down or bottom-up model to analyze implementation success or failure (Matland, 1995).

In this chapter, firstly, the research covers key concepts of the policy capacity and the digital transformation in the agriculture sector to provide the audience with the context of digitalization and the role of the key stakeholders in the implementation of the digital policy. In the second section, the research explores the significance of Matland's model in uncovering the digital policy implementation process in Kazakhstan's agriculture sector.

Digitalization of the agriculture sector

As mentioned in chapter one Introduction, the digital policy was adopted by the GoK as a part of the integrated approach of the government aimed at digitizing and diversifying the country's economy (ITU, FAO, 2020). The agricultural sector's integrated approach included several policies provided in the **Table 4** below. The. digital policy was a follow-up policy of the national program "Informational Kazakhstan" -2020 and the Agricultural Development Program adopted in 2013. Further, in 2017 the digital policy was included as part of the strategic approach of the GoK to diversify the economy. The Ministry of Informatization and Communication was

appointed to be responsible for the overall supervision of the implementation of both policies. In addition, the Ministry of Agriculture was assigned to supervise and coordinate the digital policy related to the agriculture sector.

Table 4. Government policies on digitalization in the agriculture sector

No.	Year	Name of the program	Period	Responsible
1	2013	The national program "Informational Kazakhstan" - 2020	2013-2017	MIC*
2	2013	Agricultural Development Program	2017-2021	MIC
3	2017	State Program for the Development of the Agro-Industrial Complex	2013–2020	MinAgri**
4	2017	"Digital Kazakhstan"	2017-2021	MinAgri[2]

*Ministry of Informatization and Communication
** Ministry of Agriculture

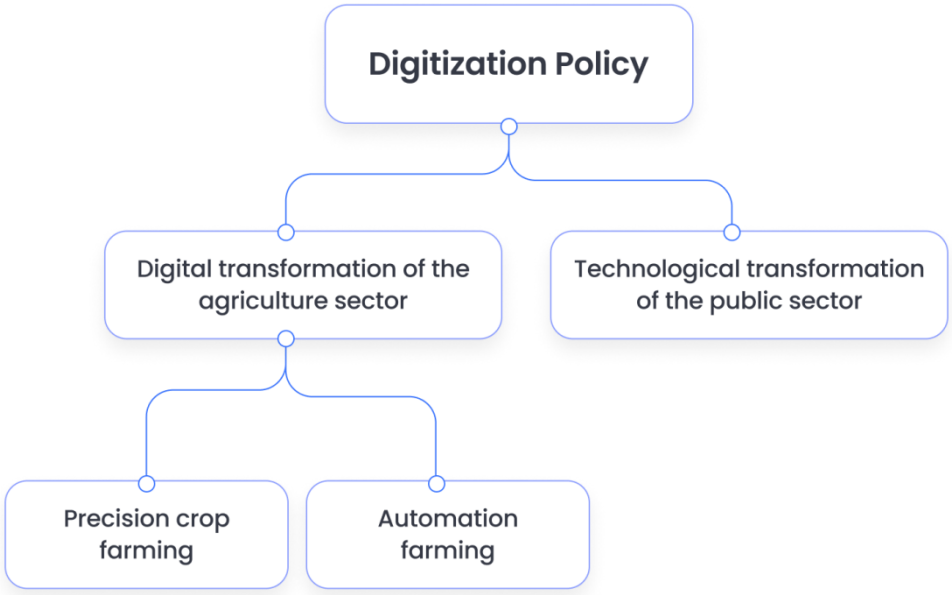
The digital policy, in general, was targeted (i) to boost production quality, (ii) to enhance volumes, and (iii) to reduce human participation in the production process (ITU, FAO, 2020), (Yensebayev), (Vorobiev, A.E. , Tcharo,H. , 2018), (Gridneva,G.A, Kaliakparova,G.Sh., 2019). Namely, digital Kazakhstan policy has focused on five categories: (i) digitization of industries (including the agriculture sector), (ii) transitioning to a digital State, (iii) implementing of the Digital Silk Road, (iv) developing of human capital, and (v) creating an innovative ecosystem (ITU, FAO, 2020).

As discussed in the chapter on Introduction, the digital policy in the agriculture sector of Kazakhstan has been implemented in two directions, the digital transformation of the agriculture sector itself and the technological transformation of public service in this sector (ITU, FAO,

[2] MIC is responsible for overall supervision of the policy, and MinAgri is responsible for the digitization of the agriculture sector

2020). Therefore, as provided in the introduction section, this dissertation thesis focuses on the digital transformation of the agriculture sector.

Figure 9. Key Components of The digital policy in the agriculture sector



The digital policy envisaged the following measures (components) targeted at the digital transformation of the agriculture sector: (i) automation of traceability of agricultural products, (ii) implementation of precision farming, (iii) creation of online trade platforms.

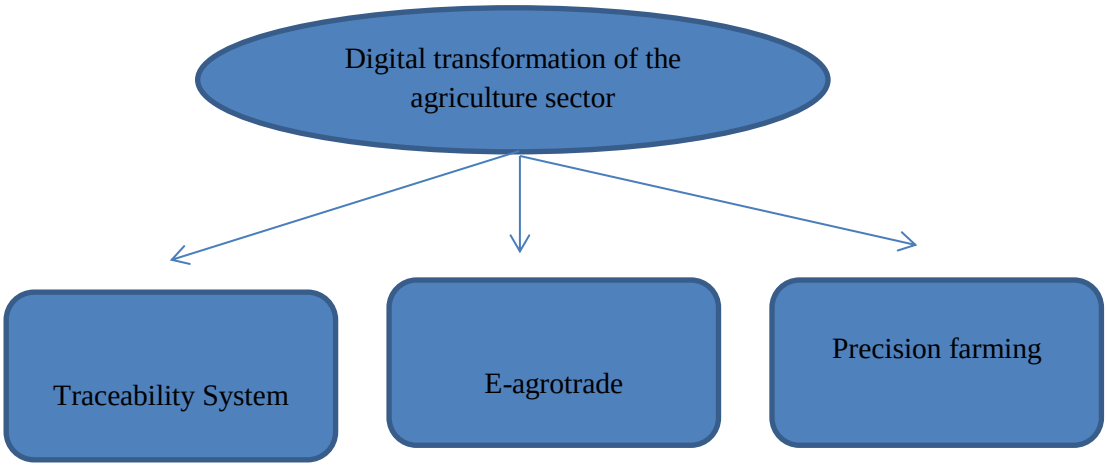
The component of the automation of agricultural products was planned to ensure the qualitative and quantitative track record of the full production cycle of agricultural products or value chain. Furthermore, the decision-makers of the digital policy aimed to (i) utilize traceability systems to attract investments in the agriculture sector, (ii) diversify the agriculture sector product line as well as (iii) increase the market access to agricultural products.

The precision farming component was targeted at increasing labor productivity and yield enhancement. Precision farming envisaged the use of big real-time data, including the condition of seeding, humidity, nutrients, nitrogen, potassium, phosphor, pest, and rainfall expectancy. The rollout of precision farming was planned via pilot projects whose success shall be later replicated in a broader sector in all regions of Kazakhstan. The digital policy envisaged that precision

farming would be implemented by purchasing new farming machinery and implementing the agricultural technologies as and when farmers are ready.

The component of creating online trade platforms was targeted at promoting the agriculture output both locally and internationally. The third component of the digital policy envisaged implementing the platform for electronic trade between farmers, wholesale centers, chain stores, markets, and stabilization food facilities (prime minister.kz, 2018), (Galiev, 2018).

Figure 10. Key components of the digital transformation of the agriculture sector



After an outline of the main components of the digital policy in the agriculture sector of Kazakhstan, it is essential to unpack key concepts of the digital transformation of the economic sector to develop a theoretical framework for the dissertation based on the literature review and body of the scholarship in policy capacity and the digital transformation. These concepts enable exploration of the main role of the key stakeholders in digital policy implementation.

The digital transformation envisages three interlinked categories (Howaldt, J., Kopp, R., and Schultze, J. , 2017). These categories include (i) generation of scientific knowledge that forms the basis for developing specific technologies; (ii) production of particular digital products and services; and (iii) use of digital products and services in production and service activities. The digital transformation of the agriculture sector falls under the third category. Key features of

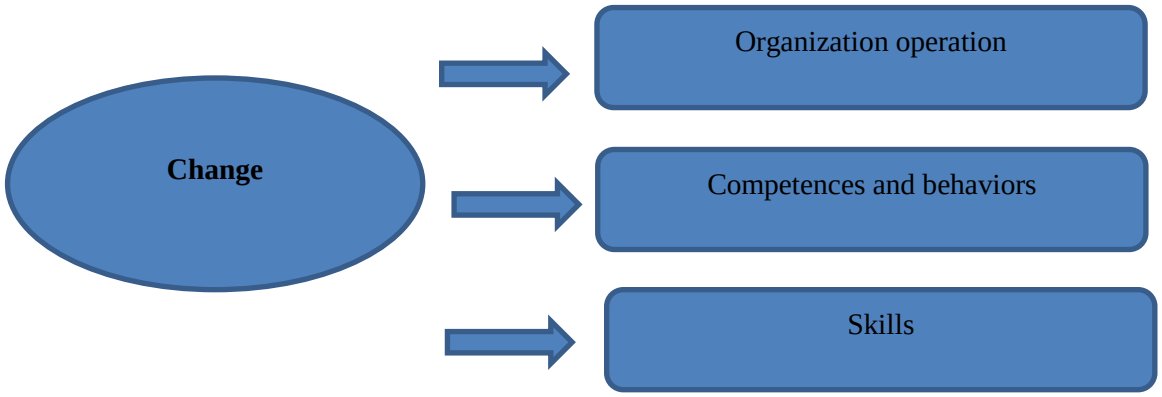
the third category are that the application of digital technologies can significantly improve **the productivity and flexibility of producers** or farmers in the case of the agriculture sector.

Secondly, the digital transformation requires technological innovations as tools and machinery and nontechnological innovations, including organizational changes, social changes, institutional changes, and ultimately system transformation (Chaminade, C., Lundvall, B.-Å., Haneef, S. , 2018), (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021). In other words, radical shifts in technology demand a change in organizations, formal institutions, and routines leading to significant societal changes (Perez, 2016). Namely, the digital transformation should be associated with social, economic, and institutional changes, such as "changes in user practices, regulations, industrial networks, infrastructure, and symbolic meaning or culture" (Geels, 2002). Scholars stress the leading role of the government in facilitating this change process (Reischauer, 2018), (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021), (Brunetti, F, Matt, D.T., Pedrini,G., Orzes, G., 2020). The main assumption of scholars is centered on the risk of technological push that, without government steering, might result in limited "one-sided technology-focused understanding of innovation (Howaldt, J., Kopp, R. and Schultze, J. , 2017), (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021). Therefore the digital transformation requires the enhancement of "a system-wide capability to innovate" championed by the government (Reischauer, 2018), (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021). Moreover, scholars argue that the arrangement and organization of the innovation and learning activities in the economic sector shall be critical in the digital transformation (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021), (Brunetti, F, Matt, D.T., Pedrini,G., Orzes, G., 2020) Therefore, the digital transformation requires facilitating management concepts and organizational structures (Howaldt, J., Kopp, R. and Schultze, J. , 2017).

Three categories of digitalization require changes in innovation systems. Namely, the development and diffusion of new scientific knowledge may require knowledge organizations

with new research agendas or changes in existing organizations. In addition, the development of new digital products and services can demand changes in industrial competence and user behavior and attitudes. Finally, applying digital technologies in existing and new organizations will also require new skills required for the automation production processes or new business models. These skills shall be developed in (i) companies, (ii) research institutes, and (iii) universities.

Figure 11. Key changes in the digital transformation of the agriculture sector



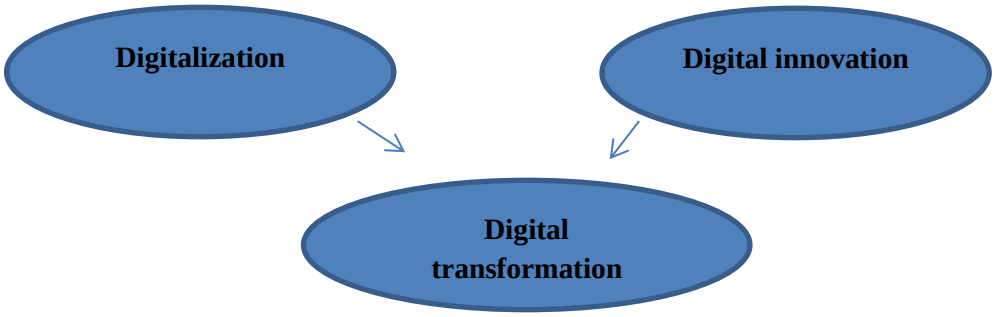
Digitalization envisages leveraging digital technology to alter socio-technical structures. Structures consist of parts arranged together, including an (i) product, (ii) service, (iii) user experience, (iv) process, and others. Hence the socio-technical structures are composed of the social (human interactions, relationships, norms) and technical (technology, tasks, routines.) aspects of the structure (Osmundsen,K., Iden,J., Bygstad, B., 2018). Hence digitalization has a broader meaning than a simple technical process of encoding analog information in a digital format (Osmundsen,K., Iden,J., Bygstad, B., 2018).

The outcome of a digital innovation might result in digitalization through absorption by the individuals of the digital innovation process. In other words, digital innovation envisages the **capacity** of individuals to acquire and practice novel knowledge and technology. Hence, digitalization and digital innovation might transform how the business operates, resulting in the

digital transformation of organizations or the entire economic sector (Osmundsen,K., Iden,J., Bygstad, B., 2018).

For this dissertation, digital transformation is defined as a combination of both digitalization and digital innovation, which are applied to ensure significant changes to how business is operated, leading to a significant transformation of an organization and an entire agriculture sector (Osmundsen,K., Iden,J., Bygstad, B., 2018).

Figure 12. Key components of the digital transformation

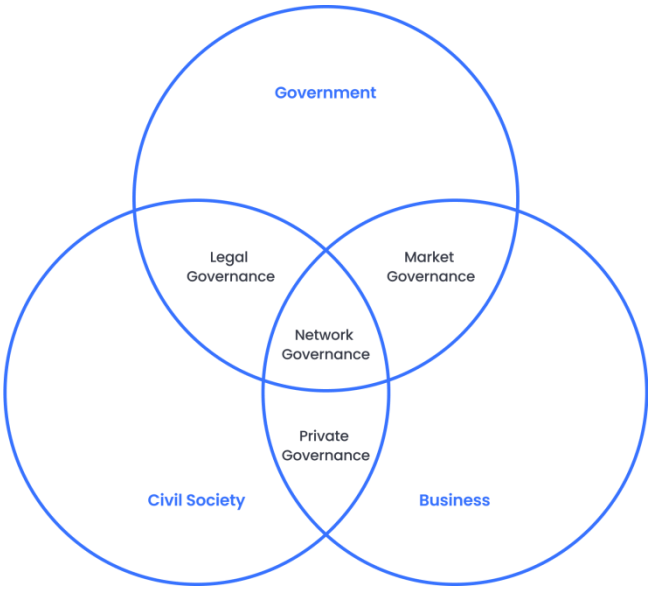


The dissertation utilizes the concept of governance in two ways to explore the key stakeholders' role in implementing the digital policy. Firstly, the concept of governance uncovers the role of the stakeholders in the implementation of the digital policy. Secondly, it enables to explore the capacity of public managers in their perception of the policy implementation and their decision to implement or not implement the policy.

The modern development of public policy concepts substituted the concept of the government functioning with the governance system (Howlett, M., Ramesh, M., 2014). In other words, the old concept of the government role is outdated and does not meet society's current realities. According to this old concept, the role of the government envisages providing a set of rules or regulations operating a set of institutions setting out "who gets what, where, when, and how" in society, managing the symbolic resources that are the basis of legitimacy and controlling the allocation of resources among stakeholders (Lasswell, 1951).

In contrast to the old concept, it is widely acknowledged that the modern world requires a governance approach. Therefore, the dissertation explored the public managers' role in coordinating the key stakeholders' efforts to address problems of collective action inherent to government and governing. According to scholars, governance envisages supporting, promoting, and establishing a specific relationship between the government and other stakeholders in the policy. In addition, governance encompasses coordination and managing the businesses and civil society organizations' involvement in creating public value and delivering goods and services to citizens (Howlett, M., Ramesh, M., 2014).

Figure 13. Governance typology

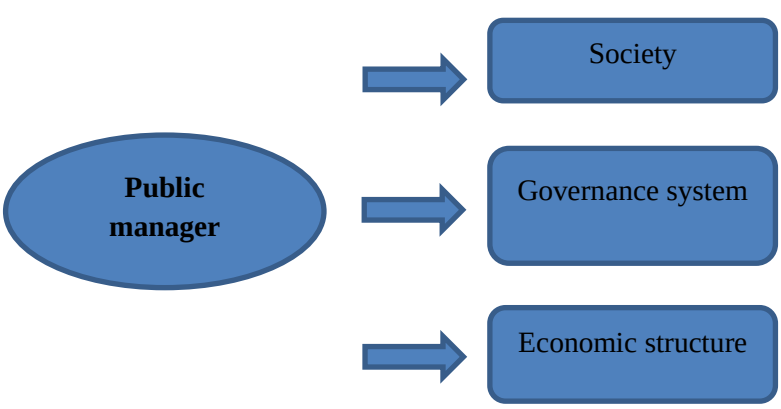


Prepared by (Howlett, M., Ramesh, M., 2014)

There are four types of governance: (i) legal governance, (ii) network governance, (iii) market governance, (iv) and private governance. The interrelation (i) between government and civil society envisages **legal governance**; (ii) between business and the government envisages **market governance;** (iii) between business and civil society envisages private governance. It should be noted that the interrelation of all three types of stakeholders envisages network governance.

Based on the discussion above, "an ability" to transform the socioeconomic structures requires new skills and recognition of the new role of public managers. Namely, one key aspect of the digital policy is its novel character in the agriculture sector's digital transformation. For the last 30 years, public managers of Kazakhstan have faced and addressed several changes in socioeconomic structures, such as industrialization or the liberalization of the market. Uncertainty in the impact of digital technologies and technological disruption on the agriculture sector's value chain makes the digital transformation unique compared to other socioeconomic structural changes such as liberalization or industrialization. Developed countries ran through industrialization and liberalization of the markets first, after which developing countries imported their experience. However, the digital transformation has been happening quickly and simultaneously in all parts of the world. Hence, digital transformation as a socioeconomic structural change has no track record or benchmark policy for developing countries. Therefore local context and local challenges are exceedingly critical in addressing the digital policy implementation issues. Hence public managers need to be equipped with the required skills and capacity based on the peculiarities of (i) society, (ii) governance system, and (iii) economic structure (Howlett, M., Ramesh, M., 2014), (Osmundsen,K., Iden,J., Bygstad, B., 2018), (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021). Matland's model is instrumental in uncovering the context of the digital policy implementation, focusing on the context of the local coalitions, which is discussed in the second section of this chapter.

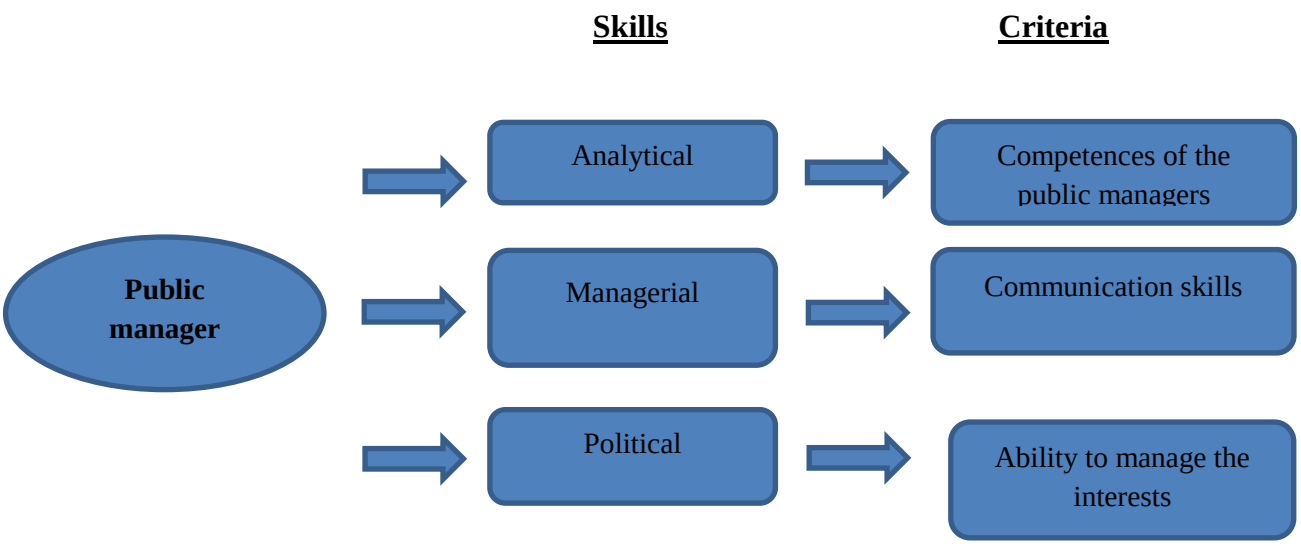
Figure 14. Key contexts of public managers and the digital transformation



Scholars argue that the novel character of the digital transformation as socioeconomic change is (i) unknown, (ii) contested, and (iii) highly uncertain globally. Therefore the digital transformation requires new nature of policy responses (Isaksen, A., Trippl,M., Kyllingstad,N., Rypestøl,J.,O., 2021). Hence the development and implementation of the digital policy require **new instruments in the policy** development and implementation, including **new policy capacity.**

The dissertation uses the governance theory to explore the policy capacity concept. The concept of policy capacity encompasses a function of three skills that influence the ability of public managers to interact with the stakeholders – (i) analytical skills, (ii) managerial skills, and (iii) political skills (Howlett, M., Ramesh, M., 2014), (Wu, X., Howlett, M., & Ramesh, M. , 2018).

Figure 15. Key skills of public managers required for the digital transformation



Analytical skills enable public managers to generate and investigate policy alternatives. Managerial skills envisage an effective use of state resources. Finally, political skills allow public managers to maneuver and get the support required to implement ideas, programs, and plans (Howlett, M., Ramesh, M., 2014), (Knox,C., Janenova,S., 2022). Hewlett and Ramesh

stress that the specific type of governance policies are likely to fail if they do not contain specific policy capacities in a particular type of governance (Howlett, M., Ramesh, M., 2014).

Based on the above-discussed assumptions, the criteria for the success or failure of the digital policy implementation under this research are provided in **Figure 15.**

Namely, the analytical skills of public managers are assessed based on their competencies to address digital policy issues. Firstly, public managers need to understand the following factors in the transformation of the agriculture sector or reform: (i) the nature of the problem they are trying to address, (ii) the skills and resources they have at their disposal to address it, (iii) the natural features of the different governances modes, (iii) capabilities and competencies each governance model requires in order to operate at a high level of performance (Howlett, M., Ramesh, M., 2014), (Wu, X., Howlett, M., & Ramesh, M. , 2018).

Managerial skills are assessed based on the communication skills of public managers to manage risks, interests, goals, and means of policy implementation. Finally, political skills are assessed based on the ability of public managers to manage the interests of the key stakeholders and address the conflict of goals, details of which are provided in the section below of this chapter.

Howlett and Ramesh (2016) developed the key assumptions on using the type of governance and listed the following. The first assumptions include the degree of state involvement in governance. Secondly, the degree to which the coordination relationship between state and non-state actors is hierarchical. Furthermore, the authors argue that a policy area's predominant governance characteristic defines the key institutional parameters.

Howlett and Ramesh developed a list of coordination types that define the potential "Achilles heel" of policy capacity or weak points of the policy capacity. First, the operational or managerial capacity is critical at the "legal" governance or "hierarchical" system level. Under

this system, the decision-makers are responsible for operationalizing the policy and public management accountability requirements (Howlett & Ramesh, 2016). Subsequently, other key stakeholders, including non-state actors, should be funded by the state and be accountable for utilizing state funds. According to Howlett and Ramesh, operational capacity at the organizational level is critical for network governance. This entails that regional public managers are responsible for developing collaborative relationships based on trust with other key stakeholders, including non-state actors (Howlett & Ramesh, 2016).

The network governance system and legal governance system are different in terms of (i) treating other key stakeholders or non-state actors,(ii) perception of the political capacity, and (iii) formation process of the policy capacity.

Firstly, the difference between the legal and network governance systems entails the difference in public managers' perception of other key stakeholders. Under a legal or hierarchical governance system, the public managers treat other key stakeholders as instruments of the state. Furthermore, the public managers consider independent power, knowledge, and operational know-how (political, analytical, and operational capacity) as capacities that the state shall control. On the other hand, under the network governance system, the public managers treat other key stakeholders as resources that they can utilize to increase policy effectiveness.

Secondly, hierarchical and network logics of governance also differ in how the elements of policy capacity relate to each other. Political capacity under hierarchical governance entails the capacity to win the field with political opposition. Political capacity in network governance entails winning the field with those stakeholders who have divergent views and building winning coalitions (Howlett, M., Ramesh, M., 2015).

Operational capacity in hierarchical governance entails skills associated with top-down and command-and-control implementation models. In the network governance system, the policy capacity involves collaborative skills. In hierarchical governance, analytic capacity is associated

with measurement and instrumental rationality. In-network governance analytical capacity entails a broader range of knowledge (Tenbensel, T., Raj Silwal,R., 2022) (Howlett, M., Ramesh, M., 2015).

Finally, hierarchical and network governance differ regarding the formation of policy capacity. Under hierarchical governance systems, analytical capacity (use of evidence) endorse authoritative policy commitments (policy capacity), which then gear up operational capacity (implementation of authoritative decisions). On the other hand, under network governance, the direction of interaction between components is an anti-clockwise cycle. The network governance entails operational capacity (management of collaborative processes), builds political capacity (stakeholder buy-in), which then fosters analytical capacity (pooling of information and analytical expertise), which then supports operational capacity (Howlett, M., Ramesh, M., 2015) (Tenbensel, T., Raj Silwal,R., 2022).

It is essential to look at policy capacity to understand policy implementation. The focus on the policy capacity concept uncovers the role of the key stakeholders in the policy implementation regarding the capacity of public managers to address challenges caused by the digital transformation of the agriculture sector. As discussed earlier, the theoretical framework of this dissertation uncovers that the digital policy concerns both changes in the organization of farms and change in the whole sector, which envisages a social-economic change in the country and requires the policy capacity which is associated with the network capacity.

Matland's Model

The literature review chapter uncovered that Matland's model proved useful in assessing and synthesizing top-down and bottom-up policy implementation models. Kazakhstan's public administration system is associated with a top-down approach based on a solid central apparatus role in authoritarian regime systems (Janenova, S. & Knox, C. , 2019), (O'Connor, K., Janenova, S., Knox,C., 2019), . On the other hand, the agriculture sector's complexity with multiple

stakeholders at the central and regional levels with diverse interests plays an essential role in public policy implementation, reflecting the importance of top-down and bottom-up approaches in the analysis. Moreover, the agriculture sector is contentious as it is historically driven by paternalistic policies (Petrick, M., Gotz, L., 2019), (Oshakbayev, 2018). Given the market economy, there is increasing pressure on the government to reassess its role in the agriculture sector. Namely, the government should discuss its role as a provider of subsidies in highly subsidized sectors and as an enabler of the agriculture sector's digital transformation. Therefore, the duality of the roles of the government imposes pressure on the implementation of the digital policy in Kazakhstan.

An implication of Matland's theory is centered on distilling the model, which can outline significant factors affecting the implementation deficit from the plethora of implementation theory models (including top-down and bottom-up models) and carving out the importance of context. In addition, Matland's model explains to which extent goals are achieved over time and why. The dissertation uses Matland's key concepts on the Ambiguity of means, goals, and Conflict of goals to explore the implementation of the digital policy in the agriculture sector.

According to Matland's understanding, **the goal of those who developed** a specific policy is key in assessing the policy's failure or success. Matland stressed that it is essential to understand the extent of the values of the policymakers and how they express their values in the goals. Matland argues that the policymakers need to choose an implementation strategy based on the goals of the specific policy.

Matland proposes a classification of policies according to goal ambiguity and Conflict and argues that implementation approaches should vary along these axes.

Matland elaborated a comprehensive implementation model from the perspective of four paradigms, including (i) administrative implementation, (ii) political implementation, (iii)

experimental implementation, and (iv) symbolical implementation. The use of one of these paradigms is dependent on main control variables such as Ambiguity and Conflict.

Table 5. Key features of Matland's model

	Low Conflict	**High Conflict**
Low Ambiguity	**Administrative Implementation** • **Normative mechanism** • **Informative capacity building** • Goals are given, and a means is clear • A central authority has the information, resources, and sanction capability to enact the desired policy. • Implementation is hierarchically ordered, with each link receiving orders from the level above. • The policy is spelled out explicitly at each level, agreeing on responsibilities and tasks. • Relatively uniform outcomes at the micro-level across many sites • The pre-requisite conditions for a rational decision process are in place • An activity associated with a generally shared and straightforward objective • Suitable for the application of a top-down approach • Key organizing concept: resources	**Political Implementation** • **Coercive mechanism** • **Negotiation capacity building** • There is Conflict over both goals and means • The implementation process is a key arena for Conflict • The distribution of power determines implementation outcomes • Compliance is not automatically forthcoming • Low ambiguity ensures that monitoring of compliance is relatively easy • A straightforward but strongly contested activity • Amenable to interaction and feedback • The location of the authority determines implementation outcomes • Key organizing concept: power
High Ambiguity	**Experimental Implementation** • **Remunerative mechanism** • Experimental capacity building • Outcomes depend largely on which actors are involved • Variation in outcome from side to side • Outcomes are hard to predict • Opportunities for local enterers to create local policies • Compliance monitoring mechanisms are of limited relevance • The policy may become a low priority • Complex policy domain: uncertain cause-effect mechanisms • Environmental influences are likely to be important; • Bottom-up approaches are likely to be important • Key organizing concept: context	**Symbolic implementation** **Capacity building mechanism** • Experimental and Negotiatory capacity building • Ostensibly implausible combination • Salient symbols can produce a high level of Conflict even when the policy is vague. • Outcomes will vary across sites. • Outcomes will depend upon the balance of the local coalition's strength • Policy ambiguity makes it difficult to activities • An absence of clarity about what can be achieved • No strong coalition to create progress • Significant professional values and allegiances

	Low Conflict	High Conflict
		• Neither top nor bottom stakeholders committed • Key organizing concept: collaborative strength

The table is prepared by the researcher based on (Hudson, 2006), (Choi,T., Walker, A.D., 2018), (Schultz, 2020), (Lotta, G., Coelho, V.S.P., Brage, E., 2021).

According to Matland, there are three types of mechanisms used in the implementation process by the public organization – (i) normative, (ii) coercive, and (iii) remunerative. A normative mechanism envisages the mutually agreed objective or high legitimacy of the authorizing individuals or bodies who request an action. A coercive mechanism envisages threatening sanctions for non-compliance with a request for action. Finally, a remunerative mechanism entails providing incentives to the agent for compliance with the requested action (Matland, 1995). Later, Heidbreder, Choi et al., and Lottea et al. introduced capacity building as a fourth implementation mechanism (Heidbreder, 2017), (Choi,T., Walker, A.D., 2018), (Lotta, G., Coelho, V.S.P., Brage, E., 2021). The capacity-building mechanism envisages public support via creating conditions for education, including building skills of both public managers and the key stakeholders to address the policy issues (Choi,T., Walker, A.D., 2018), (Schultz, 2020).

According to Matland, **administrative implementation** is associated with a policy featured by the actors' high degree of agreement on policy goals and means to reach the policy goal. Hence, a technocratic approach to compliance and follow-up dominates the implementation process. Administrative implementation is based on the assumption that resources define an outcome. Public managers deal with low ambiguity and low conflict types of issues in a highly hierarchical top-down model-based public management system under administrative implementation. Hence, administrative implementation follows traditional public administration practices and excludes contentious issues. Low-level ambiguity envisages a clear vision of the role of each actor in implementation. Under administrative implementation, actors operate in

standard procedures and ensure timely implementation. Precise technology and standard procedures define the resources and resources. Hence no outside factors influence the implementation process. Hence insulation from outside environmental factors and the standardized nature of the policy results in standardized outcomes at the micro-level in diverse contexts (Matland, 1995).

In the case of administrative implementation, the public organization uses a normative mechanism to enable action. Due to standardized technology in addressing the issues, the administration implementation failure occurs because of technical problems such as insufficient resources and time to use technology, misunderstanding, poor coordination, or lack of an effective monitoring strategy to control and sanction deviant behavior (Matland, 1995). In addition, due to several layers of the hierarchical system, the policy messages are subject to distortion as they pass through a communication network. Even if it is transparent for the sender, the messages might fail at the receiver level due to cognitive limitations and cognitive dissonance. Cognitive dissonance might result in the selected perception (Matland, 1995).

According to Matland**, the political implementation** envisages disagreement on the goals of the policy with low Ambiguity and high Conflict. The political implementation is based on the assumption that the power decides the outcomes of the policy. Hence public managers use a **coercive mechanism**. Political implementation is associated with political models of decision-making. Under this assumption, each actor has clear goals and means to reach them. However, their goals are incompatible with other actors. The central assumption of the political implementation is based on power. Under political implementation, actors use either power to impose their will on other actors of the policy implementation or use bargaining to reach an agreement with other actors. The political implementation is subject to outside environmental actors. Policy implementation envisages the resources of the actors and their compliance with the policy affecting the performance of the policy. It is critical to ensure that the opponents do not oppose the policy. Policy implementation is dependent on having appropriate power to force on

other actors and having sufficient resources to bargain an agreement. Political implementation predominantly uses coercive and remunerative mechanisms. Coercive mechanisms are used when coercive outcomes are easily monitored, and the coercing principal controls a resource essential to the actor (Matland, 1995).

For instance, land reform in 2003-2005 based on land rental and credit market participation represents the political implementation paradigm. Low ambiguity but high Conflict reflected a Conflict of Interest between large-scale and small-scale farms. The reform was aimed to facilitate efficient land allocation, however, was resulted in a significant land concentration among large-scale farms. New land relations failed to stimulate land sales and rental markets. The reform failed to provide more accessible loans for agriculture producers. Instead, the reform reorganized the land-rental market in a top-down framework, keeping the state and large-scale farms the principal landlord. Unfortunately, under political implementation, the reform's target to provide more equitable access to finance via land as collateral has not been materialized (Kvartiuk, V., Petrick, M., 2020), (Petrick,M., Oshakbaev,D., Wandel,J., 2014).

The political implementation envisages that the implementer has greater authority to require the agent's action to comply with the principal's request. However, there are cases when coercive mechanisms fail to work as many actors have independence and might refuse to participate in the policy without their missions threatened despite substantial sanction opportunities.

Disagreement on the policy can be started at the adoption stage when some stakeholders refuse to openly oppose the policy with the hope of changing the balance of power at a later stage of the policy implementation. In response to the political pressure, the supporters have little interest in the implementation stage, which might result in the non-implementation of policy. Hence industries are more successful at impacting the implementation stage than the adoption

stage of policy (Matland, 1995), (Dahan, L., Alberola,E., Rittenhouse,K, Sopher,P., Francis, D., Swartz, D., 2021).

Experimental implementation envisages high Ambiguity and low Conflict, which results in outcomes dependent on active and most involved actors. Hence context is the primary independent variable that drives the implementation process. Experimental implementation is based on context, including the willingness and resourcefulness of the participating actors. Hence the outcome of the policy might be diverse in different sites with a variety of outcomes—the decision-making process at the implementation stage stems from a "garbage can" approach. Diverse streams of actors, problems, solutions, and choice opportunities might produce outcomes that are hard to predict. Garbage can might include the following assumptions such as problematic preferences (ambiguous goals), uncertain technology (no predefined correct behavior), and fluid participation (actors vary over time) (Matland, 1995). Experimental implementation envisages problematic preferences and uncertain technologies, hence dependent on active actors, their participation intensity, the volume of demanded time and resources, and physical proximity to the decision-makers (Matland, 1995).

Experimental implementation depends on context, including the constellation of actors participating, the pressures on the actors, the perceptions of the policy, the available resources, and possible programmatic activities. Experimental is open to outside impact and influences and subject to policy mutations as diverse public entities implement the policy in different contexts. Due to diverse contexts and outcomes, it is essential to evaluate the policy implementation to reach policy learning. In case of clear goals, summative evaluations are appropriate to evaluate reached goals. In case of unclear goals, formative evaluation with a description of process and outcomes is useful without explicit labeling of approval or disapproval (Matland, 1995).

Experimental implementation envisages unclear goals and unclear means to reach these goals and clear and widely supported goals but with unclear means of implementation. For

example, many digital policies might have agreed and known goals. However, stakeholders might lack knowledge of reaching this goal (not clear mechanisms). Hence, the experimental implementation might be technology-forcing policies and can develop entirely new capabilities. The downside of these policies is that ambiguous policies erode accountability. Also, there is a risk that public manager or actors pursue their interests but not public interests. Hence ambiguous policies might result in erosion of the public policies. On the upside, ambiguity might be approached as an opportunity to get new knowledge, both new means and new goals.

Experimental implementation has two advantages. Firstly, the experimental implementation can address the risk of uniformity when policies requiring conformity lead to superficial compliance, limit the street-level bureaucrats' abilities and limit understanding of vital information. Hence, effective compliance monitoring mechanisms might not be relevant in the experimental implementation. Secondly, the experimental implementation is better placed for the learning as the goal. Hence evaluation and feedback are vital components of effective learning. Experimental implementation is better framed by the bottom-up model, not the top-down model. The bottom-up model is better placed to stress the tolerance for ambiguity and opportunities for the local-level actors. In comparison, the top-down models are better placed to stress command, control, and uniformity and fail to consider the diverse context of the implementation process.

According to Matland, symbolic implementation envisages a high Ambiguity and Conflict of goals. He argues further that policies containing a high level of symbols lead to a high level of Conflict. This is because symbolic policies play an important role in confirming new goals, reaffirming a commitment to old goals, or emphasizing essential values and principles. Therefore local-level coalitional strength is an essential factor that defines the outcome of the policy implementation as a high level of ambiguity leads to diverse outcomes in different settings. In other words, the coalition of local actors controlling available resources influences policy outcomes.

Ambiguous goals leave room to develop a diverse interpretation of the policy. For example, key stakeholders might have a diverse vision in various sites. In addition, a contextual framework might impact outcomes via coalition strength. As mentioned above, contextual conditions at the local level impact the policy outcomes through coalition strength. Professionals play an essential role in this type of implementation as professional training provides a robust set of norms for legitimate activities and practical problem-solving actions.

Vague goals and ambiguous methods to reach these goals enable professionals to play a vital role. Professionals with competing goals and various standard policies form the foundation for competing coalitions. For example, digital policy in rural areas may have an official objective to improve the economic growth of the rural area. This policy has a referential goal that may envisage the following subgoals: increased productivity, increased access to the markets, increased income, and others. Actors with diverse professional backgrounds might propose diverse proposals for policy implementation, and reaching an agreement on the policy strategy might be time and energy-consuming (Matland, 1995).

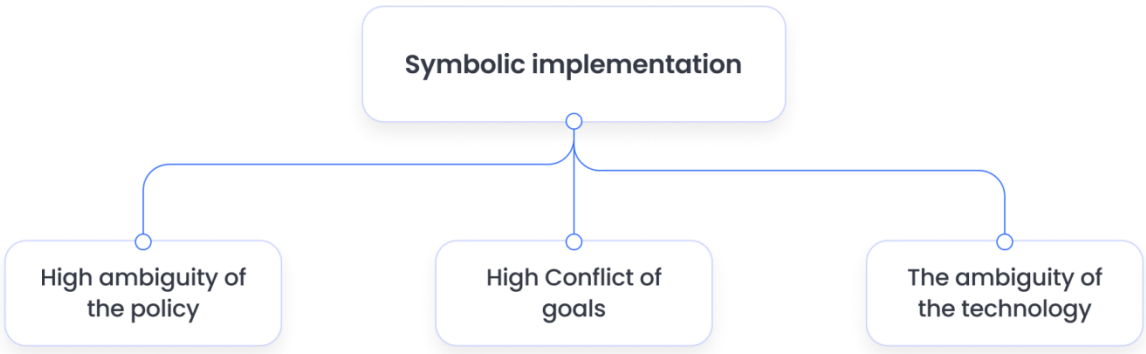
Symbolical implementation can include redistributing policies of power and goods. Therefore these policies may include limited information on the policy proceedings and procedures. Subsequently, the symbols might create substantial resistance by the local actors if declared. In other words, symbolic implementation policies potentially entail conflicts and resemble political implementation. Therefore Matland claims that conflict resolution can be achieved via bargaining or coercion mechanisms, which cause a sensible controversy and animosity among the key stakeholders. Namely, the key stakeholders fear that symbolical policy can threaten the existing relationship and status quo. The influence of the actors is dependent on the strength of the coalition.

In contrast to political implementation focused on the macro-level coalitional strength, the symbolic implementation entails the micro-level coalition's strength due to a high ambiguity

level. When a policy has ambiguous means and goals, the policy is subject to symbolic implementation. When policy ambiguity is reduced, the policy is subject to political implementation. The strategy for the central decision-makers is to decrease ambiguity via crystallization of the goals through discussion of the limited number of means that enable these decision-makers to assert some control and influence. Macro-level actors can obtain solid control of the policy when the policy is unambiguous, and the policy converts to political implementation.

Competing factions of the local level and micro-level contextual factors affecting the strength of the competing faction are vital factors in defining the outcome of the symbolic implementation. As Matland stressed, neither a top-down nor bottom-up approach is well placed to deal with substantial conflict and an ambiguous policy. The decision-makers have limited power to monitor the actions of the street-level bureaucrats and structure activities at the local level. At the same time, the decision-makers might influence the allocation of incentives and resources and prioritization of the issues. Because of the high ambiguity, the process is associated with the political process dominated by the local actors. In this regard, Matland proposes to use the bottom-up model. However, both models have limited power to structure the political nature of interactions (Matland, 1995).

Figure 16. Symbolic Implementation under Matland's Model



Matland acknowledged that the implementation of digital policies is subject to ambiguity regarding the key stakeholders' technology, policy, and conflicting interests, including affected target groups, the decision-makers, and the street-level bureaucrats. Hence the proposed theoretical framework is better placed from the perspective of epistemological positions in defining the interpretation of the issues and the policy of diverse stakeholders. In this regard, Matland's implementation theory approach unleashes the interpretive paradigm's power regarding reality. Namely, theory enables the researcher to construct reality via understandings and meanings sourcing socially and through experience.

Based on the literature review and the theoretical framework discussion, the researcher came up with the following main research question for this dissertation research:

- To what extent has a digital policy in the agriculture sector failed?

Two sub-research questions envisage the following to explore the main research question:

- What have been the roles of key stakeholders in the implementation process?
- How do key stakeholders, including central government, street-level bureaucrats, and farmers, describe their decision to implement (or not implement) digital policies /technologies?

III. Methodology

This dissertation research uses an interpretive qualitative research approach. This approach is widely acknowledged as an appropriate tool to address the research question imposed by the dissertation.

First, qualitative research is instrumental in exploring a new research issue, especially in an area where little research has been conducted or existing theory seems inadequate (Yin, 2003). Given a lack of research exploring the implementation of digital technologies among government institutions in developing and transition countries like Kazakhstan, the qualitative approach benefits from exploring the context of the policy more deeply.

Second, most of the previous research on digital policy implementation was conducted using the quantitative perspective, which covered the breadth of the analysis (Gridneva,G.A, Kaliakparova,G.Sh., 2019), (Vorobiev, A.E. , Tcharo,H. , 2018). At the same time, few studies were conducted using the qualitative approach. Therefore the qualitative approach of this dissertation study aims to understand the implementation issue in depth rather than in breadth (Yang et al., 2015). The depth of the dissertation research is achieved by document analysis, in-depth interviews, and participant observation with the key stakeholders involved in implementing digital technologies in the agriculture sector. Furthermore, the dissertation focused on exploring how the digital policy was conceived, introduced, and operated by the key stakeholders, focusing on the context of the sector, level, function, and values of the public service, and policy capacity of the key stakeholders.

Third, the dissertation exploits an interpretive qualitative research method as it is an appropriate approach for a social inquiry (Bryman, 2004). The qualitative research paradigm is based on relativists ontology and transactional or subjectivist epistemology. The interpretive paradigm assumes that reality is intersubjectively constructed via understandings and meanings

built socially and through experience (Glesne C. , 2006), (Guba, E.G., Lincoln Y.S., 1994). The study aims to understand how the key stakeholders constructed their understanding of the policy and how they define their perceptions in their specific contexts. Therefore qualitative research is an instrumental research paradigm for analyzing the implementation of the digital policy in Kazakhstan. Also, subjectivist epistemology assumes that the researcher cannot detach himself from what he knows. The researcher and the object of the investigation are linked (Guba, E.G., Lincoln, Y.S., 1994), (Denzin, N.K., Lincoln, Y.S., 2000). The truth in this dissertation research is negotiated via dialogue in a particular context or situation and time (Guba, E.G., Lincoln, Y.S., 1994).

Given this research question, a qualitative research method enables a researcher to understand and interpret how the dissertation research subjects constructed their reality. Glesne stresses that while a quantitative study seeks to generalize, predict, and provide causal correlations, a **qualitative study** is appropriate for understanding, contextualization, and interpretation. (Glesne C. , 2006). Qualitative research envisages "an activity that locates the observer in the reality in which the researcher engages in research practices to make the world visible and transform the world" (Denzin, N. K., Lincoln, Y. S., 2005).

The dissertation research is conducted in a case study that describes the experiences of the critical stakeholders in the implementation of digital policies. Namely, the dissertation research intends to analyze stakeholders' roles, experiences, and perceptions of the digital policy. The case study involves an empirical investigation of a particular contemporary phenomenon within its real-life context using multiple sources of evidence as document analysis, participant observation, and semi-structured interviews (Bryman, 2004).

It is widely acknowledged that an individual farmer's adoption of new technology is not a simple technical matter. Adoption of technology involves active consideration of values, beliefs, identities, goals, and social networks (Kuehne, G., Llewellyn, R.,Pannell, D., Wilkinson,

R.,Dolling, P.,Ouzman, J., Ewing, M., 2017), (Allen, W., Cruz, J., Warburton, B., 2017), (Pannell,D., Marshall,G., Barr, N., Curtis, A., Vanclay, F., Wilkinson,R., 2006), (Vanclay, F., 2004). It is also essential to acknowledge the key role of the institutions (interacting with farmers, technology producers, supply chain partners, supermarkets, and consumers) in the knowledge of this social context (Jakku,E., Thorburn, P.J., 2010), (Allen, W., Cruz, J., Warburton, B., 2017), (Fleming,A., Jakku, E., Lim-Camacho, L., Taylor, B., Thorburn, P. , 2018). Furthermore, it is widely acknowledged that context is crucial in policy implementation in developing countries, given the public institutions' institutional weakness and the strong role of informal institutions in hierarchical public administration systems (Pelizzo, R., Knox, C., 2021). Therefore the qualitative research study is an appropriate approach to answering the research questions of this dissertation study.

The dissertation consists of document analysis, semi-structured interviews, and participant observation methods to ensure internal validity via methodological triangulation based on multiple data sources.

First, the dissertation research analyzes publicly available documents to understand the digital policy's goals. These included the digital policy (adilet, 2021), its associated planning guidance (zerde, 2021), and several documents published for internal use by the Ministry of Agriculture and Akmola oblast Akimat. The analysis covered the statements in the documents, which provide what the digital policy would or could achieve. The focus of the analysis was both outcome and process goals.

Second, the dissertation research contains an analysis of semi-structured interviews. Semi-structured interview questions were designed based on the analysis of the existing literature in the field and publicly available documents to deeply explore perceptions by the key stakeholders of the digital policy aims and goals. Semi-structured interviews were based on standard interview scripts for each interviewee type to ensure consistency and coverage for the

foundation. The standard questions are then followed by detailed questions to explore new themes the stakeholders can raise during the interview.

Third, the dissertation research comprises the findings and analysis of participant observation. Participant observation was applied to analyze the key stakeholder's roles and experiences in implementing the digital policy.

1. Data collection approach

The data for the dissertation thesis was collected via semi-structured interviews, participatory observation, and documentary data (analysis of documents, policies, Etc.),

For this dissertation, qualitative data were mainly collected from in-depth semi-structured interviews conducted with thirty (30) respondents engaged in implementing the digital policy in the agriculture sector of Kazakhstan. Respondents were selected based on their experience and their responsibility in implementing the digital policy in the agriculture sector.

Semi-structured interviewees enabled the researcher to understand the aims and goals of the policy and test out an initial understanding of the policy from the documents. In addition, semi-structured interviews provided descriptive accounts, assessing the value of each element of the digital policy and its support and any changes made during the implementation of the policy. Finally, semi-structured interviews helped to understand the development and subsequent operation of the policy and its associated support. The dissertation research also focused on the digital policy communicated with all respondents.

Semi-structured interviews were undertaken to explore the stakeholders' perceptions of and experiences with digital technologies in general and the implementation of the digital policy in particular. In addition, the participant observation was undertaken to reflect the behavior and settings of the key stakeholders.

Semi-structured interviews and participant observation were held in Almaty, Nur-Sultan, Akmola, and Turkistan Oblasts. Specifically, the dissertation research is handled at the level of public managers, farmers, and sector experts. Public managers were involved both at the central government level and the level of the Oblast and Audan Akimats.

Table 6. List of the data collection approaches and timing

No	Method	Period
1	Participant observation	December 2020-November 2021
2	Semi-structured interviews	May 2021-November 2021
3	Documentary analysis	December 2020-November 2021

Documents used for this research envisaged government policies, government reports, and publications related to the implementation of the digital policy in the agriculture sector and other news stories. Also, the researcher analyzed the content of web portals related to the agriculture sector available at www.qoldau.kz and others.

A. Semi-structured Interviews

Data collection was conducted via 30 semi-structured interviews from May to November 2021. On May 12, 2021, the Ethical clearance of the dissertation was granted by the GSPP IREC committee at Nazarbayev University. Respondents of semi-structured interviews included diverse critical stakeholders, including central government authority managers, regional public managers, farmers, IT solution suppliers, field experts, and development institutions who have the potential to either benefit or be cut out of the value chain to some extent due to technological displacement and social change.

Since this research dissertation seeks to understand the implementation of the digital policy in the agriculture sector, the interviews focused on central topics such as the development of the digital policy in the agriculture sector, motivation and rationale, and factors that influenced the implementation process. The interview was designed to be flexible enough to

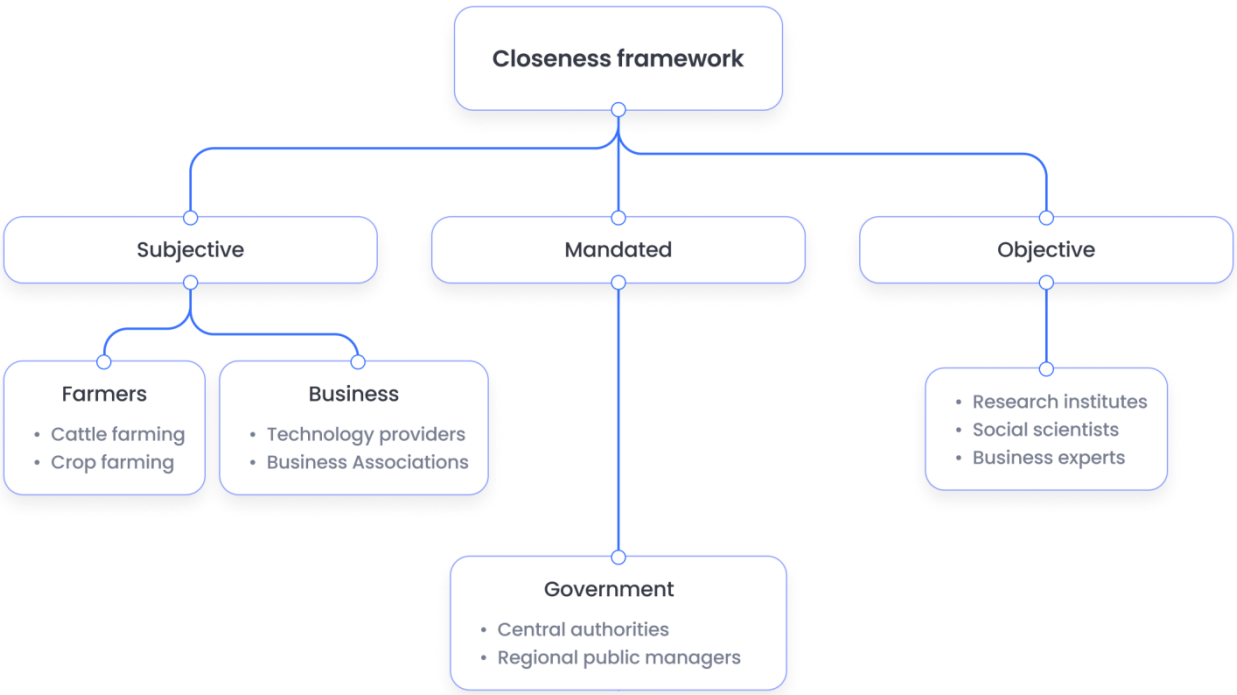
permit respondents to raise new topic areas during the interview. The interviews were held to explore respondents' perceptions of digital technologies in the agriculture sector and their implementation of the digital policy. In addition, respondents were asked about their experience with introducing digital technologies. Finally, respondents were queried about the implications of digital technologies on sub-sector development.

The dissertation thesis employs the selection of critical respondents based on a framework developed by (Devaney, L., & Henchion, M. , 2018), (Regan, A., 2019). Under this framework, potential respondents are selected based on an expert group that envisages three types of groupings of individuals. Each participant of the groupings is selected depending on their 'closeness' to the issue under consideration: (i) subjective, (ii) mandated, and (ii) objective.

Subjective closeness envisages actors with direct involvement and experience in smart farming, including farmers, rural inhabitants, IT product suppliers. Namely, subjective closeness actors have knowledge based on direct experience and exposure to the issue. This group includes business experts, service and technology providers, and business associations.

Mandated closeness encompasses actors holding a professional responsibility in the digitalization of the agriculture sector. This grouping includes central government authorities (the decision-makers), regional public managers (the street-level bureaucrats), and development institutions that provide strategic insight, define the policy, and distribute funding. Central government authorities include public managers of The Ministry of Agriculture. Regional public managers include public managers of both Oblast and Audan (regional) levels in an aggregated way. Finally, development institutions include development institutions such as the World Bank and FAO involved in developing the institutional and legal framework of the agriculture sector in general and digitalization of the agriculture sector in particular.

Figure 17. The selection process for the data collection interviews



Objective closeness encompasses actors involved in the research of digitalization in the agriculture sector or smart farming from an unbiased perspective. Scientists include representatives of the research institutes responsible for the research of the development of the agriculture sector, including both specialized sector scientists and social scientists. Using such a selection framework secures a wide range of participants with diverse backgrounds leading to the inclusive reflection of the opinions.

Respondents were selected via a snowball selection process based on referrals from sector experts and sector networks, attendance at exhibitions, conferences in the agriculture sector, and Internet research. Contacting the key individuals working on the farms was relatively straightforward due to the personal connection of the researcher and the recommendation of the experts via snowball sampling. The snowball sampling envisaged enquiring at the end of each interview whether the respondent was aware of anyone in the agriculture sector who might be

interested in being interviewed. They either provided contact details directly, via WhatsUp or email.

The central apparatus and regional akimat management interviews proved to be more challenging. Challenges with interviews with public managers were sourced in two ways. Firstly, it was hard to get access to public managers. Secondly, the workload or unwillingness of public managers to share views and information outside their scope of work challenged interview quality. The scientists demonstrated the same approach.

The sample comprises the interviewees from geographically different regions to reflect the context of the agriculture sector of Kazakhstan, in which large-scale farms dominate in Akmola Oblast and small-scale farms in Turkistan Oblast. Interviews were conducted face-to-face with interviewees generally in their place of work due to the high workload. As the agriculture sector is highly subsidized, most issues are sensitive. Therefore online interviews do not provide a complete reflection of the opinions. The interviewees were guided with the information that interviews have anonymous and confidential nature of the interview and were asked to sign a consent form. 70% of respondents agree to provide written consent.

The dissertation research interview entailed inquiry about their interpretation of smart farming and the digitalization of the agriculture sector based on the questionnaire provided in Annex 2. Firstly, respondents were asked to share their opinion and interpretation of the digital policy. Secondly, the researcher provided statements, and respondents were asked to discuss whether they agreed or disagreed with them. This statement tool facilitated further discussion around the issues and features that define digital policy and smart farming from the interviewee's perspective. The discussion was based on perceived benefits and risks associated with implementing the digital policy, smart farming, defining strengths, weaknesses, challenges, and opportunities for smart farming in Kazakhstan, and testing the ideas on the next steps in the development in the future.

All interviews were audio-recorded using a digital device (iPhone) or tracked by written notes immediately after the interview. Then, all interviews were transcribed using Microsoft Word for analysis.

Interview questions included:

- What is an understanding of the term Smart farming and the digital policy in the agriculture sector?
- What challenges and opportunities do farmers and public officials face in implementing smart farming and the digital policy in the agriculture sector of Kazakhstan?
- What risks and benefits do farmers and public officials face when implementing smart farming and the digital policy in the agriculture sector of Kazakhstan?
- What are future actions required from farmers and public officials to implement smart farming and the digital policy in the agriculture sector of Kazakhstan?

During semi-structured interviews, additional questions included:

- What does the supply chain look like for the business? For instance, who are the leading players, and how are they connected?
- How does information move between the business and others across the supply chain?
- How do public managers establish and maintain trust between businesses and others?
- What do digital agriculture and big data mean when people talk about digital agriculture and big data?
- How much is digitalization part of current business or future strategy?
- What benefits or opportunities do these digital technology applications provide?
- What problems or risks do they present?

- What are the main challenges or changes in digital agriculture that will likely impact the agriculture sector in the next 5–10 years?
- Who should be responsible for managing information or data flows along the supply chain, e.g., governments, corporates, farmers, or farmers?
- Are there going to be winners and losers from digitalization?
- What types of processes, rules, or incentives might help manage or reduce some of these risks?
- How should the government address the issues of small-scale farmers in digitalization?
- Who should address the issues of small-scale farmers in digitalization?

Such a broad collection of perceptions contributed to the dissertation research that digitalization could or could not impact (strategically or inadvertently) any stakeholder in their efforts and decided to implement the digital policy.

Semi-structured interviews enabled the researcher to investigate in-depth issues related to implementing the digital policy in the agriculture sector. Each interview lasted between 40 and 60 minutes and was recorded using a digital device. Thirty-eight interviews were conducted face-to-face in Nur-Sultan, Almaty, Turkestan, and Akmola regions. In addition, two interviews were conducted via email as respondents refused to provide an interview personally and preferred to send it by email. There were also two zoom interviews. However, the researcher recorded only 30 interviews due to the saturation factor.

B. Participant observation

Participant observation aimed to understand public managers' capacity to engage the key stakeholders in the digital policy implementation. Participant observation was used for the policy

capacity of the public managers, including managerial, political, and analytical skills. In the same vein, the participant observation was used to evaluate the communication skills of public managers and their policy capacity to manage risks, interests, goals, and means of policy implementation. The dissertation research envisaged non-systematic participant observation. During this observation, the researcher uncovered the communication patterns of public managers with third parties. This approach enabled the research to learn about the role of public managers in the implementation of digital policies and their perception of this role via behavior and communication patterns.

The participant observation was aimed to explore whether the public managers who are implementing the digital policy can understand the social and ethical context. The digital policy puts enormous amounts of power in the hands of a small group of computing and public manager elite, who operate in silos. Therefore, the participant observation was targeted to explore if these public managers are equipped with the required skills to deal with this power and what institutional behavior rationales drive them. In other words, the participant observation was targeted to explore the policy capacity of the public managers at the level of the system, organization, and individual levels. Therefore, the participation observation uncovered the specific features of public managers that indicate the effects of institutional behavior on the implementation of the digital policy. Namely, the researcher analyzed the age, background, gender diversity, behavior, and communication styles of public managers (both online and offline), comparing the Akmola and the Turkistan regions.

Participation observation started in December 2020 and ended in November 2021. The outset of the participant observation was the date of sending letters and contacting public managers' offices. The participant observation was held during semi-structured interviews during the fieldwork. The participant observation enabled the researcher to regularly observe the behavior of the decision-makers and the street-level bureaucrats via analyzing how various state agencies handle communication with third parties, including farmers. Research visits lasted 1 or

2 days due to different access levels. The researcher met with each respondent only once. However, the common feature was tracked in the setting and the stakeholder's behavior.

Table 7. The list of the public managers under participant observation.

	Position	Region	Education	Sex	Time	Age	
1	Deputy to Akim	Turkistan region	Veterinary specialist	M	May 26, 2021	50-60	Top
2	Senior public manager	Turkistan region	Engineer	M	May 26, 2021	40-50	Senior
3	Lead Public Manager	Turkistan region	Livestock specialist	F	May 26, 2021	30-40	Junior
4	Lead Public Manager	Turkistan region	Livestock specialist	F	May 27, 2021	30-40	Junior
5	Public Manager	Turkistan region	Agronomist	M	May 27, 2021	25-35	Junior
6	Minister	Central Authority	IT specialist	M	July 3, 2021	40-50	Top
7	Deputy to Akim	Akmola region	Economist	M	August 18, 2018	40-50	Top
8	Lead manager	Akmola region	Agronomist	M	September 1, 2021	35-45	Junior
9	Public manager	Akmola region	Agronomist	M	September 7, 2021	35-45	Junior
10	Senior public manager	Akmola region	Veterinary specialist	M	September 7, 2021	40-50	Senior
11	Lead public manager	Akmola region	Livestock specialist	M	September 9, 2021	40-50	Junior
12	Akim	Akmola region	Lawer	M	September 9, 2021	40-50	Top
13	Deputy to Akim	Akmola region	Veterinary specialist	M	September 9, 2021	50-60	Top
14	Senior public manager	Central Authority	IT specialist	M	November 4, 2021	40-50	Senior

The settings of the dissertation research subject included offices of one the Ministry of Agriculture and six Akimats, including two audan levels in Akmola Oblast, Akmola oblast akimat, and two audan level akimat in Turkistan Oblast, Turkistan oblast akimat. Unfortunately,

it was hard to access the office of Oblast Akimat. Fourteen respondents were under examination of participant observation, the list of which is provided above in **Table 7.**

The main findings of the participant observation and procedures in detail are provided in **Annex 5.**

C. Documentary data collection

The state is a great source of a great deal of information of potential significance and produces statistical information, textual material, or official reports (Bryman, 2004). Internal documentation is essential for researchers conducting case studies of organizations using such methods as participant observation. The interview with the authors of the digital policy enabled the researcher to understand the decision maker's perceptions and validate the documents' accuracy. In addition, documentaryanalysis enabled the researcher to demonstrate divergent interpretations among different stakeholders of key events and processes (Bryman, 2004). Through documents, different stakeholders express their positions in an organization or related to the policy. However, these documents cannot be regarded as free from error or distortion. Hence, the documents cannot provide objective accounts of state affairs. Therefore, the researcher examined and analyzed the data provided by public managers in the context of other data sources, including interviews with key stakeholders. Different positions of the authors of the documents were uncovered to develop insights into processes and factors influencing conflicting goals provided in the digital policy. The document analysis highlighted the significant role of subcultures in public institutions such as the ministry or regional akimats.

It is widely accepted that the documents partly reveal an underlying social reality (Bryman, 2004). In other words, the documents partly demonstrate processes in an organization. Namely, documents can partly uncover the culture and ethos of such an organization (Bryman, 2004). Therefore, the dissertation research uses documents as a window to organizational and

social reality. Namely, the dissertation research uses the documents to explore what they were aimed to accomplish. At the same time, the researcher acknowledges that documents cannot form a social reality and show how the organization is run day by day. Therefore, the researcher combined the analysis of the documents, interviews with respondents, and participant observations to understand how the agriculture sector operates. In other words, additional data from respondents were used to understand what documents reveal about digitalization in the agriculture sector.

Document analysis contained a significant part of the data gathering as it enabled the researcher to answer the research questions related to the digital policy implementation. Firstly, together with semi-structured interviews, document analysis was targeted to identify formal and informal rules regarding the roles of key stakeholders in the policy implementation. Secondly, document analysis enabled the researcher to explore the nature of the involvement of the key stakeholders in the digital policy implementation. Thirdly, the document analysis was targeted to identify the level of the digital policy performance in the agriculture sector via a collection of the data at the level of both the central apparatus and regional levels of the public administration.

The researcher examined the regulatory documents starting from 2017 through the current period to explore a number and variety of key stakeholders participating in the policy implementation. In the same vein, the researcher explored the range of activities and roles of the key stakeholders that were undertaken in implementing the digital policy, the rules that govern them, and the degree to which changes in these rules over time correlate with changes in the performance of these rules the digital policy.

During the dissertation analysis, the researcher had access to two documents: (i) the official regulation in the digitization of the agriculture sector and (ii) the official internal reporting of the government authorities at the level of Akimats and The Ministry of Agriculture.

To analyze the ambiguity and conflict of interests related to targets and means to achieve the objectives of the digital policy, the document analysis included the official regulation on (i) the agriculture sector, (ii) digitization, and (iii) subsidies. The dissertation research is based on statutes, regulations, regulatory orders, and other documents related to the digital policy implementation between 2018 and 2022. These regulatory documents were selected systematically according to the methods identified below.

The researcher conducted general web searches and state agency inquiries to identify proceedings in which the public authorities implemented digital policies. From these searches, the researcher created a comprehensive list of documents guiding the implementation of the digital policy in the agriculture sector. In addition, the researcher conducted a preliminary investigation of each stakeholder involvement degree. The list of documents is provided in Appendix 1. The list of proceedings was further narrowed to include only documents that addressed issues related to the digital policy implementation. Ten documents were selected for the deep analysis to include in the case study from this pool.

The official internal reporting of the government authorities included the annual reporting of Akmola Oblast and The Ministry of Agriculture to review the actual implementation results. The researcher obtained these documents from the related parties unofficially via email or hand. Internal reporting documents were used to compare the targets set by the regulation and the actual achievement of these targets. In addition, the dissertation research used internal documents in the form of a presentation and notes of the Ministry of Agriculture to review stakeholder analysis and the level of their engagement in implementation.

2. Data analysis approach - Thematic and Content Analysis

This research uses thematic and content analysis approaches to analyze the qualitative data collected via semi-structured interviews and documentation. Both analyses are foundational methods that can be utilized to analyze qualitative data (Braun, V., Clarke, V., 2006), (Vaismoradi, M., Turunen, H., Bondas, T., 2013).

It is generally accepted that analyzing qualitative data goes through three phases: data reduction, data display, and conclusion drawing and verification.

Firstly, all transcribed interviews and documents were analyzed, focusing on identifying patterns and statements representing interest. Next, each piece of evidence was examined individually to identify themes of interest, and then all the evidence was compared by the researcher. As a result, the amount of data subject to interest was reduced.

Secondly, the researcher prepared the data display based on themes and patterns from the analyzed data. The data display was organized into categories and sub-categories and the relevant pieces of text (from interviews and documents). The identified themes were confirmed by existing research and studies on implementation theory and the adoption of digital technologies.

Finally, the dissertation researcher concluded and verified based on a revision of the data many times to cross-check and verify the emerging issues and themes. In addition, the interpretation and explanation of the identified issues were provided. After that, the reported issues were compared in the existing literature and previous research.

QSR NVivo® (QSR International, version 12) was used to code, analyze, and manage the data. Interview data was sorted into the hierarchical structure of themes and sub-themes through multiple rounds of coding, informed by the analytical framework.

The qualitative coding for key concepts and uses of language from the sentence level is grouped into categories and themes in order to examine different connections and insights (Denzin, N.K., Lincoln, Y.S., 2000), ((Fleming, A., Vanclay, F., 2009), (Charmaz, 2006), (Glaser, B.G., A.L. Strauss., 1967). The coding hierarchy was instrumental for understanding, sorting, and representing the data.

The categories and themes were examined to reveal if they result in discourses. The purpose was to identify the cross-cutting ideas that were important to result in recognizable collective uses of key language, rules, norms and values, and assumptions ((Jorgensen, M., Phillips, L. , 2002), (Fleming, A., Vanclay, F., 2009). The analysis method envisaged comparing the key risks and benefits for the agriculture sector and how discourses framed these risks.

Thematic and Content analysis

The research employed two main approaches: thematic and content analysis. Both content and thematic analysis can be conducted within realist/essentialist and constructionist paradigms (Braun, V., Clarke, V., 2006). Both approaches are largely based on the "fact" perspective, which assumes that the data to be more or less accurate and truthful indexes of the reality out there (Vaismoradi, M., Turunen, H., Bondas, T., 2013). Both approaches enable the researcher to discover the actual behavior, attitudes, or real motives of the people being studied or detect what has happened (Ten Have, 2004) (Braun, V., Clarke, V., 2006).

It should be noted that both content and thematic approaches are robust to be applied for holding an introductory study on a novel phenomenon (Vaismoradi, M., Turunen, H., Bondas, T., 2013). While western scholars have investigated the digitalization of the agriculture sector, most studies held in Kazakhstan in public policy had been done in e-government or open government area. Hence, this area is novel for the study area (Janenova, 2010), (Janenova, S. & Knox, C., 2019), (O'Connor, K., Janenova, S., Knox, C., 2019).

Both thematic and content analysis has their strengths and weaknesses. The strength of thematic analysis stems from the fact that this entails both descriptive and interpretative approaches in the interpretation (Vaismoradi, M., Turunen, H., Bondas, T., 2013), (Braun, V., Clarke, V., 2006), (Fereday, J., Muir-Cochrane, E., 2006). On the other hand, the value of qualitative description stems from the fact that thematic analysis provides the origin of the knowledge and establishes meaning and solid findings, avoiding simple categorization (Holloway, I., Todres, L., 2003), (Giorgi, 1992), (Braun, V., Clarke, V., 2006), (Fereday, J., Muir-Cochrane, E., 2006).

The main advantage of the content analysis is that it uses a systematic coding and a categorizing approach for exploring large amounts of textual data to define trends and patterns of used words, their frequency, their relationships, the structures and discourses of communication (Ten Have, 2004), (Lincoln Y, Guba E., 1985), (Vaismoradi, M., Turunen, H., Bondas, T., 2013). The purpose of content analysis is to define the features of the data's content by investigating who says what, to whom, and with what effect (Bloor, M., Wood, F., 2006), (Lincoln Y, Guba E., 1985), (Denzin, N.K., Lincoln, Y.S., 2000).

The main advantage of thematic analysis over content analysis is that it amplifies the importance of context (Vaismoradi, M., Turunen, H., Bondas, T., 2013). As discussed in the introduction section, the agriculture sector is a context-driven sector due to its institutional structure. Therefore, this dissertation focused on analyzing context based on a thematic analysis of semi-structured interview results. Thematic analysis was used to identify, analyze, and report patterns (themes) within data (Vaismoradi, M., Turunen, H., Bondas, T., 2013).

The main advantage of content analysis is that it enables the dissertation researcher to analyze data qualitatively and, at the same time, quantify the data (Gbrich, 2007), (Lincoln Y, Guba E., 1985), (Denzin, N.K., Lincoln, Y.S., 2000). Furthermore, the content analysis uses a descriptive approach in both coding of the data and its interpretation of quantitative counts of the

codes to ensure the validity of the research to avoid a highly subjective and selective approach of the researcher (Vaismoradi, M., Turunen, H., Bondas, T., 2013), (Denzin, N.K., Lincoln, Y.S., 2000). Conversely, the thematic analysis provides a purely qualitative, detailed, and nuanced data account (Vaismoradi, M., Turunen, H., Bondas, T., 2013).

The main difference between the content analysis and the thematic analysis stems from consideration of the data context. For instance, content analysis envisages making sense of the meaning of messages, technology-supported social interactions, mass-media content, and information (Krippendorff, 2004), (Hsieh, H., Shannon, S., 2005). In comparison, thematic analysis envisages a combination of both meaning and meaning within a particular context (Vaismoradi, M., Turunen, H., Bondas, T., 2013). As implementation of the public policy is a very context-specific phenomenon (Matland, 1995), thematic analysis is better placed for application. Due to the repressive culture of public managers in terms of the criticism or assessment of the existing public policies, the content analysis does not fully reflect the reality of respondents. Therefore, the thematic analysis enables the researcher to uncover hidden issues which were not highlighted during semi-structured interviews.

As mentioned above, the agriculture sector is a contentious sector envisaging the double agenda of most stakeholders. Therefore, acknowledging context is the most important factor in analyzing semi-structured interviews collected in developing countries. Namely, a content analysis might miss context as it relies mostly on the frequency of codes counted to locate and make sense of essential meanings in the text (Vaismoradi, M., Turunen, H., Bondas, T., 2013). As a result, the content analysis might remove meaning from its context. The issue explains that a word or coding category may happen more frequently in a speech of one person or group of people than another for diverse reasons. Thus, multiple mentioning of the code might reflect greater meaning and importance and define greater ability or willingness to talk about the topic and vice versa (Vaismoradi, M., Turunen, H., Bondas, T., 2013). For instance, as in the case of IT technologies that are not familiar to agriculture sector players, the less frequency of smart

technology-related codes might indicate the inability of agriculture sector players to use the advanced technologies, but not lack of its importance.

The importance of a theme is not necessarily dependent on quantifiable measures but rather on whether it captures something important to the overall research question (Braun, V., Clarke, V., 2006). Another advantage of thematic analysis is drawing a thematic map. The dissertation research contains a visual presentation of themes, codes, and relationships between codes and themes. The visual presentation was used in this dissertation research to identify coherent and distinctive themes (Lincoln Y, Guba E., 1985), (Braun, V., Clarke, V., 2006), (Denzin, N.K., Lincoln, Y.S., 2000).

This dissertation thesis used a hybrid thematic analysis combining deductive and inductive coding (Braun, V., Clarke, V., 2006). Active reading and re-reading of the transcripts were used to explore the data. Under a deductive approach, two hierarchical codes, "perceived risks" and "perceived benefits," were identified a priori.

A deductive approach is useful if the general aim of thematic analysis and content analysis is to test a previous theory in a different situation or to compare categories at different periods (Hsieh, H., Shannon, S., 2005), (Vaismoradi, M., Turunen, H., Bondas, T., 2013). For example, the deductive approach was used to test control variables such as the ambiguity of policy goals, means, and conflict of goals under Matland's model.

It is widely acknowledged that inductive content analysis and thematic analysis are applied in cases where no previous studies dealing with the phenomenon are available. For example, there are no studies in public policy scholarship on implementing digital policies in developing countries. Hence, it is useful to apply coded categories in the dissertation research (Hsieh, H., Shannon, S., 2005), (Vaismoradi, M., Turunen, H., Bondas, T., 2013). Namely, inductive coding was used to explore the risks and benefits defined by the `viewers from diverse perspectives.

Data-driven codes were merged with theory-driven codes to develop themes (Fereday, J., Muir-Cochrane, E., 2006). Themes were then described, refined, and named. Finally, data extracts in verbatim quotes were provided to provide illustrative evidence. Namely, the quotes were used to capture the essence of the issue defined in each theme (Braun, V., Clarke, V., 2006), (Fereday, J., Muir-Cochrane, E., 2006), (Regan, A., 2019).

Codes were developed from initial findings from public policy literature in policy goals, support elements, the wider context of the agriculture sector, regulations, relationships between public managers and farmers, approaches to reporting and evaluation, and intended and claimed benefits of digitalization. The data was coded under several risks and benefits identified from the literature. At the same time, new coding was used to identify additional risks and benefits as presented in the data. In addition, the researcher developed themes based on the findings of other researchers, rigorous literature reviews, a panel of experts, and respondents to ensure multiple perspectives from diverse scholars with differing expertise. Finally, these codes were grouped into larger themes such as ambiguity, conflict of goals, and the digital divide.

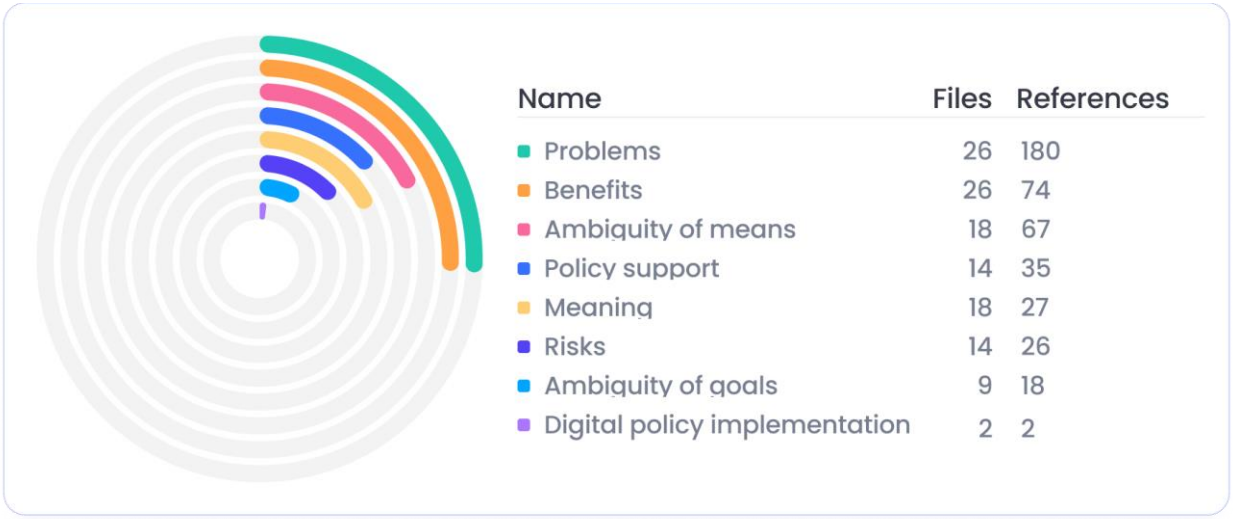
The researcher identified farmers and public managers as key stakeholders for the unit of the analysis. As this is a public policy paper, thematic analysis defines the government's support nature and the interaction between farmers and public managers as the focus for investigating the nature of the digital policy implementation in the agriculture sector.

The ambiguity theme was considered in several dimensions: the ambiguity of public managers' role, the ambiguity of policy means, and the ambiguity of policy goals. The ambiguity of the goals and means for public managers is defined by the public manager's role in implementing the digital policy in the agriculture sector. Since it is public policy research, the researcher focused on the role of public managers in uncovering the digital divide and the conflict of goals theme. Namely, the conflict of goals stemmed from the conflicting roles of

public managers. The first role envisages the role of the enabler. The second role envisages a role of a part of the informal system.

The thematic and content analysis uncovered eight main discussion themes based on the interview transcripts, as provided in the Hierarchy Chart below. A detailed analysis of each theme is provided below in this Annex 4. The analysis of semi-structured interviews is based on the conceptual framework provided in Chapter 3, covering Matland's model and the policy capacity concepts to address the dissertation's main research questions.

Figure 18. Hierarchy Chart on thematic and content analysis



During semi-structured interviews, respondents highlighted the following themes in descending order, including (i) problems with 180 references, followed by (ii) benefits (74), (iii) ambiguity of means (64), (iv) policy support (35), (v) meaning (27), (vi) risks (26), (vii) ambiguity of goals(18) and (viii) digital policy implementation (2). Each theme consists of several nodes, details of which are provided later in this Annex.

During content and thematic analysis of semi-structured interviews, public managers were categorized into two groups "decision-makers" or "central government authorities" as well as "street-level bureaucrats" or "regional public managers ."Farmers were categorized into two

groups large-scale and small-scale farmers. Respondents were also categorized into regions – Turkistan and Akmola oblast regions.

Analysis of the themes and nodes in this Annex 4 are provided in the following order based on theoretical assumptions provided in chapter 3 on the theoretical framework and the frequency of the references.

Table 8. Themes and Research Questions

	Theme	**Sub-Research Question**
1	Meaning	What were the roles of key stakeholders in the implementation process?
2	Ambiguity of goals	What were the roles of key stakeholders in the implementation process?
3	Ambiguity of means	How do key stakeholders describe their decision to implement or not implement digital policy?
4	Benefits	How do key stakeholders describe their decision to implement or not implement digital policy?
5	Problems	How do key stakeholders describe their decision to implement or not implement digital policy?
6	Risks	How do key stakeholders describe their decision to implement or not implement digital policy?
7	Policy support	How do key stakeholders describe their decision to implement or not implement digital policy?
8	Digital policy implementation	Has digital policy failed?

The researcher acknowledges that the qualitative approach has been criticized for its lack of scientific rigor and credibility with traditionally accepted quantitative methods (Lincoln Y, Guba E., 1985), (Krippendorff, 2004). The quantitative inquiry is assumed to occur within a value-free framework and relies on measuring and analyzing causal relationships between variables (Vaismoradi, M., Turunen, H., Bondas, T., 2013). Therefore, dissertation research can not ensure the independent classification of data with peer researchers (Vaismoradi, M., Turunen, H., Bondas, T., 2013). Moreover, the researcher accepts that she might have different thinking styles. Therefore, a personal research fieldwork diary was used to mitigate the risk of subjectivity and to ensure internal validity. It includes additional materials with raw data or field notes, personal code memoranda, and field notes (Vaismoradi, M., Turunen, H., Bondas, T.,

2013). In addition, the investigator discussed the coding approaches with a supervisor to ensure scrutiny and an independent alternative interpretation of the dissertation research. Namely, because of the nature of a doctoral study, themes developed codes and discussed analysis were defined with a supervisor. This process ensured method consistency.

The dissertation uses thematic and content analysis for the data analysis based on the scholars' findings that demonstrate a rigorous approach to a qualitative research study. Thematic coding envisaged a balance between inductive coding (themes emerging from the interviewee's discussions) and deductive coding (derived from the theoretical framework). Both content and thematic analysis process equally enable the reader and the scholar to define themes generated from the raw data to unveil meanings related to smart farming. This detailed description of the steps and processes used in data analysis can be replicated and enable a researcher to represent a high degree of clarity of the conceptual framework and method of analysis applied.

IV. Findings and Discussions

Based on documentary analysis, participant observation, and content and thematic analysis of the semi-structured interviews presented in Chapter 4 on Methodology and Annexes 5 and 6, Chapter 5 provides key findings that address the research questions.

The first section of the chapter provides the findings on progress of implementation of digital policy and the digital policy context for identifying the roles of key stakeholders in the implementation of that policy. Namely, the section provides specifically, the roles of farmers and public managers in digital policy implementation. Public managers were categorized into two groups: (i) "decision-makers" or "central government authorities" and (ii) "street-level bureaucrats" or "regional public managers." Farmers were categorized into two groups by size: large- and small-scale farmers.

The second section discusses the ambiguity of goals, and the third section addresses the ambiguity of the means of implementing digital policy. Lastly, based on the documentary analysis, participant observation and analysis of the semi-structured interviews, the chapter provides assessment of the key stakeholders on policy implementation results.

1. Implementation deficit

Based on the documentary analysis and analysis of the semi-structured interviews the thesis clearly establishes that there is implementation deficit in digital policy in the agriculture sector of Kazakhstan. This section systematically highlights the specific components that were missing in implementation.

Namely, under the digital policy, the government was targeted to implement three components of the digital transformation of the sector, including (i) precision crop farming, (ii)

automation of traceability of agricultural products (cattle farming), and (iii) creation of online trade platforms. Overall, under a decree of the government of Kazakhstan, the digital policy was aimed to introduce and 500 basic farms, 3000 advanced farms, 40 digital farms. Ministry of Agriculture defined three levels of farms, depending on the stage of digitalization– (i) digital farms, (ii) advanced farms, and (iii) basic farms.

Documentary analysis and semi-structured interviews revealed that only two out three major policy components were partially implemented. Namely, the implementation of components on precision farming and automation of traceability of agricultural products were partially fulfilled, while the government has delayed the introduction of online trade platforms. Out of 500 planned basic farms, Kazakhstan introduced only 81 basic farms in the precision farming and 39 basic farms with some components of the automation of the cattle farming.

Firstly, under the precision crop farming component, the government planned to establish one pilot project, which then shall be replicated countrywide. In 2020 Akmola region introduced a pilot project in Barayev village. However, the project was partially replicated in the country. In general, mostly selected large-scale farms in Northern regions, including Akmola, Northern Kazakhstan, and Kostanay oblast introduced the precision crop farming technologies. In total, in 2022, 81 farms introduced digitalization with components of precision farming technologies.

Table 9. Farms introduced the precision farming technologies

Year	**2019**	**2020**	**2021**	**2022**
Number farms	28	43	58	81

It should be noted that precision farming technologies comprised three levels of digitalization of farms. Basic farms included: (i) mapping the fields and (ii) agrochemical soil survey. The advanced farming included components of (i) application of fuel flow sensors, (ii) application of GPS trackers, (iii) introduction of software, (iv) electric map of weeds, and (v)

installation of agrarian meteorological stations. Finally, digital farming includes the components of (i) yield sensors, (ii) automated traffic control, (iii) differentiated seed, and (iv) fertilizer application.

Table 10. Farms with automation farming technologies

Year	**2019**	**2020**	**2021**	**2022**
Number farms	21	26	31	39

Automation farming technologies envisage automotive monitoring and management of livestock. Basic farming included the components of (i) index assessment of cattle, (ii) milking parlor with software, and (iii) herd management system. Advanced farming technologies included the components of (i) electronic balance, electronic chipping of livestock, (ii) automatic system of manure removal, (iii) electronic cattle matching, and (iv) automatic drinker. The digital farming technologies included the components of (ii) monitoring of animal activity, (ii) integration of the farms with the Cattle Tracing System, (iii) milking robots, feeders, and (iv) renewable power sources. In 2022, 39 farms introduced components of automation farming technologies.

Despite official data from the Ministry of Agriculture only on basic farms, documentary analysis and semi-structured interviews revealed that some large-scale farms introduced some components of both advanced and digital farming.

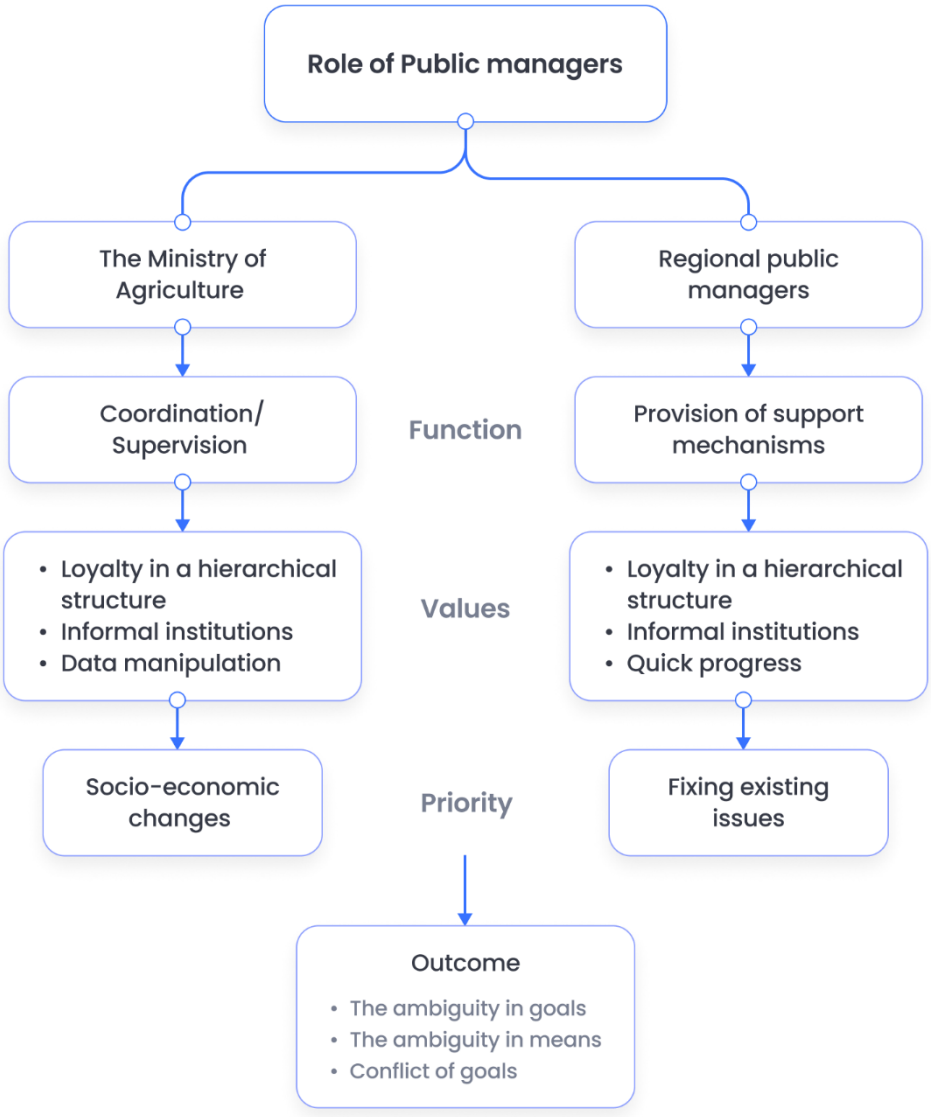
As a result, the research revealed that the implementation of the digital policy in Kazakhstan failed to achieve the targeted goals. Namely, only 84 farms introduced digital technologies against 3,000 advanced farms, 40 digital farms, and 500 basic farms, as declared by the Ministry of Agriculture earlier in 2018.

Key digital policy stakeholders

This section provides overview of key stakeholders of digital policy, such as the Ministry of Agriculture, regional public managers, and farmers, based on semi-structured interviews and documentary analysis findings.

The Ministry of Agriculture played a key role in implementing the digital policy to coordinate national activities. In addition, under the digital policy, the Ministry of Agriculture is responsible for supervising policy implementation in the agriculture sector.

Figure 19. Roles of public managers in the digital policy



The Ministry of Agriculture is deeply interested in implementing the digital policy and generally supports that effort. At the same time, semi-structured interviews with regional public managers revealed that decision-maker's power to enact and implement the policy is low due to a lack of (i) clear goals, (ii) public engagement, and (iii) required expertise. (Details on each will be discussed later in this chapter.)

Regional public managers played a key role in implementing the digital policy by coordinating implementation and providing support at the regional levels, including the audan and oblast levels. Functions of both the Ministry of Agriculture and the regional public managers included creating an enabling environment for the digital transformation of the agriculture sector via public support mechanisms. However, no clear public support mechanisms were provided with the digital policy, leading to ambiguity in the details of the means to implement it, as discussed later in this chapter.

Farmers played a key role in implementing the digital policy relating to their primary entities, and they introduced digital technologies and underwent a digital transformation.

2. Ambiguity of goals

This section discusses key factors that drive key stakeholders to implement or lead them to fail to implement digital policy. This section focuses on key stakeholders' (particularly public managers') perceptions of ambiguous policy goals. Content, thematic, and documentary analysis revealed discrepancies between perceptions of public managers at central authorities and managers at the regional level regarding digital policy goals.

According to Matland, low ambiguity in goals leads to successful policy implementation. Hence, it is essential to determine if stakeholders clearly understand digital policy goals, including both the meaning of the policy itself and the role key stakeholders play. The research revealed that key stakeholders have diverse understandings of the meaning of the digital policy and goals across regions and stakeholders. For example, the semi-structured interview findings

revealed that respondents' understanding of the meaning of the digital policy mostly concentrates on the topics of (i) automation, (ii) data recording (or collection), (iii) business process optimization, and (iv) precision farming. At the same time, however, stakeholders understand the benefits of the digital policy. The document analysis provided in the relevant section of Chapter 4 on Methodology supports the finding of diverse perceptions of meanings. Comparing the findings from the document analysis and the thematic analysis revealed that different regions have different track records and criteria regarding digital policy implementation. Thus, no coherent, nationwide approach to digital policy exists. In addition, documentary analysis and semi-structured interviews revealed discrepancies in goals and policy implementation performance in terms of both public management levels and time.

Table 11. Source of data discrepancy on goals performance between regional public managers and central government authorities

1	No guidance from central government authorities on goals
2	No systemic monitoring at both regional and central level
3	The constant change in the goal targets at a central level

First, semi-structured interviews with respondents revealed that central government authorities provided regional public managers with no official document containing instructions and guidelines for tracking progress with policy goal implementation. As a result, discrepancies arose in performance reporting at both the decision-maker and the street-level bureaucrat. In other words, no coherent standards were established between central government authorities and regional public managers for reporting on digital policy performance. Specifically, respondents from central government authorities noted that the Ministry of Agriculture did not provide any detailed KPI based on subsectors or regions that acknowledged the particular circumstances of individual regions.

Second, the data collected via websites and semi-structured interviews revealed that no public institution has a systemic monitoring and tracking system for digital policy implementation. Moreover, each government stakeholder approached by the researcher has its

own monitoring system, and the data provided by these entities do not correlate. Semi-structured interviews revealed that regional public managers are not obligated to monitor digital policy implementation systematically. Instead, regional public managers provide the list of digital farms to superior management or the relevant ministries only ad hoc or upon request.

Third, semi-structured interviews revealed that central government authorities had several times updated targets for introducing smart farms according to classification. To facilitate digital policy implementation, the Ministry of Agriculture in 2018 classified smart farms using three groups: (i) basic, (ii) advanced, and (iii) digital. However, the classification of smart farms has been updated by the Ministry of Agriculture twice since 2018. Subsequently, starting in 2021, the Ministry of Agriculture has tracked only digital farms in their reporting, and it has eliminated the basic and advanced farm types from the classification system. No justification was provided for this update.

Unlike the Ministry of Agriculture, akimats of Akmola Oblast still maintain a monitoring system based on the classification of digital farms as basic, advanced, and digital. Comparing the data from the Ministry of Agriculture and akimats of Akmola Oblast thus revealed discrepancies: At the end of November 2021, according to Ministry of Agriculture data, the Akmola region had 27 digital farms, whereas akimats of Akmola Oblast reported data showing 17 digital farms and 27 advanced farms.

Table 12. Track record of implementation of digital farms under the Digital Kazakhstan Policy

No	Oblast	2018		2019		2020		2021		Total
		Crop	Cattle	Crop	Cattle	Crop	Cattle	Crop	Cattle	
1	Akmola	2	3	9	3	10				27
2	Aktyubinsk						2	1		3
3	Almaty	3	5		1				1	10
4	Western Kazakhstan							1		1
5	Zhambyl						1			1
6	Karaganda	2	1					2	3	8
7	Qostanay	4	4	1			1	4		14

No	Oblast	2018		2019		2020		2021		Total
		Crop	Cattle	Crop	Cattle	Crop	Cattle	Crop	Cattle	
8	Kyzylorda				2	1	1			4
9	Turkestan	1	1				2	1		5
10	Pavlodar							1		1
11	Northern Kazakhstan		1	6		1	1			9
12	Eastern Kazakhstan									0
13	Almaty city							1		1
Total		12	15	16	6	12	8	11	4	84
Total per annum		27		22		20		15		84

Source: Internal document of the Ministry of Agriculture, dated November 27, 2021.

It should be noted that neither the Ministry of Agriculture nor the oblast akimats provided official data on digital policy implementation performance.6 The researcher, therefore, obtained and used data from public managers that had been collected for internal, unofficial use only.

Interestingly, the region's performance reflected the structural differences between Kazakhstan's northern and southern regions. As seen in Table 12, Akmola introduced 27 digital farms. At the same time, Turkestan introduced only five digital farms. Such regional differences in digital policy implementation can be explained by broad context of Kazakhstan's agriculture sector. Traditionally, Kazakhstan's agriculture sector has had two subsectors: cattle farming (dairy and livestock) and crop production. Historical regional specializations within these sectors have shaped farm types and production structures. Large, capital-intensive grain and livestock farms with strong economies of scale in production are concentrated in such northern regions as Akmola, Kostanay, and North Kazakhstan. About 40 of these large-scale agricultural farms control about 30% of grain farmland, selling two-thirds of the wheat domestically and the rest abroad (Petrick, M., Wandel, J., Karsten, K., 2011), (Oshakbayev, 2018).

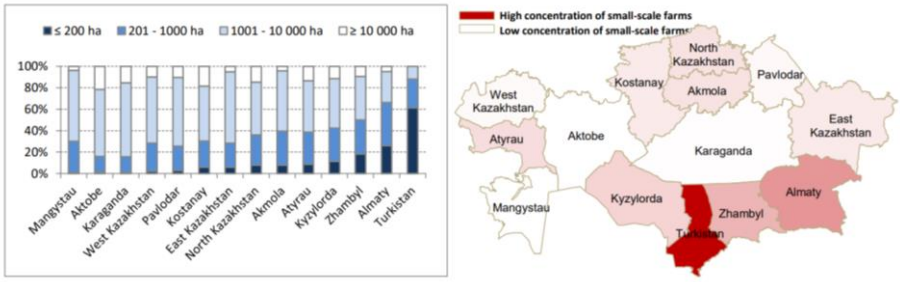
On the other hand, household and individual farms are concentrated in southern regions, such as the Almaty, Turkistan, and Zhambyl oblasts. This variation leaves large-scale farms dominant in the agriculture sector, a result of their cultural settings as well as government

6The researcher obtained and used data collected by public managers for unofficial internal use only.

preference for large farms as sources of (i) rural employment, (ii) food security, and (iii) social safety. The agriculture sector is thus associated with elite capture, with a key role being played by informal institutions related to Soviet-style policies that favored large-scale farms due both to public authorities' propensity to support large taxpayers and to cultural beliefs (Petrick, M., Gotz, L., 2019), (Oshakbayev, 2018), (Petrick, M., Oshakbaev, D., and Wandel, J., 2014).

Furthermore, the supply-side favors informal institutions' role because individual farmers place low trust in officials. This mistrust is rooted in memories of misappropriation and asset stripping during the transition period, with rural elites often exploiting new legislation and institutions for their own benefit (OECD 1. , 2019) (Petrick, M., Oshakbaev, D., and Wandel, J., 2014), (Oshakbayev, 2018). (Details are discussed later in this chapter in the section on farmers' level of trust in public managers.)

Distribution of agricultural land by farm size, 2016



Source: Statistics Committee.

In summary, the research revealed that key stakeholders have ambiguous and varying perceptions of the meaning of the digital policy and goals across regions and types of stakeholders. One key factor for implementing the policy was to meet its policy goals, but these goals have proven ambiguous for three reasons. First, the classification of smart farms and the target numbers were revised twice during the implementation of the digital policy. Second, no coherent classification of the digital policy has been provided at the regional or oblast akimat levels. In other words, the classification of smart farms and inconsistent statistics reported by different layers of the government (decision-makers versus street-level bureaucracy) have remained ambiguous. Consequently, frequent changes in digital policy goals regarding farm

classification resulted in ambiguity in those goals. The lack of coherent statistics and data is discussed later in this chapter.

3. Ambiguity of means

Based on the qualitative analysis of emerging themes, this section describes key factors driving key stakeholders to either implement or fail to implement the digital policy. Focusing on perceptions among public managers and farmers of the ambiguity of available means and based on documentary, content and thematic analysis, and participation observation, this chapter was mapped onto Matland's model to identify the key factors associated with key stakeholders' decisions. By considering the context of agriculture sector issues and the public administration structure, this research revealed the perceived risks and barriers impeding or distorting key stakeholders' decisions on policy implementation. Likewise, exploring agriculture sector issues sheds light on factors influencing farmers' willingness and capacity to implement the policy. Finally, exploring public administration issues uncovers the capacity and willingness of public managers to facilitate and implement digital policy in the agriculture sector.

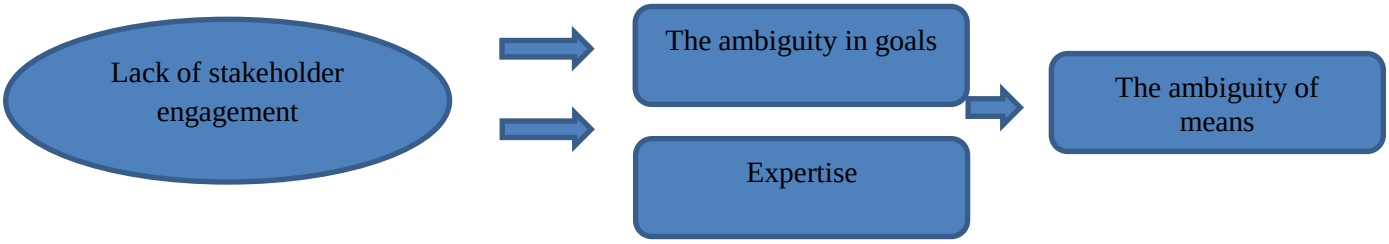
This section consists of three subsections. The first explores the research findings on key stakeholders' **engagement issues** regarding their role and factors influencing their policy implementation. This analysis of stakeholder engagement showed that the government failed to support farmers. Based on this analysis, the remaining two subsections address two government support mechanisms influencing farmers' decisions to implement the digital policy: **remunerative policy** and **capacity-building relating to skills and expertise**. These key supports were provided to farmers by the government for implementing agriculture sector policy in general and digital policy in particular, but ultimately farmers saw both mechanisms as uncertain.

A. Stakeholder engagement

Key findings from semi-structured interviews revealed that public managers' lack of stakeholder engagement served as a crucial barrier hindering key stakeholders, including public managers and farmers, from implementing the digital policy.

Respondents highlighted the importance of collaboration between farmers and public managers in building the competency and expertise of agriculture professionals to achieve a robust agriculture sector value chain. Collaboration would help increase awareness of policies in the agriculture sector and digital transformation and would reduce the ambiguity in policy means. However, the lack of key stakeholder involvement in the agriculture sector's project cycle resulted in ambiguity in policy goals between farmers and public managers (discussed in the previous section) and a lack of expertise (discussed in the next section). In addition, the ambiguity of goals resulted in the ambiguity of means.

Figure 20. Stakeholder engagement and results



This section mainlt considers two aspects of stakeholder engagement: (i) street-level bureaucrats or regional public managers and (ii) farmers.

Lack of engagement from regional public managers

The semi-structured interviews with respondents revealed that central government authorities' efforts to involve regional public managers in the policy development process are the exception, not the rule. Regional public managers highlighted that they have no opportunity to provide feedback on the policy during the drafting process; they are not even provided the option to comment on drafts. Their needs and opinions are otherwise rarely taken into account during

the process. This failure to use a bottom-up approach left respondents without the opportunity to facilitate implementation by helping to define clear policy goals.

> "*We have still Soviet-style hierarchy. Nobody asks us anything in the regulation process. They rarely ask our opinion. We write that we agree with them" (2T8PM).*

This finding from the semi-structured interviews was supported by participant observation, which revealed that public managers are not open in their interactions. During interviews, public managers' behavior seemed constrained as they responded to questions within their competence very narrowly. No criticisms or suggestions for policy improvements were made, demonstrating the compliance culture among public managers in the public spaces. As Lipsky noted, uncertainty, conflicting goals, and coping mechanisms for dealing with high workloads modify public managers' behavior to match their performance. As a result, constrained communication skills are part of public managers' routine behavior, helping them cope with uncertainty and work pressure. Hence, instead of implementing goals and objectives, these managers tend to modify the objectives to fit their current job functionalities, simply recording and reporting (Lipsky, M., 1980).

This lack of involvement from street-level bureaucrats as key stakeholders is rooted in the hierarchical structure of the public management, where no opinions other than official ones are accepted, and policy is developed centrally, reflecting path dependency on Soviet nomenclature (Vakulchuk, 2016). As a result, street-level bureaucrats' lack of engagement with policy ambiguity creates an ambiguity of policy means. This increases inconsistency in implementation results among the various stakeholders at regional levels, as noted in the section above concerning digital policy performance. In addition, due to a lack of engagement in policy development and implementation that leads to diverse reporting standards, key stakeholders, including street-level bureaucrats and decision-makers (the Ministry of Agriculture versus oblast akimats), struggle with misreporting issues.

"… The akimats do not know how to report, or they do not know the importance of reporting. The regional akimats do not know where to report, how to report, what they have to do if this is the case…" (BE6).

At the same time, decision-makers shared negative attitudes toward regional public managers regarding implementing the digital policy. For example, some public managers in the Ministry of Agriculture stated that regional public managers viewed the digital policy as an additional burden on their existing workloads, for example, refusing to participate in public awareness trips with IT specialists because they saw the trips as an additional burden with no benefit to them.

We [the Ministry of Agriculture] organized the trips with Oblast Akimats to increase farmers' awareness of the digital policy and the available technological solutions provided by the Kazakhstani IT developers and dealers of the big IT companies. But, unfortunately, only 4 Oblast Akimats accepted our initiative to arrange such field trips due to the high workload of public managers in regions. In addition, we did not have a budget for such trips, while the regional akimats were reluctant to arrange such trips at their costs (2M10PM).

Lack of engagement from farmers

Most respondents revealed that few farmers were involved in any aspect of the policy development process except for selected large-scale farmers. To gain the information, farmers were supposed to attend business association meetings, but these associations are weak in the country. In addition, respondents described feeling that the laws were adopted without any prior involvement of key sector stakeholders; a few respondents noted that feedback from the agriculture sector was obtained only after the policy had been issued. This left stakeholders uncertain about how the policy was meant to be implemented, and consequently, policy goals and means were ambiguous for them.

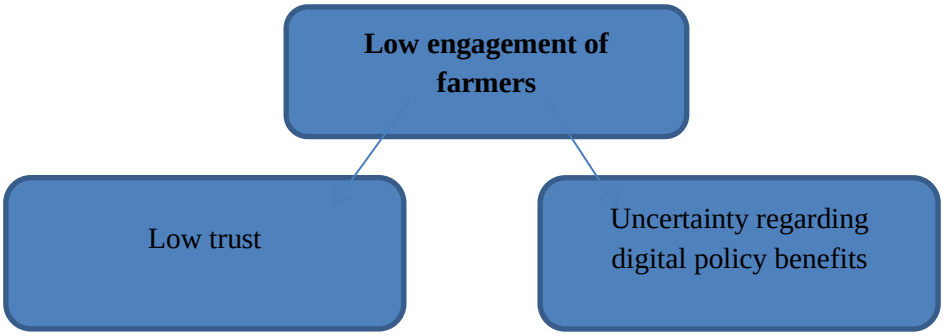
"*A barrier to policy implementation is that farmers and regional public managers are not involved in the policy development and do not understand the guidelines clearly" (2T9PM).*

"It should not be only the Ministry of Agriculture wanting to implement the policy. It should be done jointly with farmers, agriculture experts, digital experts, and expert

working groups. There should be effective communication channels and all groups working hand in hand. However, first, they need to build expertise" (2M10PM).

On the farmers' side, most respondents expressed their assumption that farmers were reluctant to become engaged in developing and implementing the digital policy due to (i) low trust in the government policy among farmers and (ii) uncertainty over the policy's benefits. In addition, lack of trust was linked to poor communication channels among public managers, which has remained a major barrier to policy implementation.

Figure 21. Engagement of farmers in the digital policy



Low levels of trust

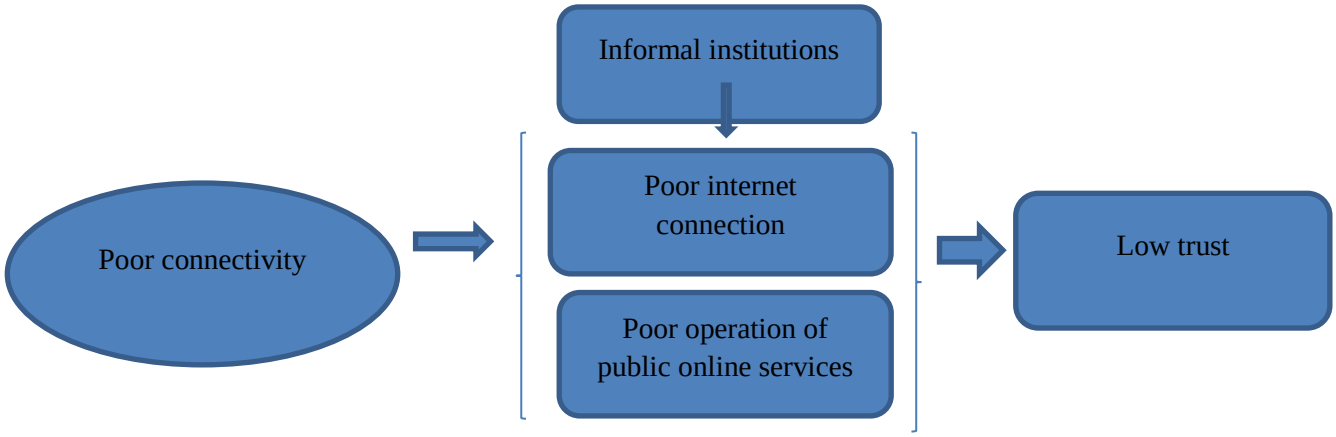
The respondents highlighted the websites' poor connectivity and poor content quality. The lack of network availability was noted as a key issue for the agriculture sector and a major barrier to digital policy implementation. The respondents consider poor connectivity to be one cause behind farmers' low level of trust in the government and its institutions, leading to lower levels of trust in the government's agriculture sector policies in general and the digital policy in particular. Connectivity issues are identified with stakeholders' communication experience with the government via digital outlets. Ten respondents discussed connectivity as a problematic issue for the agriculture sector, and 30% of respondents from all regions represented public managers and farmers.

First, respondents highlighted that infrastructure and low internet connection quality affect the operation of farms and communication with public managers. In addition, most

farmers rely on public support subsidies (discussed in more detail in this chapter below), and due to the pandemic, they must apply for subsidies using online services.

> *"Farmers complain about the low quality of operation of the portal (qoldau or iss) and internet. Sometimes the portal does not work. There is no internet or electricity connection" (2A1PM).*

Figure 22. Key factors behind low levels of trust



Notably, most regional public managers highlighted the poor quality of operation of government-related websites and online services (which are a part of e-government initiatives) as barriers in communication channels. In 2005, GoK launched the "E-government" initiative establishing the www.egov.kz website, public procurement portal, and online public service centers. Public authorities were required to launch electronic websites and organize web conferences to facilitate public service delivery and communication among the state, society, and businesses. E-government envisages government-to-government ("G2G"), government-to-business ("G2B"), and government-to-citizens ("G2C") modules.

Respondents highlighted two main issues related to communication infrastructure: (i) malfunction of the various digital monitoring systems operated by the government as part of G2B module and (ii) lack of integration (coordination) of different digital systems operated by government agencies as part of G2G module.

Respondents revealed that the agriculture sector has multiple databases that are not interconnected and/or duplicated. For example, the government operates five major digital monitoring systems. In addition, individual agencies often operate other systems. For example, different systems are operated by departments in the Ministry of Agriculture and the Ministry of Finance, and farmers must work with four databases simultaneously to apply for an investment subsidy, which is burdensome and frustrating.

Table 13. List of government databases under e-government initiative

No	Website	Activity	Responsible Ministry
1	www.plem.kz	Registry of the cattle breed	Ministry of Agriculture
2	https://portal.iszh.kz	Veterinary registry of the cattle	Ministry of Agriculture
3	www.qoldau.kz	Subsidy for crop and cattle farming (fertilizers, cattle, water, and others)	Ministry of Finance
4	http://www.aisgzk.kz	Land cadaster system	Ministry of Agriculture
5	www.sybaga.kz	Subsidy and registry system for the cattle	Ministry of Agriculture

One key reason for the launch of E-government was the government's aspiration to exclude corruption and ensure transparency. However, despite these expectations, during the semi-structured interviews, small-scale farmers and regional public managers revealed that the cost and operation structure provided by operators of e-government systems is not transparent and thus creates additional barriers in the subsidy application process while leaving room for suspicion of corruption or data manipulation. Participant observation also supported the lack of transparency in communication, which revealed that public managers prefer to work with traditional channels to avoid e-government solutions. More likely, public managers prefer to avoid blame for unprofessional or substandard services, which might be easily tracked through the online system. As a result, the researcher’s applications for meetings sometimes did not reach the intended party (one in the ministry and three in the oblast akimats). This finding aligns with findings from the semi-structured interviews that public managers have the propensity to report

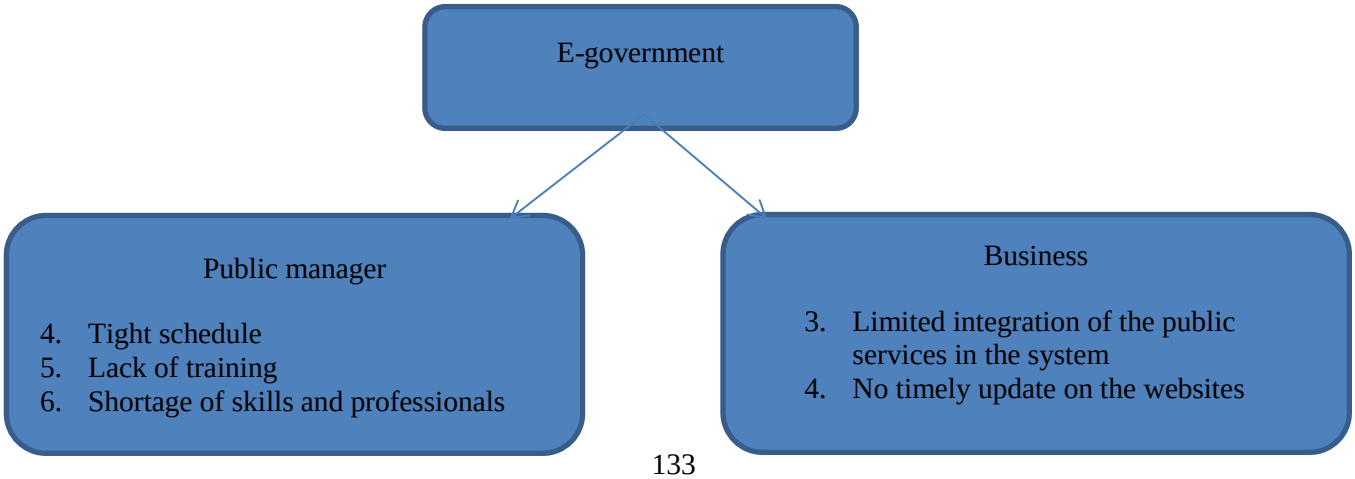
"good news" or "outperformance," a tendency nurtured by the culture of faking policy results. This experience proves the argument that data manipulation has become routine for public managers due to pressure from higher-level public managers and their interest in career advancement.

The suspicion of corruption and data manipulation, in turn, increases farmers' unwillingness to use the advanced technologies because they associate online public services with non-transparent mechanisms. This indicates mistrust toward policy objectives to facilitate farm operations by improving G2B channels.

Poor communication channels with public managers foster a lack of trust and discourage farmers from being proactive in implementing digital policies. Farmers' poor experience with e-government solutions can be traced to poor communication channels.

On the one hand, given the high influence of informal practices in society, business, and the state in Kazakhstan, the introduction of e-government has been successful in reducing transactional arrangements between public managers and citizens, reducing corruption opportunities, and improving public services quality (O'Connor, K., Janenova,S., Knox,C., 2019). On the other hand, e-government has been recognized as a tool to enhance accountability and transparency and thus reduce corruption and limit the impact of informality on state-business relations (Janenova, S., Knox, C., 2017), (Vakulchuk, 2016).

Figure 23. Issues of implementation of the E-government



In the same vein, the dissertation's findings supported the existing scholarship criticism that e-government initiatives had a mixed impact on the public and business (Vakulchuk, 2016), (Janenova, 2010). Vikalchuk argues that e-government took attention away from more important issues for which public managers are responsible: public managers had to continue to respond to official requests from the public and private businesses without additional personnel.

In addition, little training on e-government was arranged for public managers. As a result, public managers' output had lower efficiency due to increased workloads. Public managers find it challenging to process all requests and constantly update website information because of their tight working schedules, shortage of personnel, and lack of experienced professionals to maintain the IT infrastructure for e-government (Vakulchuk, 2016). Public managers were not prepared to use state resources effectively, indicating weak managerial skills.

From the private sector's perspective, e-government has had two effects. On the one hand, it enables access to information and a more transparent system as the public procurement system became less opaque, and a feedback function and hotline are available for requests and assistance. Nevertheless, on the other hand, all public tenders are now processed electronically, reducing direct contact between the parties.

At the same time, this dissertation proved the criticism of e-government that it limited the integration of public services into one electronic system. In addition, despite greater access to information, information on public agencies' websites was not updated in a timely way. As a result, companies must contact public authorities directly to obtain updates and comprehensive information, which slows down communication and project implementation and poses corruption risks, as highlighted by respondents. Finally, despite adopting laws to address corruption and introducing associated anti-corruption measures, protectionism, nepotism, and cronyism based on informal institutions predominate in Kazakhstan (Junisbai, 2010).

I approached the department and complained that I could not file an application via egov system and requested to assist with the application process online. They also tried to apply online. Then they explained that some parts of the application could not pass the system, and other additional information was required for the submission. I found a company mediator in the egov system that processes the application. I am puzzled why the application cannot be filed in hard copy directly with the oblast department in Akimat and automatically transferred to my account without the involvement of a third party. There is a human factor here. Eventually, they block your application process, make you run around, and engage at additional cost a specific third party company to facilitate submission of the application. Furthermore, in the end, you wake up and realize that you need to take any action to pass the system. You guess that you can handle this application process via bribing. Then you find a third party and negotiate on margin for a bribe to pass the application process. Once you engage with such third-party company, your application is automatically processed. Isn't it the corruption? The government creates this system. Why do they not arrange this system directly?... However, the process is arranged intentionally by top management (in the government) for the involvement of the third party. With this practice of doing business, can we introduce advanced technologies? (2T8FS)

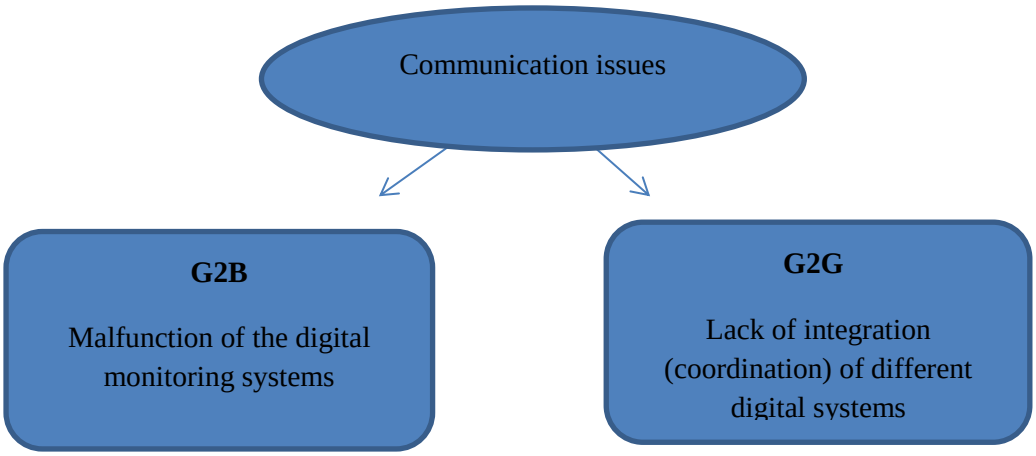
Interestingly, the large-scale farmers did not highlight barriers in the investment subsidy application process as a key issue. This diverse perception of trust among respondents, i.e., from small-scale farms versus large-scale farms, might reveal the key role of informal institutions in Kazakhstan and other disparity issues (disparity is discussed in this chapter below).

Historically, the agriculture sector has relied on a subsidy system and public funding. After the Soviet system of public funding distribution collapsed, the market mechanism failed to create an equitable and efficient allocation of capital. A literature review revealed the dominance of informal institutions in policymaking in the agriculture sector, which is associated with disparity and has led to red tape and corruption issues (Oshakbayev, 2018), (Petrick, M., Wandel, J., Karsten, K., 2013). These disparity issues cause most farmers to be reluctant to trust government policies.

For instance, while the Land Code regulating land ownership was adopted formally, land sublease arrangements in many rural areas were regulated informally, based on informal institutional arrangements (Petrick, M., Wandel, J., Karsten, K., 2011). Current regulations on the title to the land in Kazakhstan create uncertainty due to gaps that leave room for inconsistent practical implementation. These uncertainties lead to weak administrative and technical

infrastructure (such as the absence of a public registry of plans and maps) and arbitrary hurdles created by local officialdom (Oshakbayev, 2018). Moreover, as land relations legally and commercially are "quite muddled," small-scale farms are at a disadvantage compared to large agricultural enterprises (Liefert, W.M., Liefert, O., 2012). As a result, public managers have focused mostly on large-scale farms, while small-scale farms have been ignored (Petrick, M., Wandel, J., Karsten, K., 2011).

Figure 24. Communication issues in the digital policy



In summary, farmers and public managers continue to mistrust the digital solutions provided under the transformation of the public services component of the digital policy (performance of which is outside the scope of this study). This distrust relates to the operation of “G2B” and the “G2G” modules. Based on this unfortunate experience with e-government, farmers have an ontological query about whether the government can manage the system to transform the agriculture sector if it has been unable to handle existing communication issues. Furthermore, some farmers perceive that instead of measures to improve the operation of the agriculture sector, the government uses different databases to collect more information on farmers. In general, the interviews reflected a high level of mistrust regarding the competence and objectives of public managers, which in turn affects farmers' willingness to implement digital technologies and engage in the policy implementation process.

Discrepancies in benefits

As mentioned in the introduction to Chapter 1, digitization was undertaken to achieve the following benefits for all parties involved: (i) increased productivity and sustainability, (ii) widened access to markets and business management, (iii) improved management of administrative processes, and (iv) enhanced risk management. However, semi-structured interviews reveal uncertainty over these benefits that impacts farmers' willingness to implement the digital policy.

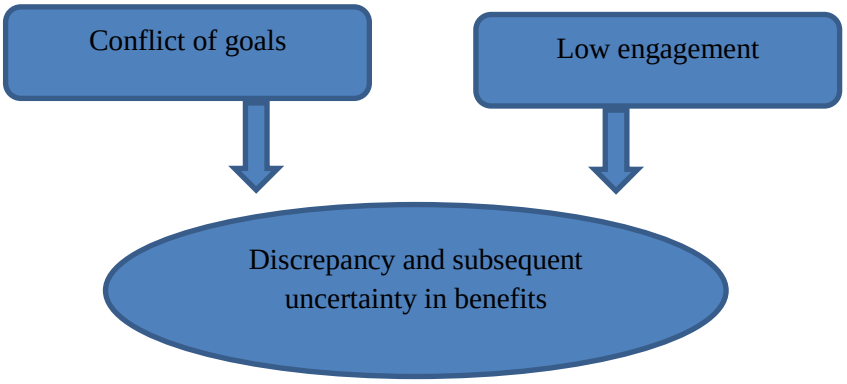
According to the analysis of the documents on the digital policy, the key benefits of digitalization are increased productivity, efficiency, and exports. Stakeholders, however, perceive the benefits quite differently: They highlight such benefits as data monitoring and a decreased human factor role, placing these above efficiency benefits. According to a thematic analysis of semi-structured interviews, 22 respondents highlighted data collection and monitoring, and almost 14 respondents highlighted a decreased human factor as the main benefits of digital transformation. In contrast, only 7 (out of 30) respondents cited benefits related to productivity, and eight respondents noted efficiency benefits. Other benefits mentioned included a transparent system for subsidy allocation, improved communication channels; increased opportunities for big data analysis; better planning and forecast options; and food security (Details appear in Annex 5.) .

The discrepancy between stakeholders' perceptions on the benefits as enumerated in the digital policy sheds light on two issues. First, the majority of respondents representing key stakeholders are unaware of the objectives of the digital policy. Ignorance concerning goals stems from a lack of proper communication between the decision-makers and key stakeholders, i.e., farmers and street-level bureaucrats. As discussed in the previous section, the discrepancy in understanding digital policy objectives suggests that all key stakeholders lack public engagement in developing and implementing the digital policy. Second, this discrepancy also suggests

inconsistency in the objectives as seen by the decision-makers responsible for the policy development and key stakeholders. Both factors, individually or together, may have led to this discrepancy.

Of the 30 respondents, 22, including public managers and farmers, cite data collection opportunities as a key benefit of digitalization. Interestingly, in analyzing key stakeholders' perceptions of the meaning of the digital policy, data collection and processing were mentioned most often, together with automation. Furthermore, data collection or recording themes were reflected most often by respondents from the Akmola region and one scientist in the Turkistan region. One speculation regarding the high placement of the data collection theme thus emphasizes the dominance of large-scale farmers in the Akmola region and the need to monitor land issues using digital solutions.

Figure 25. The ambiguity of benefits



> *"Therefore, digital solutions must facilitate monitoring technological and technical processes, the quality of seeding, use of pesticides, harvesting, use of herbicides, and monitoring logistical processes from the field to the warehouse. Although we are focused on monitoring the technological process within the farm, we do not include the clients" (2A3FL).*

Fourteen respondents reflected on benefits related to the reduction of human factors. Interestingly, most of these references come from public managers, followed by large-scale farmers.

> *"Digitization is one of the directions to facilitate the labor force (reduce human factor by decreasing the number of employees involved). Therefore, as you know, our company is*

automated and in full compliance with the digital policy, as I will show you later. Furthermore, the work is fully automated by robots that provide cow feeding and milking functions, including a full range of the required work. Therefore, the human interaction is minimal" (2T1FL).

It should be noted that the top two benefits perceived by respondents coincide with their perception of the top two meanings of the digital policy, as discussed in the previous section. Namely, the automation component is discussed mostly by respondents as a key component of digitalization, while reducing human factors is also discussed by respondents as a consequence of automation. Respondents emphasize that the digital policy could reduce human factors via automation, reducing labor force costs and possibilities for fraud and error. In addition, data recording or collection was also discussed by respondents as key components of digitalization that bring such benefits as smoother data monitoring and reporting as compared to paperwork.

Table 14. Results of thematic analysis of semi-structured interviews

Theme	Respondents	References
Meaning of the digital policy	**18**	**27**
Automation	15	18
Data recording	6	9
Business process optimization	5	5
Precision farming	3	3

Theme	Respondents	References
Benefits of digital policy	**26**	**74**
Data collection	22	37
Human factor	14	19
Productivity increase	7	14
Efficiency	8	11

Digitalization and capacity-building support

Farmers who are uncertain about the benefits of the digital policy include mostly small-scale farms. Generally, small-scale farmers reveal a misunderstanding of the benefits offered by the digital policy.

> *"I do not understand digitization in general. It is maybe registration of the business on the computer" (2T10FS).*

At the same time, small-scale farmers also recognize the drive to introduce digitization, coupled with excitement about what might be possible in the mid-term future. However, pressing existing problems endemic in the agriculture sector's institutional structure — lack of financing, land issues, and outdated infrastructure — currently raise barriers to prioritizing the digital policy.

> *"I monitor the changes in the industry and the know-how available in the region. However, digitization is not a pressing issue or priority for our farm. Instead, we plan these opportunities in the future" (2T8FS).*

Respondents also highlighted that the benefits of digitization stressed by technology providers, public managers, and large-scale farms are mostly associated with the large-scale farms only, rather than benefiting small-scale farms.

> *"Some people need digitization. Some people do not need digitization. It is his level of its development. It does not make sense to have digitization with 10–15 cows. We have 10,000 cows, and we need them. It is a corporate business that can be replicated… However, these [small-scale] farms do not need digitization" (2A1FL).*

Uncertainty regarding digital policy benefits was further evident in respondents' reflections on the implications of digitization for the broader agricultural system in which they operate. Semi-structured interviews revealed that key stakeholders tend to focus on digitization's business process optimization function, but they are less likely to take a big picture perspective. In other words, key stakeholders do not perceive the implications of digital policies for the development of the agriculture sector's value chain in general.

Few large-scale farmers in the meat cattle subsector imagined how digitization would influence export and productivity increases in their sector in general. For instance, only one large-scale farmer highlighted the benefits to the agriculture sector of the use of big data analysis:

> *"What digitization will bring is another question. We should divide what we have now and what we will receive at the end is another question. If we talk about a timeframe of 20 years, then the digitization should result in a full cycle of automation in both cattle and crop farming. The full data of the management process is digitized, and decisions are taken on a big data basis. The data analysis will not require the human factor" (2A2FL).*

At the same time, the application of digital technologies using big data can provide far more timely information about agricultural production across the whole agriculture sector. For instance, based on meteorological data, decision-makers can forecast drought and address the consequences of climate change (land degradation; lower yields/crop damage and failure; increased risk of wildfire). Another example is the drought-related calamity in the western regions of Kazakhstan during the summer of 2021. In addition, the Ministry of Agriculture's inability to promptly address feed allocation to suffering farmers led to livestock deaths. Respondents revealed that the lack of or unwillingness to use big data in planning and modeling might be linked to the heavy subsidies in the agriculture sector; no one wants transparent procedures for subsidy allocations. As a result, digitization is used for symbolic imitation of international practices, such as to monitor available resources like land, but not to optimize the agriculture sector's business processes and the value chain cycle.

In summary, weak stakeholder engagement played a key role in determining whether to implement the policies. Key stakeholders link digitization to benefits such as collecting data and decreasing human factors at the farm level. At the same time, key stakeholders also fail to consider digitization's potential for improving value chain operations. Public managers selected large-scale farms, and IT producers only associate digital transformation with large-scale farms. These stakeholders have a high propensity to see the benefits of digitization primarily from the large-scale farmers' perspective, leading to the digital disparity.

The small-scale farmers lack the expertise to acknowledge and realize the benefits of digitalization. In addition, small-scale farmers are constrained by a lack of financial resources to implement it (Details are provided below.)

Public managers confuse the concept of digital transformation in the agriculture sector and the concept of digital transformation of public services. Instead, public managers focus on the performance-based approach to using data and evaluating the potential of digital technologies. In other words, public managers lack digital solutions to address issues across the agriculture sector by using opportunities presented by big data analysis and forecasting. Currently, public managers see the benefits of digitization as decreased paperwork and easier recording and control of data, thus focusing more on e-government opportunities.

To summarize, the lack of engagement with key stakeholders when developing and implementing digital policy raises barriers to policy implementation. The decision-makers engaged in the policy development process were initially only IT solution companies and selected large-scale farmers. In contrast, regional public managers and small-scale farmers remained outside the policymaking process during implementation. Moreover, regional public managers were not proactive in arranging awareness workshops for decision-makers. This approach led to a conflict of interest between street-level bureaucrats and central government authorities.

Public managers do not have the skills to engage farmers in policy implementation and are therefore unable to foster stakeholder engagement. In addition, farmers have low trust in government policies, stemming from poor communication channels with public managers, thus discouraging farmers from proactive engagement. In addition, uncertainty regarding the benefits of the digital policy hinders small-scale farmers from engaging with policy implementation, leading to the situation in which only selected large-scale farmers are involved in digital transformation, thus resulting in digital disparity in the sector.

B. The remunerative policy support mechanism

Key findings of the semi-structured interviews revealed that a remunerative support mechanism is a foremost factor driving digital policy implementation. Investment in digitization in the agriculture sector depends on farmers' willingness and capacity to invest. Digitization is a capital-intensive investment for farmers. To be willing to invest, they must clearly understand the benefits of the novel technology and the need for their business to invest in it. However, farmers' capacity to invest in digitization depends on the country's general investment climate. Since the agriculture sector is linked with food security, pricing mechanisms are highly regulated. Farmers' choices thus depend on the state's agricultural policy in general, changes that can have either adverse or positive effects on the farmer's business.

As this is a public policy dissertation, the focus here is on the capacity of public managers to incentivize or constrain farmers contemplating digitization. Lack of (i) clarity in the regulatory framework and (ii) non-consistent agriculture sector policies, in general, are the primary factors constraining farmers' willingness to implement the digital policy. In other words, uncertainty in policy support was the main barrier to policy implementation.

This section thus first analyzes the nature of policy support provided by the government, farmers' perceptions of this support, and why remunerative policy support does not work in Kazakhstan. Also addressed is the role of informal institutions in the decision-making process behind remunerative policies. The section then explores issues related to policy consistency in the sector.

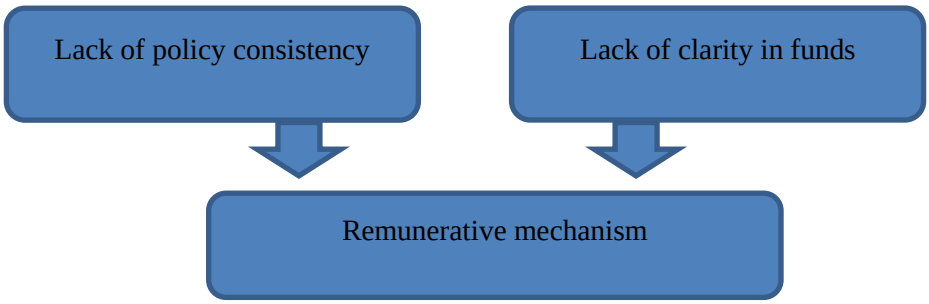
Most public managers and large-scale farmers highlighted remunerative policy support, including government incentives in tax refunds and subsidies, as key to motivating farmers to implement the digital policy.

> *"The digital policy envisages many incentives. In the digital policy framework, any farm and entrepreneur can import cows and robots using the incentives. For example, there*

are incentives to import robot equipment, including tax credits. For example, we imported Hungarian cows, Holstein-Friesian [a breed of cows], at our own cost. However, the GoK provided tax incentives when we delivered the cows to the farm. As a result, we founded this farm in the digital policy framework and fully robotized the farm" (2T1FL).

At the same time, respondents revealed the subsidy mechanism's lack of clarity as a key problem in the sector. (Details appear in the subsection section on **clarity of funds**.)

Figure 26. Remunerative mechanism issues



The findings of the semi-structured interviews highlighted the corruption issues in subsidy allocations and the dominance of informal institutions in regional public managers' decision-making process. The interview findings were also supported by Kazakh scholarship on informal institutions. According to this literature, regional informal institutions work based on resource allocation and power distribution principles. The first principle is blood-based kinship or the "clan" approach, and it is a key determinant for power distribution (Collins, 2004). The second principle, based on competition between financial-industrial groups (also referred to as "FPG") over political and economic resources, rather than inter-clan and center-periphery rivalries, serves as the main driver for Kazakhstani politics (Junisbai, 2010). Junisbai stresses the increasing role of FPG in contrast to the decreasing role of unions, lobbies, and NGOs (Junisbai, 2010).

Scholars argue that the public administration system of Kazakhstan is largely influenced by informal networks, diminishing the ability of formal institutions to exercise real power (Collins, 2004). They emphasize that the decision-making system in Kazakhstan is concentrated

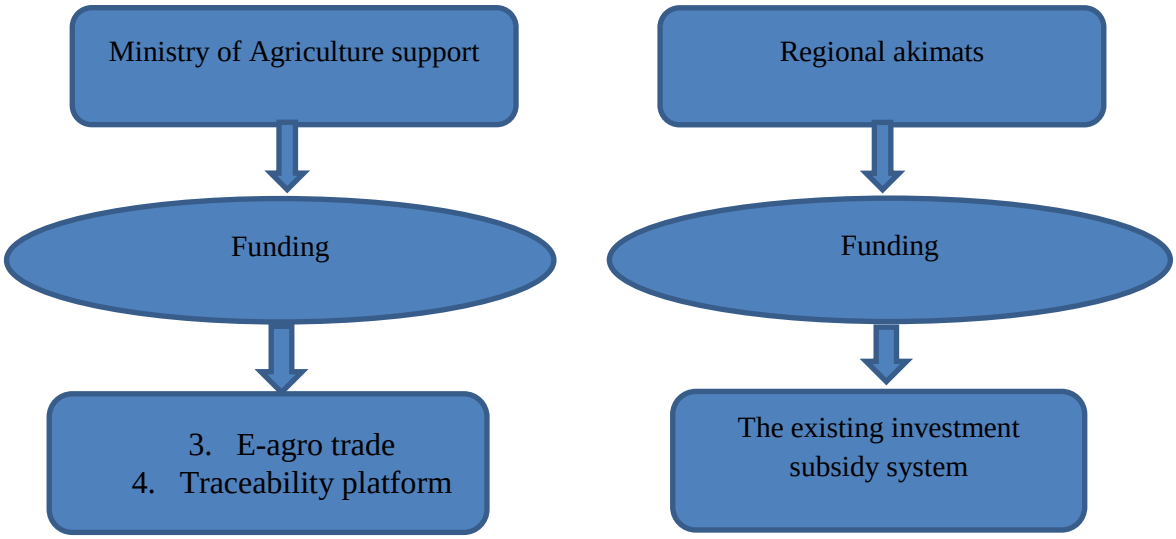
in the political elite, with the president and elbasy7 at the highest level of the hierarchy (Ibrayeva, A.R., Nezhina,T., 2013), (Junisbai, 2010), (Collins, 2004), (O'Connor, K., Janenova, S., Knox,C., 2019). Informal networks are associated with family ties, work, education, and patron-protégé relationships (Junisbai, 2010). The regional elites accumulate economic power to challenge the center on policy implementation (Collins, 2004). Although no open confrontation occurs between the center and periphery, the regions pretend to comply with the decision-making process of the center while amassing autonomy to implement regional policies, using foreign investments as independent sources of leverage. The center controls the periphery via the rotations of akims to prevent them from gaining power (Junisbai, 2010). The informal ways and practices for solving issues have been dominant among regional public managers due to a lack of knowledge and skills (Vakulchuk, 2016).

The research findings revealed that the ambiguity of means related to a lack of clarity in the funding sources. Given budget constraints, decision-makers were targeted to ensure a bottom-up approach to digital policy implementation. However, a detailed review of the law governing digital policy (provided in the previous chapter) showed that the Ministry of Agriculture had no resources or funding under this program to promote digitization among farmers. Rather, the digital policy incorporated funding only for public entities under the online platform component on traceability and e-agro trade systems.

Subsequently, decision-makers expected that regional public managers would provide funding support to farmers using existing support mechanisms, such as investment subsidies. In other words, the decision-making process on budget allocation for investment subsidies is done at oblast akimats, and regional public managers have more discretion in allocating the investment subsidies in line with the existing policies.

7. *Elbasy*: The first president of Kazakhstan, Nursultan Nazarbayev, stepped aside after 29 years as president in March 2018.

Figure 27. Functions of public managers

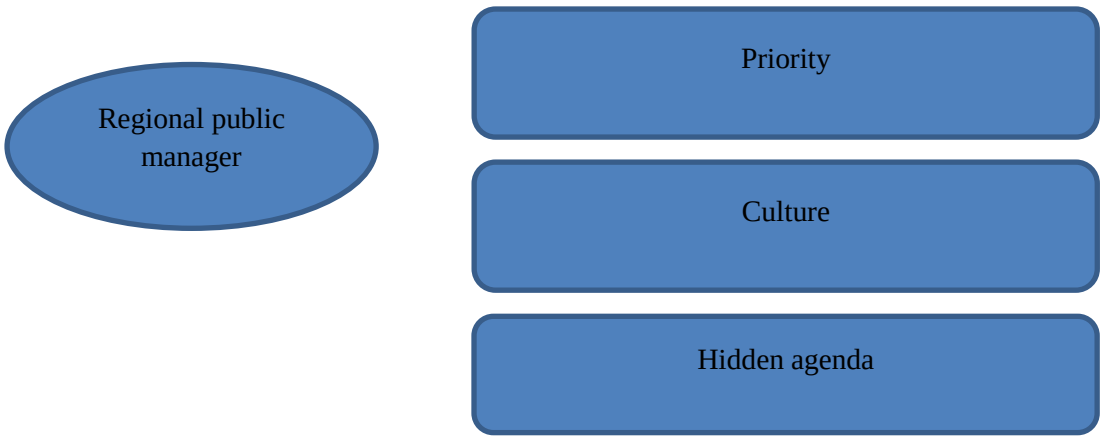


As regional public managers have had great discretion in implementing policy, their decisions on allocating funds were influenced by three key factors: (i) the existing priorities of regional public managers, (ii) the prevailing culture, and (iii) hidden agendas incompatible with the policy goals.

In terms of priorities, semi-structured interviews revealed that regional public managers perceive the fulfillment of digital policy targets as a lower priority than other sector policies. Regional public managers are supposed to meet all hard targets of other existing agriculture policies, including the use of investment subsidies in the agriculture sector. Therefore public managers used the existing policy on investment subsidies as a support mechanism for farms to upgrade their agricultural infrastructure. In other words, public managers supported farmers not by focusing on the digital policy but by offering opportunities to use the funds under the existing investment subsidy support policy. Implementing the digital policy was not a priority for regional managers, who were more interested in using the investment subsidy. A negative consequence of allocating the budget under the existing investment subsidy mechanism was targeting mainly large-scale farmers. As discussed earlier in this chapter (in the engagement section), the government considered large-scale farmers the solution for addressing high priority

goals such as food security (details are discussed in the engagement section). Subsequently, some respondents, especially the small-scale farmers, were unclear about the role of the subsidy mechanism, posing a key problem in the sector. Respondents highlighted that the existing investment subsidy policy has several drawbacks for engaging small-scale farmers that undermine digital policy implementation.

Figure 28. Decision factors in investment subsidy allocation



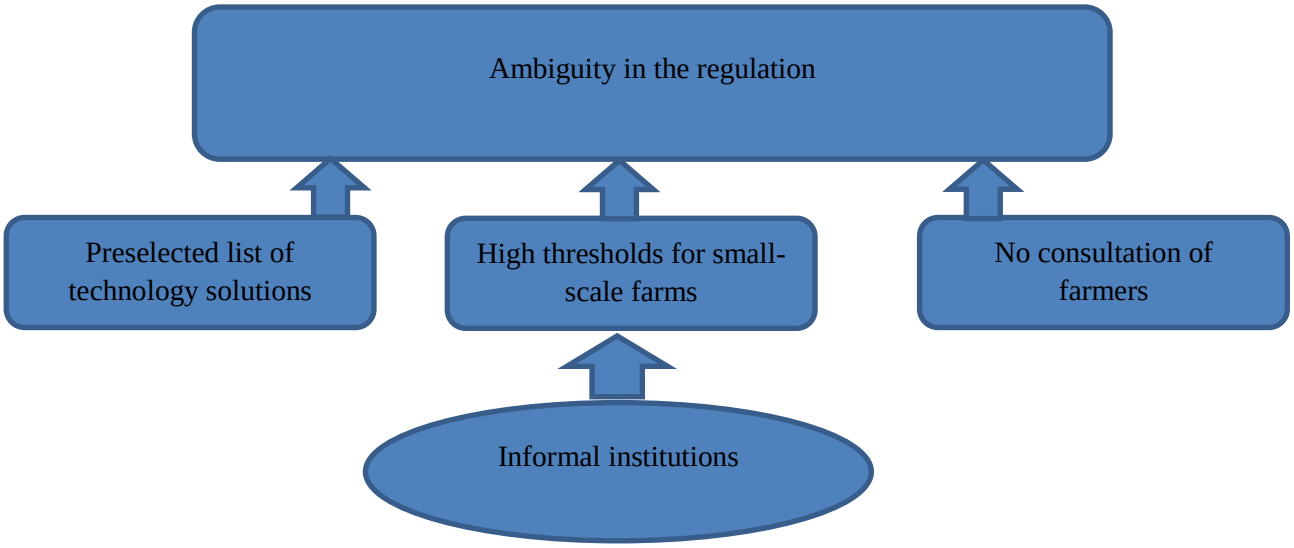
First, farmers do not have a real choice of digitization technology because of eligibility requirements. Namely, the farmers are obliged to link their investment decisions to their land scale or number of cattle. Furthermore, a high eligibility threshold for the investment subsidy led to a preference for large-scale farms, creating asymmetrical access in the sector.

Second, existing investment subsidy regulation envisages a predetermined list of technological solution providers approved by the Ministry of Agriculture. As a result, farmers could not install the technology of their choice, only technologies from listed providers.

In addition, regional public managers lack the expertise and skills to engage the small-scale farmers in the digital policy implementation (discussed in the expertise section of this chapter). Subsequently, even large-scale farms do not receive consultation assistance from regional public managers based on their particular needs. Given the low expertise level on farms,

this factor may limit farmers' willingness to invest in the technologies. Due to a lack of expertise, regional public managers have generally not been well equipped to promote the digital policy among farmers and have mostly proven unable to explain the available technologies and the advantages or disadvantages of the digital or technological solutions provided by the preselected companies.

Figure 29. The ambiguity of the investment subsidy allocation



In terms of culture, semi-structured interviews and participant observation revealed that regional public managers inherited a data manipulation culture based on Soviet nomenclature (Van der Wal, Z., Mussagulova, A., Chen.Ch., 2020). Due to frequent rotation, public managers focus only on policies with higher visibility when reporting to superior managers. In addition, public managers have a short time to report their performance (the average duration for an akim is three to four years). Therefore, they focus on large and visible projects. Digital policy, however, is not targeted at core business but related to auxiliary services. Therefore, the effect of digital technologies is not as visible as the solutions to other, more pressing issues. In addition, the propensity to report "quick progress" or "outperformance" nurtures a culture of faking policy results. Several respondents indicated that data manipulation has become routine for public managers due to pressure from superior public managers and their interest in promoting and gaining economically. The patron-agent system is rooted in the institutional arrangements of the

Kazakhstan administrative system. When public managers encounter too many hard targets that they cannot meet, they manipulate the statistical data by over-reporting achievements and under-reporting failures. In the same vein, findings from participant observation suggest that public managers suffer from groupthink and professional tribalism. Public managers also frankly ignore many of the issues around financing for small-scale farmers in the sector, creating a dependency culture. In addition, technical knowledge is held in the hands of a tiny group of elite technocrats, who are largely ignored by the rest of the world because their activities are seen as ambiguous, boring and geeky, and dull and therefore of no interest to everybody else.

> "*This approach is a feature of the public administration system of the country. Namely, the regional public manager cannot meet all the binding targets because they do not have this capacity. However, public managers still have to meet those targets by whatever measures, which means they have to produce fake data" (2T9PM).*

As a result, regional public managers decide to support farmers, considering the impact on the region's overall performance indicator. Public managers thus see benefits from sector digitization as being among the lowest of their priorities.

The semi-structured interviews also revealed hidden agendas among regional public managers who do not make the digital policy as a priority because they have responsibilities they consider more pressing. Respondents argue that regional public managers supported farmers in selected digital policy components, using the effort to pursue other priorities hidden under the guise of digital policy. Regional public managers, for example, introduced the digital mapping policy as part of digital policy, which it was not. The regional public managers thus obtained data on land availability to report to the Ministry of Finance. This allowed regional public managers to use digital policy as a cover-up for their priorities; this did not relate to increased productivity at the farmer level, although it may have been beneficial at the agriculture sector level.

> "*People from www.qoldau.kz needed the digital maps to review the availability of land as the cadaster database does not reflect the real picture. They needed to look at the reality. Hence they made everyone digitalize their land plot. The specialists who can project the*

output per hectare visit farmers. Farmers do not care about it as it is an additional burden. They do not have a practical application to this program. They did it as public managers made him install it" (RE3).

In summary, the decision-makers targeted to ensure the implementation of the digital policy with a bottom-up approach were given tight budget limits. Consequently, document and thematic analysis of semi-structured interviews revealed that overall regional public managers already had tight budgets to address existing issues in the sector. Consequently, due to tight budgets, regional public managers used existing subsidy mechanisms according to their own priorities, culture, and hidden agendas. For example, the "quick progress" culture resulted in faked results and promoted only selected large-scale farms. In addition, regional public managers focused mostly on addressing their priorities, such as land distribution issues, by covering digital mapping, which remains outside the sector's digital transformation scope and does not address digital policy goals of restructuring the sector through digital transformation.

C. Capacity-building support mechanism

Thematic analysis of semi-structured interviews revealed that respondents mostly acknowledged that, second to the remunerative policy mechanism, the capacity-building policy mechanism was key support that farmers expect from the government when implementing policies in the agriculture sector in general and digital policy in particular. Moreover, while public administration capacity-building is aimed primarily at institutions (systems and structures), the capacity-building of individuals (for example, public managers) can be equally important to improving those institutions' ability to perform more effectively and efficiently (EU, 2014).

Respondents highlighted uncertainty related to availability of capacity-building mechanism in the sector. On the other hand, six respondents reflected that the government ensure public support to promote capacity-building mechanism. Interestingly, most respondents

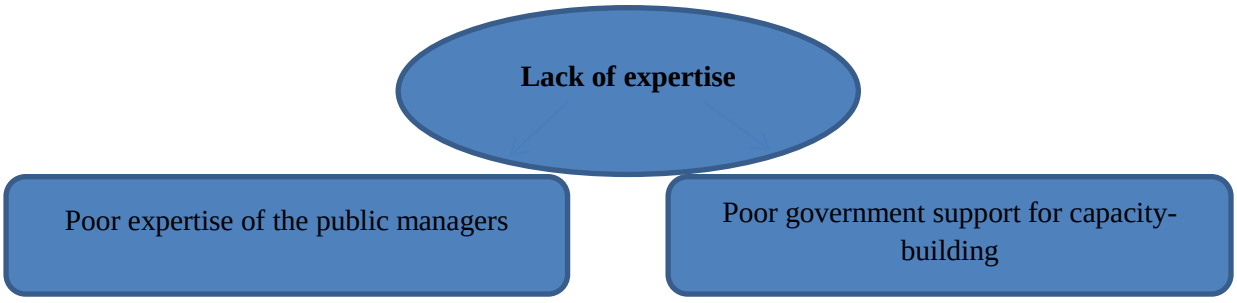
included either science or business experts. Only two respondents — public managers in the Ministry of Agriculture and Akmola region akimat — saw capacity-building as a policy support measure.

> *"Farmers may need support in the practical introduction of digital technologies. This support may include subsidies and training support. The development of digital technologies per se is progressing well in Kazakhstan, and private companies offer various practical solutions, applications, and platforms. Both farmers and public officials should familiarize themselves with what is available in the market and start testing" (BE4).*

Analysis of semi-structured interviews revealed that drawbacks in implementing digital policy stemmed from poor skills in the agriculture sector in general and digital expertise in particular, as the government provided no capacity-building support mechanism. More than 60% of respondents, or 17 out of 30, highlighted skills issues as a main problem in the agriculture sector.

Thematic analysis of semi-structured interviews revealed that lack of expertise derived from three issues: (i) poor levels of expertise among public managers, (ii) poor government support for farmers' existing skills, and (ii) poor preparation in these skills by the universities. (The third issue lies outside of the scope of this dissertation.)

Figure 30. Poor levels of expertise among public managers



Most farmers and agriculture sector experts indicated that public managers are less likely to acknowledge the low level of expertise in the agriculture sector. Respondents felt that public

managers have weak analytical skills and focus mainly on managerial skills, only on funding public service-related components or efficient subsidy allocation tasks via investment subsidy policy. Therefore public managers in regions did not consider the missing collaboration mechanisms with key stakeholders as a failure or missing part of policy implementation. Document analysis revealed that the digital policy did not contain policy support mechanisms to promote peer knowledge sharing and exchange mechanisms. In addition, regional public managers do not consider the digital policy mandatory (discussed in the chapter section on the ambiguity of goals). Moreover, public managers lacked expertise in promoting the agriculture sector's digital transformation. As a result, public managers have a lower understanding of the need for change in the social-economic structure.

The semi-structured interviews revealed that regional public managers in the oblast and regional akimats acknowledged their lack of experience with digital technologies. Consequently, they failed to assist farmers in appreciating the opportunities digital transformation might provide and instead directed them toward financial organizations providing investment subsidies.

These findings of the semi-structured interviews and documentary analysis were supported by participation observation. Most meetings held by the researcher were with junior and mid-level public managers with limited responsibility for or grasp of information about the sector and its issues. The junior public managers also noted they were not in a position to express opinions and assessments openly and professionally due to limited experience and responsibility. Their lack of confidence and frequent referral to superior managers or colleagues in their organizations revealed that the public managers lack policy capacity in terms of analytical and political skills and reflected the dominance of the patron-agent relations in the workplace.

Poor government support for farmers' existing skills

Semi-structured interviews revealed that farmers acknowledged that they are reluctant to implement the policy as they do not have (i) required expertise, (ii) priority, or (iii) knowledge of

available support programs, technologies, and purposes of digital technologies. Furthermore, according to semi-structured interviews, no systemic policy support was provided to increase the farmers' capacity via training or workshops, as discussed in the previous section.

Semi-structured interviews revealed that, to date, no formal permanent working committee responsible for developing the operational aspects of the digital policy involving the regional public manager and farmers or at least business associations had been set up. Hence regional public managers did not have a plan to make clear to implementers (both farmers and public managers) how, when, and what aspects of the digital policy should be implemented at a particular point in time. Furthermore, unfortunately, no discretionary funding was available at the oblast akimat level for technical assistance to local farmers. As a result, public managers and farmers experienced ambiguity about how the policy was implemented.

> *"We did not hear from the Ministry on policy implementation. They issue the policy and inform the law and its date and targets. However, we did not receive a roadmap or guideline to comply. We do not have such an obligation or task to comply with the digital policy, but we provide the data if they request" (2T9PM).*

To increase expertise in the agriculture sector, the Ministry of Agriculture set up a formal, constant line of dialogue between the IT sector and the Ministry in the first year after the policy's launch. Initially set up as working groups with IT companies providing IT solutions to develop a list of suitable equipment and technical solutions and recommendations for the policy implementation jointly. However, this list of equipment and solutions was not distributed among the regional stakeholders. In addition, the decision-makers arranged networking events early on that involved only selected technology providers to support knowledge exchange and the sharing of learning. The events took place at the regional level within the four defined oblasts facilitated by the decision-makers. However, when top management changed in the Ministry of Agriculture, working groups with IT companies stopped operating.

On the other side, regional public managers were reluctant to roll out systemic workshops due to the high workload and lack of discretionary funding for such measures. Moreover,

technology providers were reluctant to work at the regional level as they prefer working with large-scale farmers who can afford capital-intensive investments. Technology providers could reach these large-scale farmers via the business association, while the small-scale farmers remained below the radar of the large-scale companies.

Scientists argue that clear expectations for training reduce policy ambiguity and increase public awareness of government policies. However, although respondents highlighted the importance of training and skills development in the agriculture sector, they also revealed that small-scale farmers were unaware of the availability of training. At the same time, outside the digital policy scope, the Ministry of Agriculture, jointly with NANOTS institutions, has provided training to selected farms in the agriculture sector on other advanced technologies, such as training courses for farmers on increasing productivity using new seeding technology, and other topics.

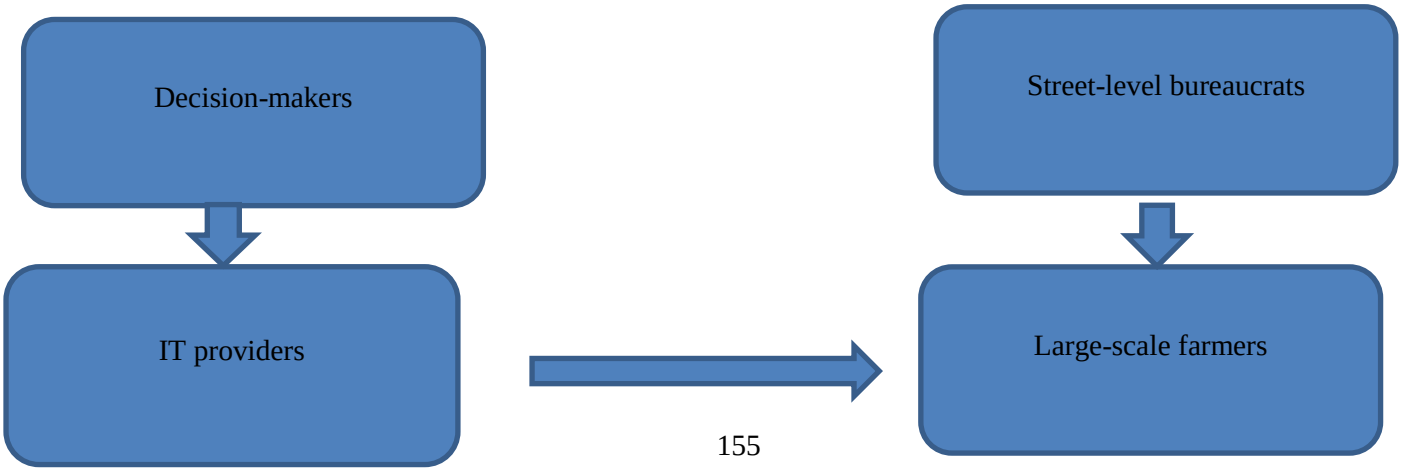
The inability of public managers to provide capacity-building support for farmers is rooted in the lack of training for street-level bureaucrats on digital policy and policy capacity enhancement, leading to a high ambiguity of means. Poor expertise among street-level bureaucrats is rooted in distinct patterns of center-periphery relations formed after 1991, echoing the Soviet legacy. Substantial economic and social development gaps and cultural and social differences persist between urban and rural life, forming the center-periphery divide (Vakulchuk, 2016), (Junisbai, 2010). For example, under the Bolashak Programme, government public service academies and on-the-job training have effectively equipped public managers with their required skills. At the same time, a weakness of this policy has been the unequal allocation of competent public managers and substantial differences in public service delivery between central and regional authorities (Vakulchuk, 2016).

For instance, in 1993, the GoK launched the Bolashak scholarship to educate the young generation of professionals in diverse economies and public spheres. However, Vaculchik argues

that most Bolashak scholars preferred central public service authorities. As a result, the private sector players prefer to work with competent central authorities associated with fairly predictable actions. In contrast, cooperation with regional authorities is often unpredictable. Highly skilled public managers who have studied abroad and have international experience are concentrated at the central governance level. Therefore private sector players prefer to work with the central authority public managers rather than regional public managers (Vakulchuk, 2016).

The digital policy did not contain a systemic training support program for farmers. The public managers facilitated only a limited interaction of IT companies with the farmers to promote their IT solutions, but not to train farmers in new skills. In addition, the Ministry of Agriculture provided no support program on technical expert assistance through learning from peers. The existing mechanism of the Ministry of Agriculture only motivated IT companies to push technologies among the large-scale farmers. At the same time, the small-scale farmers remained demotivated to implement the digital policy due to a lack of expertise and educational support mechanisms from the government side. In other words, to increase the sector's expertise in digitization, the government relied on the IT sector players to promote collaboration with farmers. However, the IT sector players focused only on selected large-scale farmers they believed were creditworthy and could make capital-intensive investments. The government's reliance on IT sector players left the existing expertise and capacity in the agriculture sector in a poor state.

Figure 31. The digital transformation in Kazakhstan under the digital policy



In the same vein, findings from participant observation suggest that public managers suffer from groupthink and professional tribalism. It is important to understand the context in which digital policies are developed and implemented. Participant observation revealed that public managers had embedded biases and that decision-making teams lacked diversity. In addition, the research also revealed the importance of how digital policy is implemented and developed in terms of the policy initiative and whether the people implementing it understand the social and ethical context. The digital policy puts enormous power in the hands of a small number of the computing and public manager elite; these agents operate in silos, do not necessarily want that level of power, and probably are not equipped to deal with it.

Uncertainty regarding policies

The semi-structured interviews revealed that uncertainty regarding support mechanisms is a primary issue in key stakeholders' policy implementation and decision-making process. Most respondents indicated that public policies in agriculture were inconsistent and adversely affected digital policy implementation. For example, 9 of 30 respondents from both the Akmola and Turkistan regions saw a lack of consistent policies as creating an ambiguity of means.

> *"Please tell us what the rules of the game are? Do you support us or not? If you do not support us, we will do what we want, not what you want. You say one thing and push us in that direction. Then you do not support us. You tell us to do other things. We did it the other way. Then you say you should do it the other way. There are ambiguity and a lack of clarity about future development. You see the last development. We again have a new minister" (2A1FL).*

Respondents see the uncertainty of policy support as rooted in issues such as a lack of consistent policies due to frequent rotation of top management among both decision-makers and street-level bureaucrats and informal institutions. Respondents link this inconsistency with the personalities of top management. Some respondents, predominantly large-scale farmers, highlighted the issues at the central apparatus level:

"Each time we have a new minister, he develops his development program for the agriculture sector and the strategy, including Agrobusines 2016, 2020, and 2021. There are many of them. Each minister has a program. It is so stupid" (2A1FL).

"The government should adopt one [consistent program] with which we can work. This program will exist for 5–10 years. However, in reality, how does it work? We have a new minister and are adopting a new program. Moreover, each time it changes. Please check the last ten years. How many times have the programs been changed? How many ministers were replaced? It is not clear to us. Mamytbekov came with one program, and Kurishbayev with another program. Shukeev has a third program. We can't see the stability and clarity" (2A1FL).

As shown in Table 15, since national independence, 19 minister rotations have occurred.

On the other hand, the Ministry of Energy has had only seven replacements in the last 30 years.

Table 15. Ministers of agriculture since 1991

No.	Name	Period	Birthplace
1	Dvurechenskyi Valentin	12.1990–02.1992	Russia
2	Tursumbayev Baltash	02.1992–10.1993	Russia
3	Kulagin Sergey	10.1993–06.1994	Akmola Oblast
4	Karibzhanov Zhanybek	06.1994–03.1996	Russia
5	Akhymbekova Serik	06.1994–03.1996	Almaty Oblast
6	Kulagin Sergey	01.1998–09.1998	Akmola oblast
7	Nurkiyanov Toleukhan	09.1998–01.1999	Russia
8	Karibzhanov Zhanybek	01.1999–07.1999	Russia
9	Mynbayev Sauat	07.1999–05.2001	Almaty Oblast
10	Yesimov Akhmetzhan	05.2001–05.2004	Almaty Oblast
11	Umbetov Serik	05.2004–08.2005	Almaty Oblast
12	Askar Myrzhakhmetov	08.2005–01.2006	Turkistan Oblast
13	Yesimov Akhmetzhan	01.2006–04.2008	Almaty Oblast
14	Kurishbayev Ahylbek	04.2008–04.2011	Almaty Oblast
15	Mamytbekov Asylzhan	04.2011–05.2016	Turkistan Oblast
16	Askar Myrzhakhmetov	05.2016–12.2017	Turkistan Oblast
17	Shukeev Omirzak	12.2017–02.2019	Turkistan Oblast
18	Omarov Saparkhan	02.2019–10.07.2021	Turkistan Oblast
19	Karashukeev Yerbol	01.09.2021–	Almaty Oblast

Respondents highlighted issues related to frequent reshuffling at the local and regional levels. Some respondents revealed that local policy priorities are linked to the continuity of the position or frequent changes of heads of the local authorities.

"The meeting was arranged from the top. The most important thing is that most akims and top management are reshuffled very often, except Batalov (Almaty Oblast), who has held the position for the last ten years. Unlike it, the top management of the Northern Kazakhstan Oblast is changed every 3–4 years. First, second, and third. I think any akim of the region is interested in developing the agriculture sector because it is his direct responsibility and has the quality indicator he reports to the country's head" (BE2.1).

"We do not have stability. We have akims replaced frequently, each half year. We do not have stable akims. We do not have stable programs. This is a problem" (2A1FL).

A systemic and frequent rotation or reshuffling of top management at regional levels results in uncertain policy support and systematic process-oriented performance issues. Interview findings reveal that a frequent change of top management leads to a culture of reporting processes without any outcomes. In other words, each local akim is targeted to report on his short-term achievements at any cost. Hence he cannot implement the digital policy that impacts overall sector performance.

"*There are no priorities in the government policy in the agriculture sector. The paperwork and reality are different. There is hype, a pressing issue, and we solve this issue. Now we go through the roof regarding the land issue. So we highlighted this issue, and the whole Ministry of the Agriculture team bent over backward to address the issue for press on time. They found that they did not know the details of the issue. They look for and write the notes to the Minister and Prime Minister. They make decisions. Hype. There is another issue. How many organic producers do we have? What territory do we have? Hype. It is a vicious circle always. We have smaller hypes. We have bigger hypes. The land is a big hype. They ran with this issue for a month. Then they had a meeting, discussed the issue, and closed it. Then the next. Hence there are no priorities in the agriculture sector as such. Formally, they have. However, informally, they are considered ad hoc" (RE 3).*

Consequently, public managers tend to manipulate statistical data due to frequent reshuffling. Therefore, falsification or data manipulation was highlighted as an ongoing issue.

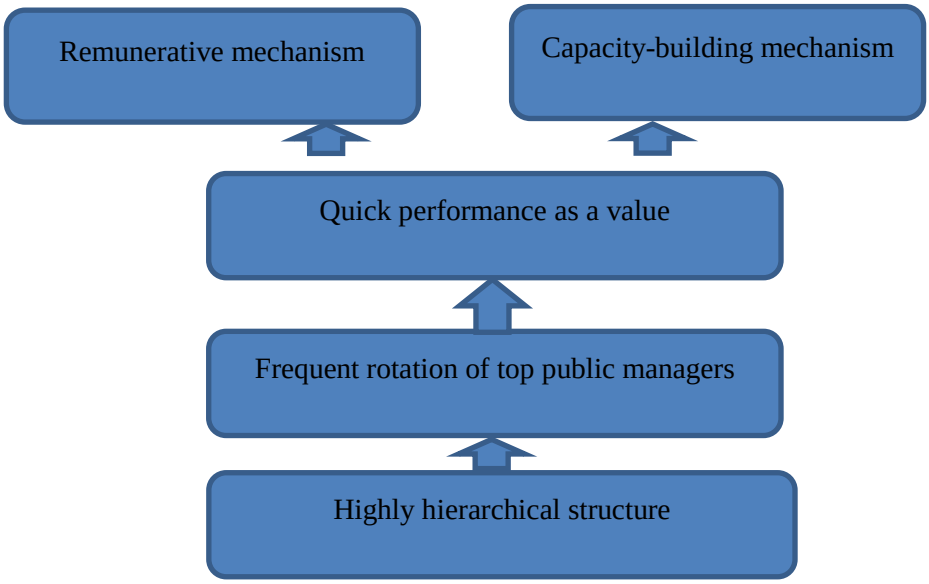
"I should mention that the management in the oblast does not know how many cattle they have in the region? The same is in the entire country" (2A3FL).

Documentary analysis also revealed that statistical data manipulation has a long history in Kazakhstan, inherited from Soviet-style management of the planned economy. This situation creates the phenomenon that the "good" number produces officials, and "good" officials produce "good" numbers. Farmers and public managers stressed that the propensity to report "good news" or "outperformance" nurtured the culture of faking policy results. Several respondents indicated

that data manipulation has become routine for public managers due to pressure from superior public managers and the managers' interest in the promotion and economic gain.

> *"When public managers encounter too many hard targets that they cannot meet, they manipulate the statistical data by over-reporting achievements and under-reporting failures. This is a feature of the public administration system of the country. As a result, they cannot meet all the binding targets. Public managers do not have the capacity for this. However, public managers still have to meet those targets by whatever measures, which means they have to produce fake data" (2T9PM).*

Figure 32. Uncertainty of policy support mechanisms



One of the drivers of this approach has roots in a built-in patron-agent system based on a hierarchical, vertically administrative system. Initially, frequent rotation or reshuffling of top management was considered a crucial factor for a unitary state formation to achieve cultural harmony, expand learning, and prevent corruption. In addition, frequent rotation of regional akims is considered necessary to cross-pollinate between regions and ensure cultural harmony (Siegel, 2018). It was also considered a way to foster "professionalism and the development of corporate culture" that would have "a positive effect on the real content of a unitary state" (Baimenov, A., Liebert, S. , 2018). Furthermore, scholars argue that cadre rotation allows akims to learn to work for the entire country, not for a particular region. Finally, reshuffling top management has been considered "an anti-corruption measure" that prevents akims from obtaining too much personal power in any region or agency (Siegel, 2018).

In reality, as demonstrated by the findings of this research, frequent cadre reshuffling or rotation of the top-rank public officials has minimized political capacity and spurred personal interrelations, kin ties, and loyalty based on elements of local culture and path-dependent Soviet-style administrative practices (Siegel, 2018). The latter factors influence public managers' decision-making, recruiting, and promotion processes and build a culture in which public managers engage in data manipulation.

Due to a shortage of skills, each akim or minister has his own "team membership" or "komanda" approach. Oleinik et al. (2014) argue that team membership has the greatest negative influence on public managers' perception of "the ability of teams to increase government effectiveness." Before 2012 the existing regulation envisaged legislative loopholes that public managers could substantiate cadre or team rotation. Under the Decree on Public Service of 1995, political employees were allowed to transfer their team members to a new appointment, thereby stimulating the formation of permanent working groups (Ibrayeva, A.R., Nezhina, T., 2013). Thus, firstly, this type of governance system demonstrates highly politicized public service and undermines senior officials' merit-based selection and appointment (O'Connor, K., Janenova,S., Knox,C., 2019). In addition, due to frequent cadre rotations, institutional memory is non-existent in the public policy system of Kazakhstan. As a result, it takes some time for policies to be implemented or evaluated. Due to frequent reshuffling, however, top-rank officials and mid-rank public managers do not have sufficient time to learn about policy failures or successes. As a result, middle-range public managers have poor capacity and skills. Finally, public managers subject to frequent reshuffling suffer from the heavy workloads associated with changes in administration and resist further change to the bureaucratic process (O'Connor, K., Janenova,S., Knox,C., 2019).

In summary, respondents highlighted that inconsistent policymaking in general and the agriculture sector in particular impact trust in the digital policy. Key findings reveal that digital policy is mostly associated with remunerative and capacity-building support. However,

malfunction of both support policies have impeded policy implementation. First, the remunerative policy support focuses on the subsidy allocation mechanism, which lacks clarity, transparency, and consistency due to the increasing role of informal institutions and frequent reshuffling of the top management of regional public managers.

Second, the general sentiment in the agriculture sector is that the policies in the agriculture sector are inconsistent due to the frequent reshuffling of top management in public authorities. Each newcomer or new holder in top management in the central authority or regional akimat can manipulate the data. Therefore policies are not instituted. Moreover, due to the attitude that "good" numbers produce officials and "good" officials produce "good" numbers, public managers tend to over-report achievements, creating uncertainty over features of the policy and distrust among farmers looking for government support in adopting it.

Implementation deficit: Perceptions among stakeholders

This section identifies stakeholders' perceptions of digital policy implementation performance. It provides findings based on semi-structured interviews and documentary analysis (such as articles on related research) to identify factors influencing perceptions of an implementation deficit.

Semi-structured interviews revealed that, in general, respondents acknowledged and were broadly familiar with policy implementation performance. For example, recognition of the relevance of digital policy to agriculture sector performance was explicit:

> *"There are a lot of benefits to this policy for the RoK. I believe in this. Yelbasy pays big to pay attention to the development of the agriculture sector. The GoK provides incentives in the agriculture sector. Digitization has been implemented not only in urban areas but also in rural areas. Digitization is one of the directions to facilitate the labor force" (2T1FL).*

However, respondents were reluctant to assess implementation performance. There might be several reasons for this. First, since the agriculture sector is highly subsidized, farmers may

fear losing subsidies if their discussion is revealed to public managers. The government of Kazakhstan has engaged in forms of control, censorship, and other methods associated with authoritarian regimes (Shklovski,I., Valtysson,B., 2012). Citizens continue to be censured, and conversations that do not adhere to the dominant discourse of a given society are often limited or silenced (Shklovski,I., Valtysson,B., 2012).

Second, in response to an inquiry on policy implementation improvements, respondents expressed broad uncertainty linked to a lack of individual expertise in the policy arena. Since the digital policy relates to innovation and novel technologies, this may help explain reluctance over the policy. In addition, respondents thought about policy implications but claimed that an in-depth understanding of those considerations was not their role. Public managers' uncertainty about perceptions of digital policy performance is consistent with a scholarly opinion about public managers' lack of responsibility for serving the public. The Kazakhstani public administration system, as successor to a system dominated by Soviet nomenclature, lacks separation between politics and administration, despite several reforms (Van der Wal, Z., Mussagulova, A., Chen.Ch., 2020), (O'Connor, K., Janenova, S., Knox,C., 2019). Moreover, appointments in public service have prioritized ideological credentials over technical competence, and the process does not envisage any potential for criticizing existing policy and regulation (Van der Wal, Z., Mussagulova, A., Chen.Ch., 2020), (Knox,C., 2008), (O'Connor, K., Janenova, S., Knox,C., 2019).

Third, as mentioned in previous sections, the digital policy itself includes no clear, objective provisions for performance.

Finally, there is an existing apolitical culture concerning state policies typical of public in transition countries. The Kazakhstani population is largely apolitical, which is reflected in general ignorance of the results of government policies (Kozhnazarov, 2019). In other words, the indifference of farmers regarding policy implementation correlates with the general society's

detachment from interaction with the government. In addition, public managers or farmers demonstrate no general sense of ownership or involvement in the policy:

> *"[Pause.] I do not know. I think the government adopted all programs rightly. I am not prepared for this question. I need to think about it. We need to work more on the platform. However, I need to think about it. I cannot say it now. However, I think the government takes all measures rightly as it is convenient for all — the public authorities and farmers" (2A1PM).*

In summary, the findings did not reveal the perception among key stakeholders of the necessity for successful digital policy implementation. Instead, ambiguity regarding such perceptions is rooted in (i) fear of losing subsidies, (ii) lack of expertise, and (iii) ambiguity in the policy goals themselves.

V. Conclusion

This Ph.D. dissertation began with the research question: Has the digital policy implementation failed in Kazakhstan's agriculture sector? The dissertation research findings revealed that digital policy implementation was associated with an implementation deficit. Hence the digital policy, as a measure within a policy toolkit aimed at increasing productivity, export of the sector, addressing food security, and enhancing the well-being of the people of Kazakhstan, seems to have had minimal impact.

The dissertation research brought interesting and unexpected findings that have not been spotlighted in public policy scholarship previously in the literature on Kazakhstan and Central Asia. This research demonstrated the utility of Matland's model, proving it can be instrumental in defining processes and factors associated with deficits found in the digital policy implementation process (i.e., implementation deficits) in the agriculture sector of Kazakhstan. At the same time, the dissertation findings also demonstrated that Matland's model should be refined in light of the empirical findings of digital policy in Kazakhstan by considering the developing countries' context, including hierarchical administration systems and informal institutions.

Based on the dissertation research results, considerable factors contributing to the implementation deficit in the digital policy of Kazakhstan were associated with: high ambiguity of the policy goals; the policy means; and high conflict of the policy goals—all of which are in line with Matland's model. This chapter analyzes key findings that extend Matland's model in developing countries' contexts such as Kazakhstan, taking into account complications of the bottom-up approach in highly hierarchical administration systems of developing countries. This phenomenon is demonstrated in **Figure 33** below. Additionally, this chapter reflects findings that further build the model, incorporating digital policy in an extended Matland's model.

The research revealed that the implementation of the digital policy in Kazakhstan in the context of digital transformation of the agriculture sector has failed to achieve the targeted goals. At this time, only 84 farms have introduced digital technologies compared to the 3,000 advanced farms, 40 digital farms, and 500 basic farms declared by the Ministry of Agriculture earlier in 2018 as part of the project. Furthermore, a detailed review of the digital policy revealed that two out of three major policy components were not implemented. Namely, only the introduction of precision farming was partially fulfilled. At the same time, the government has delayed implementing the creation of online trade platforms.

The paradox of the digital policy in the agriculture sector of Kazakhstan is that key stakeholders, including public managers and farmers, have been reluctant to conceive the performance of the digital policy as an implementation deficit due to the ambiguity of policy goals, as well as the dominance of "good news" culture engraved in the highly hierarchical administration system of Kazakhstan. Hence, the digital policy has not been accepted as a policy failure.

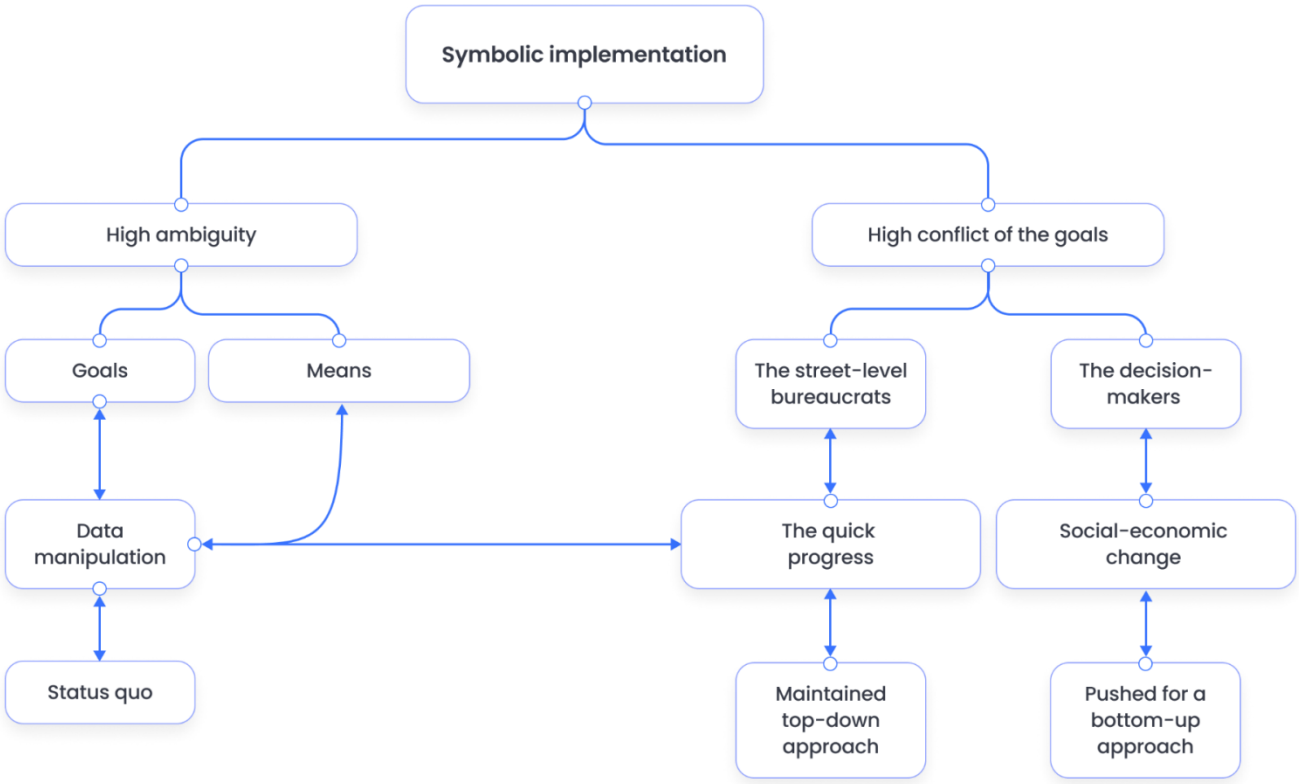
The chapter envisages four sections. The first section uncovers the main contributions of the thesis in the concept of ambiguity of policy goals and conflict of the goals. The second section provides key contributions to the dissertation on the concept of ambiguity of policy means. The third section reviews the extent this research has contributed to the Implementation Theory by addressing the limitations of applying the bottom-up model in developing countries. The final section covers the practical implications of the research for public policy and public administration.

The ambiguity of Policy Goals/Conflict of Goals

The ambiguity of Goals is an essential factor in conceptualizing the implementation deficit of digital policy in the agriculture sector when assessing developing countries with a hierarchical administration structure. Specifically, the concept of ambiguity of goals is an essential factor in addressing the research question on key stakeholders' roles in the implementation process.

The dissertation research revealed that *ambiguity of goals* resulted in the inability of public managers at both the central authority and the street-level bureaucrat level to track the performance of the digital policy. In turn, the inability to track performance resulted in divisive perceptions of the goals by the decision-makers and the street-level bureaucrats. This ambiguity in goals stemmed from frequent changes in policy regarding the classification of the farms. Namely, the government adopted the digital policy benchmarks to introduce 3000 farms via internal document back in 2018. However, in 2022 neither Ministry of Agriculture nor the regional akimats could provide a benchmark target for the policy implementation. As a result, semi-structured interviews revealed that both progress reports on digital policy implementation vary from the data provided by the Ministry of the Agriculture with no target benchmarks entailed.

Figure 33. Revised symbolic implementation under Matland's Model in a developing country context

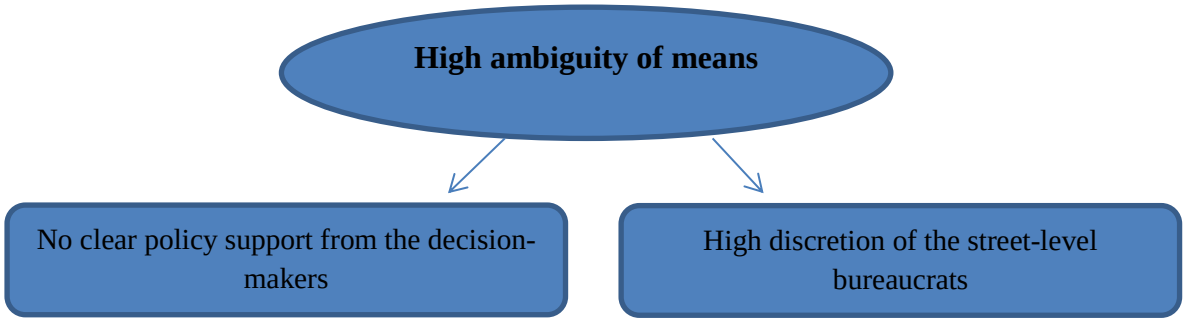


Ambiguity of Means

The ambiguity of Means is a critical factor in the implementation deficit concept to address the research question of how key stakeholders describe their decision to implement or not implement digital policy. In this research, the ambiguity of means for implementing digital policy stemmed from a lack of clarity in the decision-makers policy support (no earmarked funding and guidelines) versus the high discretion of the street-level bureaucrats in using the available resources. The dissertation research revealed that this implementation deficit of the digital policy in the agriculture sector stemmed from structural issues in the agriculture sector: a) low stakeholder engagement; b) uncertainty of policy support; and c) low expertise and skills. All these underlying factors were rooted in bureaucratic obstruction and reflect the dominance of informal institutions in the decision-making processes and the highly hierarchical administration

system of the country. These factors are discussed in detail in the following section on the Ambiguity of Means.

Figure 34. Ambiguity of means

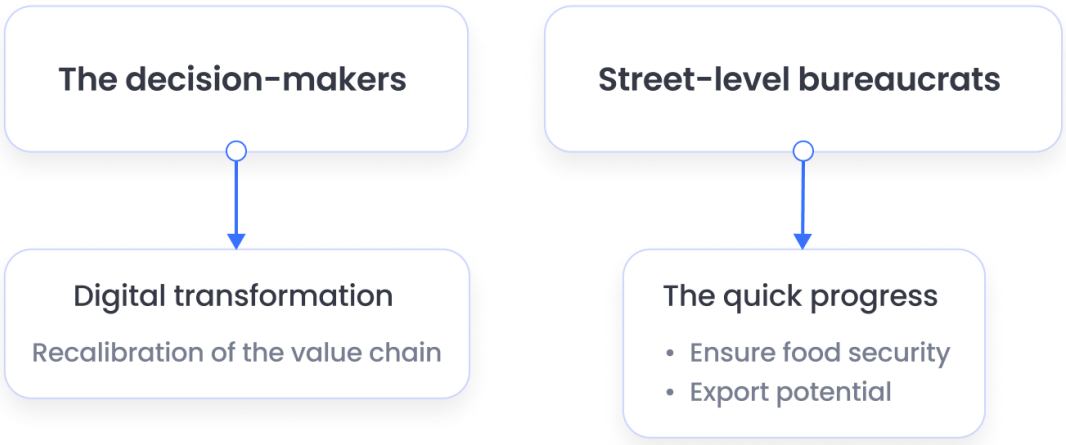


High conflict regarding goals resulted in divergent goals for the decision-makers versus the street-level bureaucrats. The *decision-makers* targeted their change efforts at readjusting and recalibrating the agriculture sector's value for the existing social-economic structure. This long-term strategy assumed the necessity of a bottom-up revamping of the agricultural system to achieve change. In contrast, the street-level bureaucrats took a "quick progress" approach, seeking to implement a digital policy that ensured food security and increased export potential. In other words, at the outset of the digital policy implementation process, the decision-makers perceived the implementation of the digital policy as experimental and capable of achieving the desired goal of increased production. However, the street-level bureaucrats perceived the policy implementation as *symbolic* due to their lack of expertise and a bureaucratic culture emphasizing "quick progress" grounded in standard operating procedures. The conflict produced by these diverse goals is discussed below.

The dissertation found that the sophisticated digital policy developed by the decision-makers was fundamentally incompatible with the goal of the street-level bureaucrats, whose primary goal was to show quick progress. Through the lens of the bottom-up approach, the decision-makers appeared to have designed a policy characterized by a high ambiguity in both goals and means of implementation, purposely relying on the discretion of street-level

bureaucrats to implement the policy with a focus on the locality and expertise in identifying idiosyncratic attributes of the relevant regions that impact implementation. Decision-makers, targeting social-economic change through the nurturance of an enabling environment for the digital transformation of the agriculture sector, utilized a bottom-up approach to prevent a high resistance in these regions. However, this "bottom-up" approach clashed with the "quick progress" focus of the street-level bureaucrats. This reflects the reality that in this country, street-level bureaucrats are able to set priorities in the policy. As a result, this defines the issue of food security in terms of a "large-scale farmer" issue. The consequence is that only selected farms were able to participate in the implementation of digital policies. See Figure 35—*conflicting goals of public managers under the digital policy.*

Figure 35. Conflicting goals of public managers under the digital policy



Contributions to Implementation Theory

Decision-makers used a bottom-up approach to implement the digital policy to address two implementation needs: a) to get the support of the key stakeholders in the regions; and b) to generate technology transfer by taking into account the specificities of the agriculture sub-sector and regions. In other words, the goal was to minimize the potential resistance of the key stakeholders to the digital policy by acknowledging the novel and experimental nature of the

policy. Unfortunately, subsequently, the decision-makers based their implementation decisions on false assumptions and designed a digital policy that resulted in unclear goals and unclear means for street-level bureaucrats to implement the policy successfully.

One contribution of this research is that it has extended Matland's model in terms of applying an experimental approach when implementing a novel technology, particularly as it pertains to a developing country context. Specifically, this research has indicated that experimental implementation is not successful in decreasing technological ambiguity in developing countries due to: a) the lack of an evaluation system that can support feedback during the implementation process; b) frequent turnover and rotation of top management; and c) a lack of expertise at mid-level management.

Matland's model suggests using an experimental approach in the novel technology-involved policies to mitigate the issues related to the technology's ambiguity. According to Matland's model, as discussed in Chapter 4, the bottom-up model approach is well suited for experimental implementation. It provides opportunities for the local-level actors to obtain new capabilities and effective learning in the digital transformation of the agriculture sector. Furthermore, the experimental policy approach to implementation, if it has low conflict and high ambiguity of means and goals, is potentially a sound strategy for developing new capabilities required for the agriculture sector's digital transformation (Matland, 1995).

Initially, the "bottom-up" approach generated enthusiasm for change at the local level. It was seen as an essential step for the decision-makers in ensuring the street bureaucrat's support of the digital policy initiative. However, in reality, the operational mode of public managers in the regions of Kazakhstan, entrenched in a highly hierarchical administration system that has served well for the last 30 years, has not proven effective in meeting new challenges such as the digitalization of the agriculture sector. For example, in this research, the conventional governing

approach has made an experimental implementation strategy essentially non-effective for enacting a complex policy such as the digital transformation of the agricultural sector.

The transfer of technology for this sector has not materialized due to the frequent rotation of top management for both decision-makers and street-level bureaucrats. As a result, there is decreased capacity to follow through on "learned lessons" –a mainstay element of the experimental implementation approach—producing missed opportunities for the successful implementation of new policies in the agriculture sector of Kazakhstan. Furthermore, this research did not identify any technological "transfers" between farms or regions during the last three-year period, resulting in the inability to cash in on the lessons learned from different local approaches to generate replicable solutions.

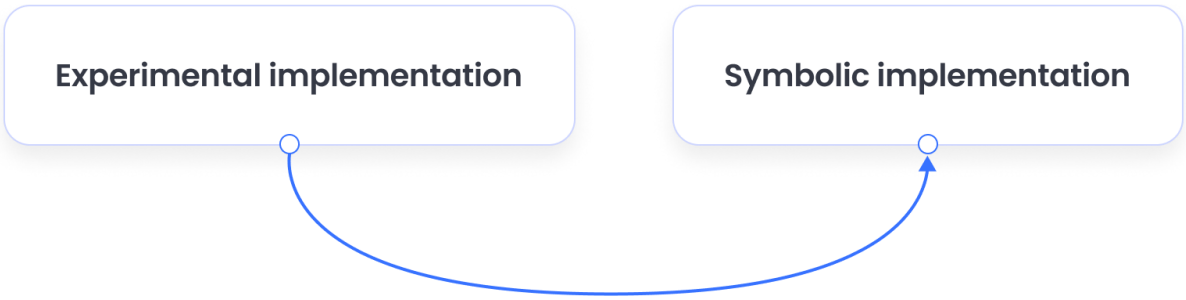
Figure 36. Barriers to experimental implementation

The second finding was that in the case of Kazakhstan, street-level bureaucrats disguised the support of the digital policy via data manipulation to address their pressing agenda and priorities. The highly hierarchical government structure, coupled with the dominance of informal institutions, nurtured the quick progress value among public managers leading to data manipulation. This issue of data manipulation was a cultural attribute inherited from the Soviet bureaucratic system, which has fostered an erosion of accountability. This is represented in the mixing and adulteration of performance results of the digital policy at the regional and central government levels. In turn, this erosion in accountability has undermined the effectiveness of the experimental implementation. So while the experimental implementation of the digital policy could have a large potential for effective learning, it has not materialized due to the lack of an

evaluation system in the public administration—a direct result of the frequent rotation of top management and a lack of expertise at the level of middle-level managers.

Analysis of the digital policy via the lens of Matland's model raises questions as to whether the failure to generate generalizable solutions represents a failure of policy implementation that could have been remedied through interventions to support policy change or whether the issues were more intransigent and unmalleable given what the dissertation revealed on the need for enhancement of the policy capacity of the public managers.

Figure 37. ***Dynamic nature of the digital policy implementation under Matland's model***



The first contribution of this research is that it has extended Matland's model and rendered the direction of dynamic model. Matland has suggested that the experimental model should theoretically move to an administrative implementation. According to Matland, to achieve successful policy implementation, the experimental implementation approach can advance to the central control or administrative implementation stage once digital policy projects are identified as feasible and effective. However, in this study, this phenomenon did not happen due to political pressure on public managers to report on "the quick progress"—and the lack of an evaluation system ingrained within the highly hierarchical and rigidly bureaucratic administration systems in Kazakhstan. So the digital policy did not materialize as high-profile policies that would receive adequate funding to achieve sustainability. Nor was it able to overcome farmers' resistance, especially small-scale farmers who tend to lack expertise and adequate funding support. Interestingly, the decision-makers associated the digital policy with

experimental implementation subject to low conflict of goals and high ambiguity of means during the initial policy implementation stage. However, the digital policy implementation later shifted and resulted in a dynamic shift from an experimental to a symbolic implementation approach.

A second contribution of the research is that it extended Matland's model on the role of key factors driving bottom-up failure in the context of a developing country. Specifically, this dissertation offers new insight into the implementation processes as it envisages that the "bottom-up approach" in principle is not applicable in the implementation of the digital policy within Kazakhstan. This was due to three causal factors: 1) the diversity of regions and structure of the sub-sectors, 2) the lack of evaluation system engrained in the policy implementation process, and 3) the lack of policy capacity.

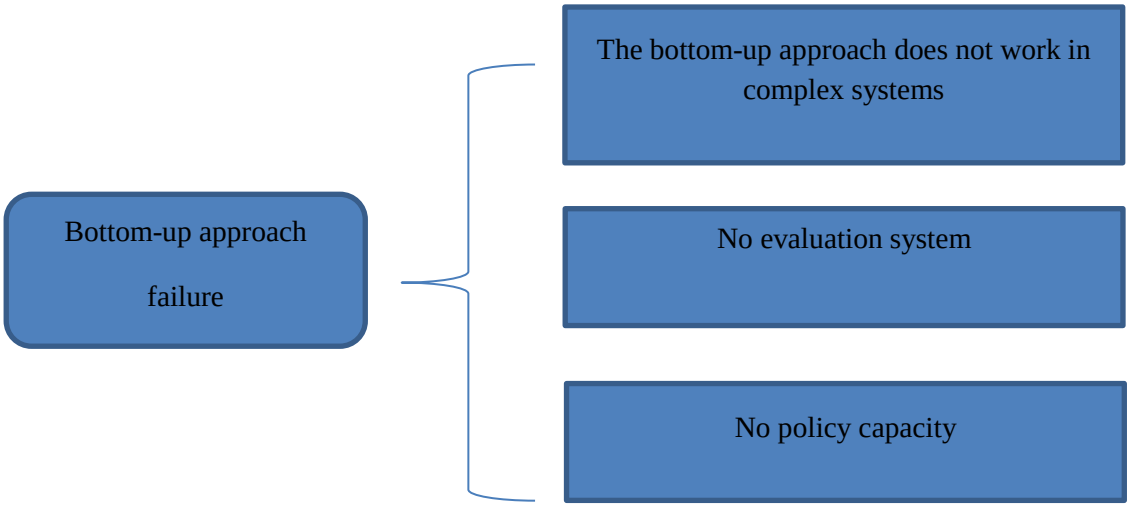
1) Diversity of Regions and Structure of the Sub-sectors. The country's agriculture sector has inherent contradictions of the diversity of the sub-sectors and regions. This finding is in line with Horton and associates (2018) argument that placing diverse and locally specific projects under a single policy tends to result in codified frameworks that are less likely to achieve the goals of the policy. Furthermore, scholars argue that the outcomes of the bottom-up approaches are unpredictable. For example, Horton and associates (2018) explored change in complex systems in the healthcare system. They highlighted challenges associated with "codifying" innovations and the role of local adaptation (Horton,T., Illingworth,J.H., Warburton, W.H.P., 2018). In other words, policies targeted at the sectors with high diversity in sub-sectors and regions cannot always address the context of those regions and sub-sectors during the implementation process.

2) Lack of an Engrained Evaluation System. The digital policy did not include using an evaluation system to facilitate feedback and to learn to improve outcomes—or as a means for refining or replicating programs in other regions. According to Bailey and associates (2017),

evaluation project implementation is crucial for gaining knowledge and generating a rapid change from the bottom-up. They argue that this is an adequate approach to scaling and replicating policies (Bailey,S., Checkland,K., Hogson,D., McBride,A., Elvey,R., Parkin,S., Rothwel,K., Pierides,D., 2017).

Unfortunately, no empirical evidence was found in this study that the digital policy in Kazakhstan contained an evaluation mechanism. An evaluation mechanism would have facilitated the policy implementation if the digital policy design had an evaluation mechanism that provided ongoing feedback and put performance demands on regions (especially those perceived to be doing well) to engage with others to share best practices. Successes could have been used for replication what had worked locally to other regions. In addition, policymakers could have learned from other regional experiences from the policy's outset.

Figure 38. Why did bottom-up approach implementation not work in Kazakhstan?

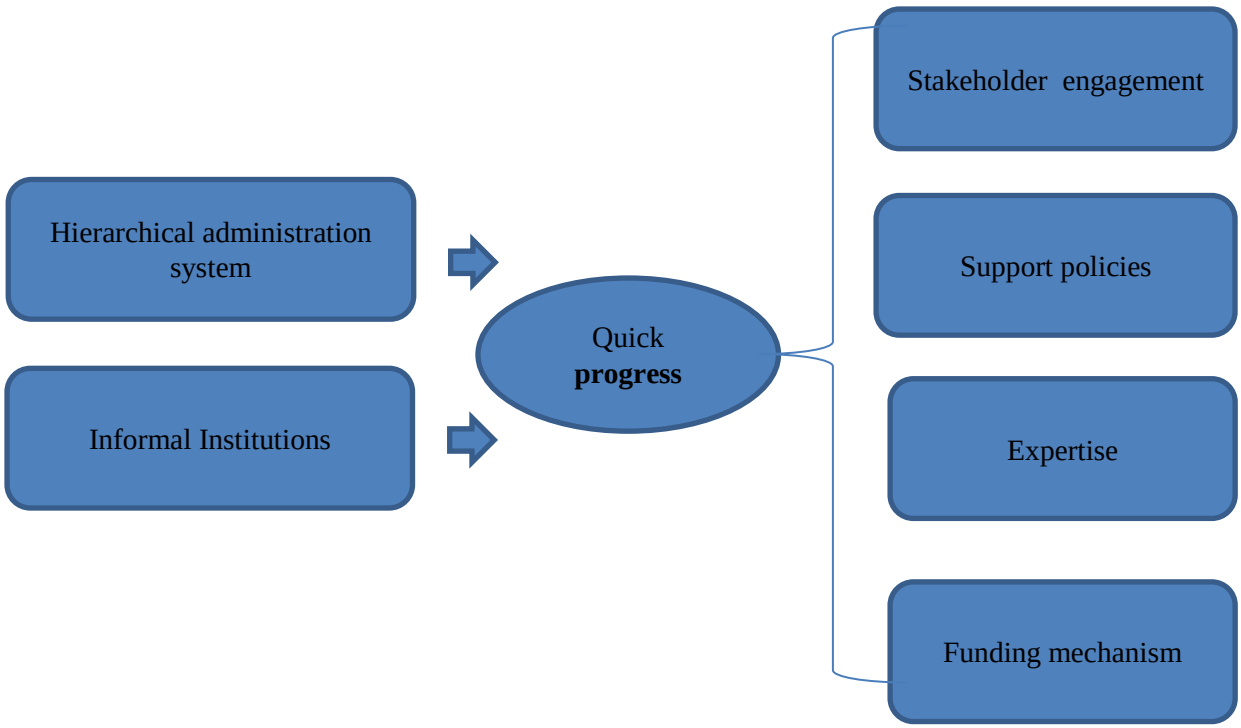


3) Lack of Policy Capacity. The main contribution of the dissertation is that the study has clearly demonstrated that the inability of a public administration system to ensure "policy capacity" can and has led to the lack of expertise required for an experimental implementation approach and can and did result in a shift toward symbolic implementation. This is discussed in the ambiguity of means section below.

In summary, the research contributes to the extension of Matland's model by increasing the prediction power of the model for developing countries. In developing countries, the experimental policy implementation does not necessarily result in administration implementation. Instead, it might result in symbolic implementation due to political pressure to report on "the quick progress" and the lack of an evaluation system incorporated in highly hierarchical administration systems.

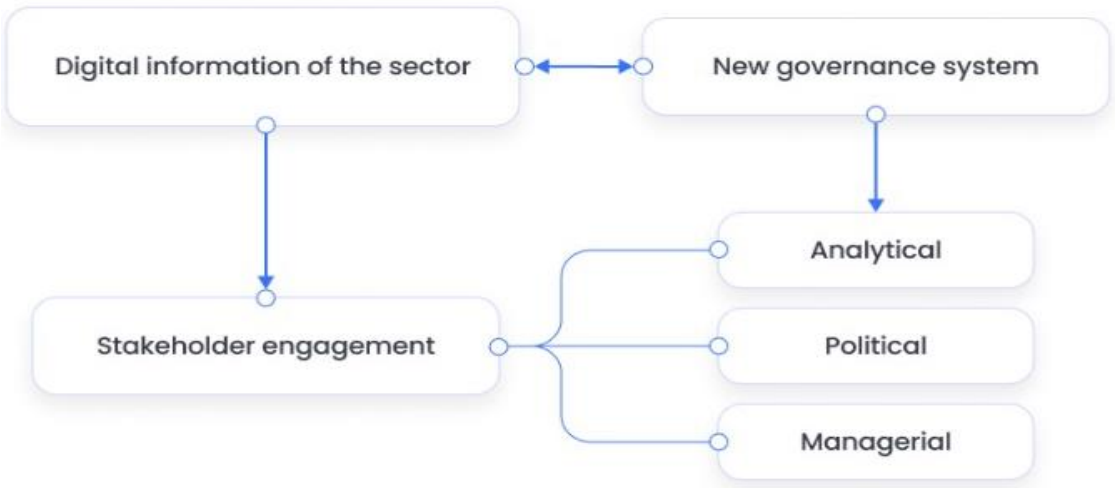
Based on findings, the research revealed that the street-level bureaucrats failed to address the complex tasks of creating an enabling environment for social-economic change in the agriculture sector, primarily due to a weak policy capacity. For example, the street-level bureaucrats did not have the policy capacity to foster: 1) stakeholder engagement; 2) support policies; 3) expertise; and 4) funding mechanisms.

Figure 39. Drivers and factors of ambiguity of means at the street-level bureaucrats level



1). Stakeholder Engagement. As discussed in Chapter 3, digital transformation requires a social-economic change in the country. In other words, the sector's digital transformation with its complexity requires a systemic approach and active engagement of key stakeholders (Edler, J., Bonn, W.P., 2018; Bugge, M.M., Coenen, L., Branstad, A., 2018). Moreover, stakeholder engagement in digital policies has become increasingly critical. Including stakeholders in policy-making can increase buy-in and public support for sector change and change the country's entire social-economic structure. Most importantly, stakeholder engagement provides ownership of the policy to key stakeholders, thereby enhancing the policy implementation process (Avison, 2010). Subsequently, structural social-economic change requires a different way of thinking, administration, and management approach. Primarily this is true given that change can be obtained only via a new governance approach of public managers, which in turn is reliant on an adequate policy capacity that includes the following three skills: 1) analytical skills; 2) managerial skills; and 3) political skills (Peters, 2015; Howlett, M., Ramesh, M., 2014).

Figure 40. ***Digital transformation and a new governance system***

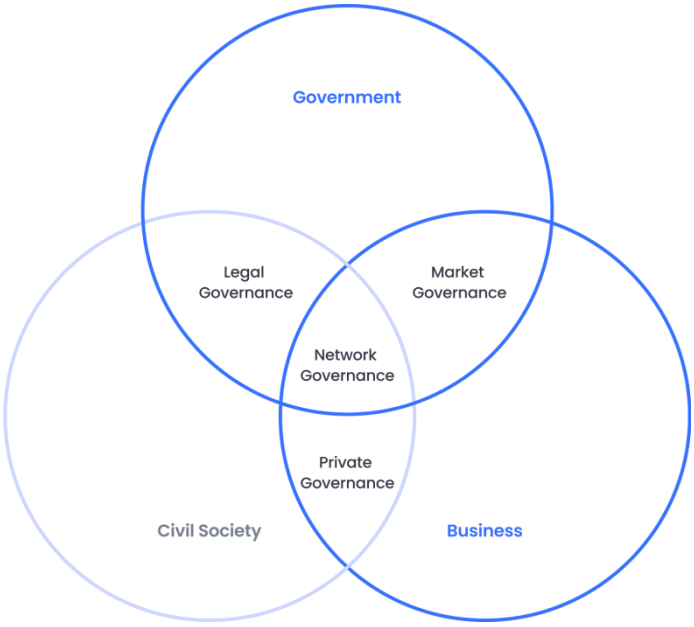


The analysis of stakeholder engagement practice in the sector revealed that public managers in Kazakhstan lack analytical and political skills for implementing digital policies.

Namely, the decision-makers "bottom-up" approach has struggled to introduce new governance system elements, providing the street-level bureaucrats more discretion in achieving their goals instead. However, regional public managers lacked analytical and political skills to generate policy alternatives to engage key stakeholders, especially small-scale farmers. Instead, regional public managers have focused on managerial skills to effectively use the state resources or the investment subsidies that generally cover the selected large-scale farmers.

Under the new governance system approach, the decision-makers designed the digital policy based on the network governance system provided in Figure 41. below. This system envisages all key stakeholders' engagement, including public managers, farmers, and civil society, represented by individual farmers or small-scale farmers in the regions. However, the street-level bureaucrats focused on implementing market governance by relying largely on the selected large-scale farmers via IT companies. On the other hand, the small-scale farmers remained in the circle of civil society. They were subject to legal governance with high reliance on operational subsidies in general due to the sub-optimal operation of the sector.

Figure 41. Legal governance system structure of the digital policy

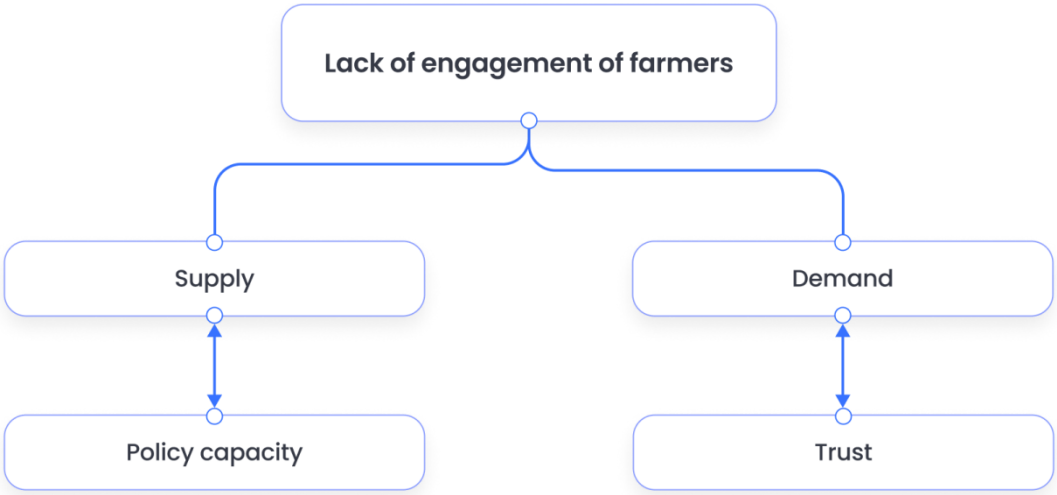


Prepared by (Howlett, M., Ramesh, M., 2014)

Active involvement of IT sector players in implementing the digital policy at an early stage of the digital policy regarding raising farmers' awareness about new technology opportunities contributed to a better understanding of the digital policy by the selected large-scale farmers. However, small-scale farmers were not engaged at any stage of the policy process. Consequently, farmers did not fully grasp the opportunities provided by digital transformation. Moreover, IT service and product companies were targeted mostly at large-scale, creditworthy farmers who have access to their own funding or government support for capital-intensive investments in digitalization. This consequently resulted in digital disparity in the agriculture sector, given the distortion in the stakeholder engagement. In addition, uncertainty on the benefits of the digital policy hindered small-scale farmers from being engaged in the policy implementation (the details of benefits are discussed in the next sections).

The research findings revealed that poor engagement of farmers by the street-level bureaucrats in the policy implementation was rooted in a lack of policy capacity of public managers on how to engage farmers from one side and the lack of farmers' trust in the government policies from the other side. At present, public managers lack independence and expertise, and their professional path depends on a superior manager in the hierarchy. For example, reporting bad news can be (and was)seen as disloyal to one's organization—better to "cover up" issues than to expose the office in a negative light. In addition, training for public managers was woefully inadequate, leading to inconsistencies in their understanding and implementation strategies. As a result, weak policy capacity and monopoly of the decision-makers on policy advice in the policy-making process undermined the plurality of the stakeholder engagement efforts. The policy capacity details are discussed in the expertise section in details.

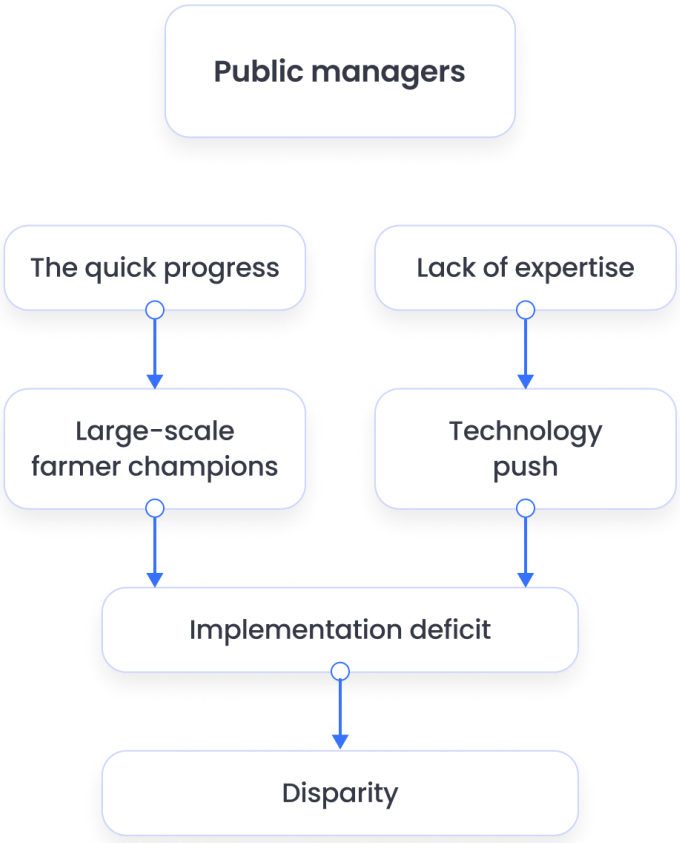
Figure 42. Key factors of lack of policy capacity in stakeholder engagement



Namely, from the supply side, due to a lack of policy capacity, the decision-makers used temporary dialogues with the IT industry as the facilitating mechanisms for digital policy implementation resulting in a technological push. Given the role of farms in the economic development inherited by the Soviet planned economy, the street-level bureaucrats used the selected large-scale farms as the champions or main drivers for the digital policy implementation. Subsequently, the proclivity to support large-scale farmers and to miss small-scale farmers from the policy continuum has led to an implementation deficit with limited effect on achieving the goals and has contributed further to the digital disparity. Jensen et al. (2018) stressed the danger of "fickle and fleeting alliances" between local actors in supporting the implementation of policies (Jensen,C., Johansson,S., Lofstrom, M., 2018). In other words, the decision-makers planned to involve large-scale farms and IT companies in the circle of market governance, as provided in the Figure on governance below. However, it was not materialized as the IT companies approached mostly only selected large–scale farms and overlooked small-scale farms.

From the demand side, frequent rotation culture in the public administration of Kazakhstan resulted in the malfunction of other policies in the agriculture sector. In addition, an increasing role of informal institutions has led to government support of selected large-scale farmers resulting in the malfunction of the existing policies in the agriculture sector.

Figure 43. The key role of public managers in the policy capacity and the stakeholder engagement

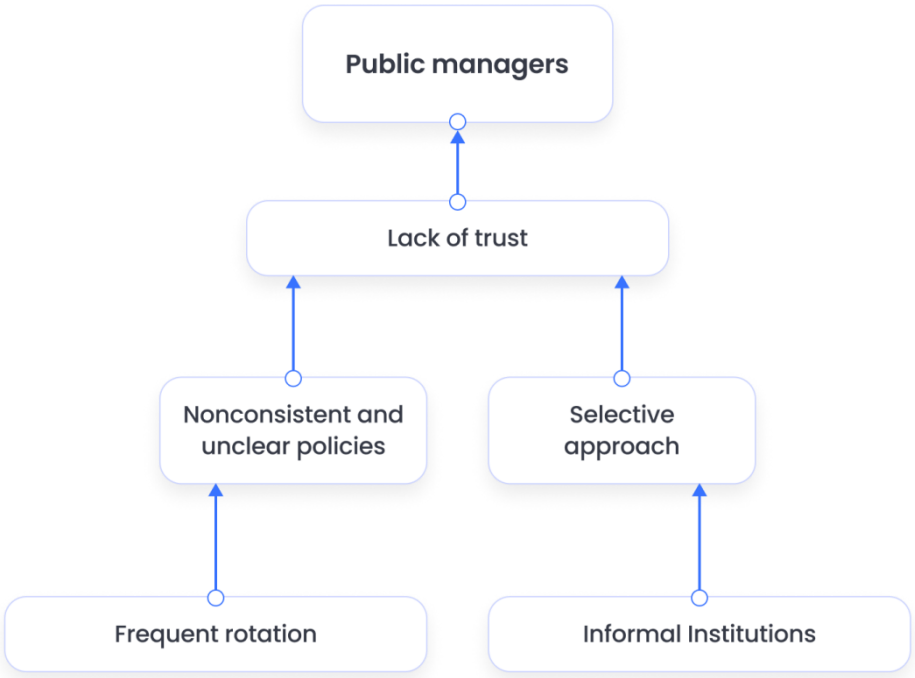


Inconsistencies in applying public support to farmers with a high proclivity to selecting large-scale farmers can be explained by the breadth of coverage of informal institutions, based on which public managers provide public support beyond professional norms and strays. One example, the research did not reveal that any small-scale farm received public support in the sector's digital transformation. Those farms that received public support were predominantly from the Akmola region, dominated by large-scale farms. Moreover, the cultural morales of Kazakhstan make influence public managers' functioning. In a post-Soviet country where networks, familial relations, and clanship are prevalent, using one's influence as a public manager to provide public support poses a risk to support only selected farms with informal links with the public managers. In the same vein, faking and manipulation of data, a practice that is a generational curse of the Soviet bureaucracy for a planned economy did not promote the efficiency or well-being of citizens but rather "the quick progress" culture.

This malfunction of other policies (such as e-government, land regulation, and others), propensity to support the selected large-scale farmers led to a lower trust of the society, including farmers, in public policies, insertion, and lack of willingness to participate in the government initiatives. So public managers failed to build strong, trusted relationships required for complex societal changes (Jensen,C., Johansson,S., Lofstrom, M., 2018). In other words, public managers demonstrated weakness in building the **political capacity** for implementing digital policies. Therefore, to achieve social-economic change in the sector and the digital transformation of the sector, the concept of government functioning should be substituted with the governance system (Howlett, M., Ramesh, M., 2014). However, the dissertation findings revealed that public managers in developing countries keep following the traditional concept of the government role, which often does not reflect society's current realities. Specifically, the street-level bureaucrats in the agriculture sector relied on traditional concepts of reliance on a set of rules or regulations—but failed to utilize a formal set of principles. The traditional concept envisages institutions setting out “who gets what, where, when, and how." According to this concept, the government has historically been responsible for controlling the allocation of resources among stakeholders (Laswell, 1958). However, in the case of the digital policy in Kazakhstan, the street-level bureaucrats focused on providing investment subsidies to large-scale farms rather than creating an enabling environment for the farmers and other key stakeholders.

In broader terms, a new governance approach envisages the government coordination of the efforts of public managers to address problems of how to coordinate collective action (Howlett, M., Ramesh, M., 2014). In other words, this view of e-governance conceptualizes its goal as one of supporting, promoting, and establishing a specific relationship between the government and other stakeholders in the policy. In addition, governance encompasses coordination and managing the businesses and civil society organizations' involvement in creating public value and delivering goods and services to citizens.

Figure 44. Lack of engagement from farmer perspective—lack of political capacity



This dissertation demonstrates and amplifies that digital policy requires addressing grand social-economic challenges, encompassing various complex policy areas, including public and private institutions. Hence digitalization needs to engage various stakeholders inside and outside the agriculture sector. However, in reality, public managers of Kazakhstan used the standard administrative approach of communication with the street-level bureaucrats based on a highly hierarchical administrative structure without the involvement of other key stakeholders during the implementation processes. There was a limited engagement in the IT sector at the beginning of the policy implementation due to a focus on managerial capacity and a lack of analytical and political capacity.

Third dissertation's main contribution envisages that the bottom-up approach does not apply to digital policy implementation in developing countries without a capacity-building mechanism engraved in the policy. Due to the lack of analytical and political skills of the regional public managers in the sector, the digital policy resulted in a low stakeholder engagement. At the same time, stakeholder engagement is the main component for implementing policies associated with the social-economic structure change as the digital transformation of the

agriculture sector. By inertia, regional public managers focused on managerial skills to effectively use the state resources or the investment subsidies leading to the digital disparity. As a result, the regional public managers tend to rely on a top-down approach and covertly sabotage the policy implementation by using data manipulation and ignoring the power of their discretion.

The next contribution of the dissertation is that it extends Matland's model in terms of the impact of the ambiguity in the developing countries with a highly hierarchical administration system. In developing countries, the decision-makers often are not assumed to have a role in reducing the ambiguity due arising from the existing data manipulation culture of street-level bureaucrats. The main findings on stakeholder engagement uncovered peculiarities of the measures on reducing ambiguity. Matland assumes that the policy ambiguity can be reduced via stakeholder engagement that facilitates the discussion of the goals and means of the digital policy. Furthermore, Matland claims that the decision-makers might retain solid policy control when the policy is unambiguous.

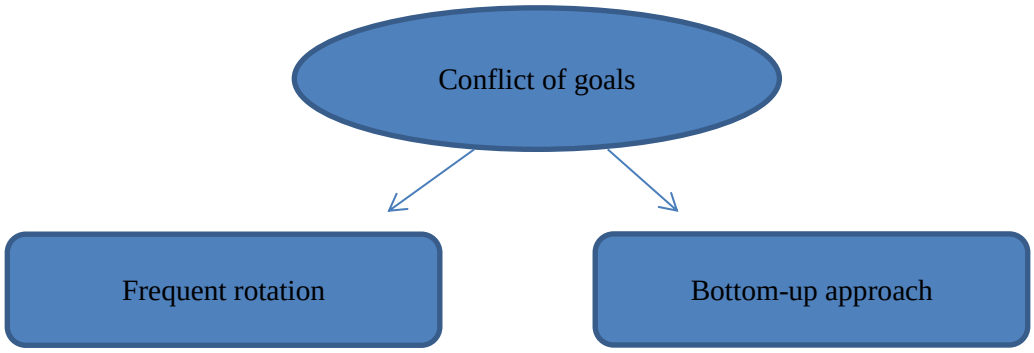
The research extended Matland's model further by projecting the model into the context of a transition country and accounting for the influence of informal institutions in the decision-making process of public managers. Due to the highly hierarchical administration system inherited from Soviet Bureaucracy, the street-level bureaucrats in transition countries tend to minimize opposition through data manipulation or focusing on "good progress." Consequently, the decision-makers are not aimed at reducing policy ambiguity. Instead, they are inclined to use the street-level bureaucrats' distorted "success" data and assume that the key stakeholders agree with their approach. Hence no stakeholder engagement mechanism is fully operational in transition countries.

Uncertainty of Government Support. A lack of clarity in the regulatory framework and consistency of the policies in the agriculture sector was highlighted as one main constraint in the willingness of farmers to implement the digital policy. In addition, research revealed that the

uncertainty of policy support is rooted in the role of informal institutions and a frequent rotation of top management of both the decision-makers and the street-level bureaucrats, which is widely supported by existing studies in Kazakh public policies (Baimenov, A., Liebert, S. , 2018; Siegel, 2018;O'Connor, K., Janenova, S., Knox,C., 2019; Junisbai, 2010).

Rotation of Top Management. The dissertation research uncovered inconsistent policy support derived from two incompatible goals of decision-makers. The first goal of the decision-makers is related to the formalization of the state's central role by minimizing the role of local coalitions via frequent rotation of top management—i.e., regional public managers. The second goal of the decision-maker is to use the bottom-up approach, designed to maximize the discretionary and active role of the street-level bureaucrats in the policy implementation process.

Figure 45. Conflict of goals of the decision-makers



Reshuffling of top management, associated with countries with highly centralized administration, is utilized to ensure the power of the "center" and to prevent the flow of power to regional authorities. In other words, the reshuffling of top management has been a means of "centralizing state bureaucracy, one of the defining features of statehood in the modern era"(Siegel, 2018). Succinctly stated, the government employs rotation of top management as a preferred political strategy for assuaging and reducing the differences between clan-based and

center-periphery politics through the award of patronage positions. Furthermore, it was assumed that the reshuffling of top management prevents the regional leaders (akims) from accumulating popularity and authority among specific region communities (Siegel, 2018).

Ironically, however, frequent cadre rotation of top management has represented volatility of the system, which tends to render the public policy system in a constant state of flux, increasing the dominance of the informal institutions and lowering the potential for successful implementation and/or effective program evaluation (O'Connor, K., Janenova,S., Knox,C., 2019). Most importantly, the influence of informal institutions on the distribution of power and wealth in the country, and their increased impact on economic and sector development, has led to a disparity in the sector. Namely, informal institutions' competing groups/coalitions allocate the resources and influence both policy-making and implementation. This results in asymmetrical support for the selected-large scale farmers, leaving small-scale farmers in an outsider position. Furthermore finally, a byproduct of this strategy has been that the reshuffling of top management has created a lack of policy capacity among middle-range public managers, who now no longer have the expertise and skills needed to implement policy successfully.

The fifth contribution of the dissertation is that the bottom-up approach is not an adequate approach to policy implementation in developing countries' contexts unless it enhances the policy capacity of the street-level bureaucrats and acknowledges the role of informal institutions. Succinctly stated, this research's main contribution is that the digital policy implementation is not realistic in a highly hierarchical system with a strong negative impact on informal institutions that undermine merit-based employment. Implementation of the digital policy in the agriculture sector of Kazakhstan demonstrated that setting unrealistic or incompatible goals for a policy in transition countries can damage the policy outcome overall. Furthermore, the dissertation uncovered a tension between limited guidance of the decision-makers on how the digital policy should be implemented, how to factor in the peculiarities of the

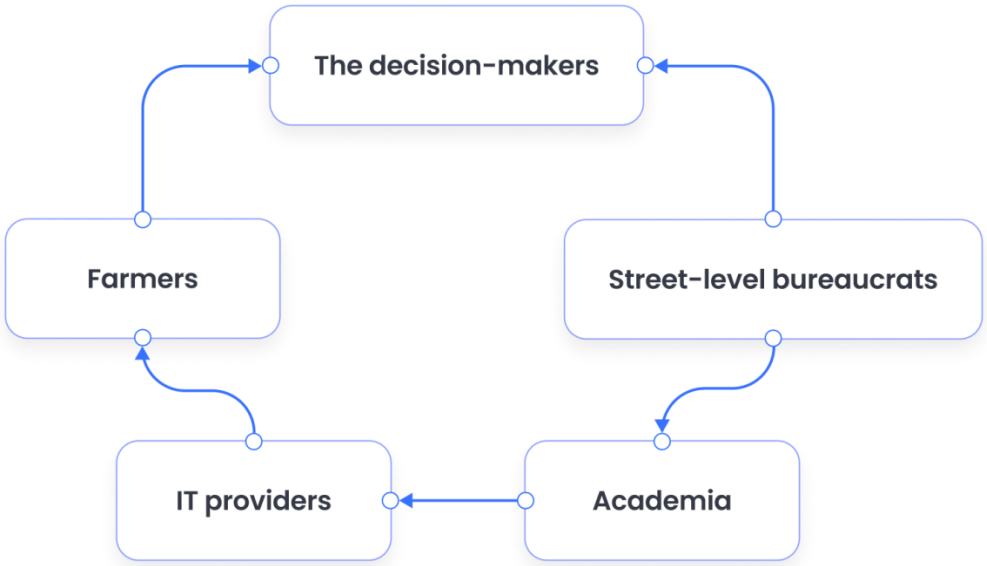
relevant regions and the subsectors, and the wide discretion of the street-level bureaucrats. They focused more on gaining political points at the cost of meeting implementation best practices.

Expertise and Skills. Skills and expertise are essential factors of digitalization. As discussed earlier, the digital policy envisaged that the Ministry of Agriculture and the regional akimats would drive the implementation process, helping facilitate the digitization at the farmer's level. Facilitation of the digitalization process also included ensuring skills and expertise in the sector. However, the policy did not contain clear mechanisms to achieve this. As discussed earlier, public managers responsible for the sector within the digital policy mostly focused on funding. Namely, the Ministry of Agriculture focused only on funding public services-related components of the project.

In contrast, the street-level bureaucrats focused on funding selected large-scale farms receiving investment subsidies. At the same time, digital transformation requires greater integration between key stakeholders—academia, technology providers, and farmers, as provided in the Figure 46 below. Within this scenario, digital transformation of the business and agriculture sector incorporates structured partnership and collaboration between key stakeholders and requires a new form of governance, as discussed previously.

One of the key issues in engaging the key stakeholders was the inability of public managers to provide capacity-building support, including training, to farmers. Training is a key factor in policy implementation as it provides a basis for competency and empowers key stakeholders to address the obstacles and barriers (Ghodsi,D., Omidvar, N., Rashidian,A., Raghfar,H., Eini-Zinab,H., Ebrahimi,M.K., 2017; Mathews,C.,Boon,H.,Flisher, A.J.,Schaalma, HP, 2006; Mwendera, C., de Jager, C., Longwe,H., Kumwenda,S., Hongo,C.,Phiri,K., 2019). The inability of public managers to provide capacity-building support for farmers is rooted in the lack of expertise of the street-level bureaucrats themselves.

Figure 46. Digital transformation elements



Matland stresses that successful outcomes are often determined by the coalition of actors at the local level who control the available resources (Matland, 1995). Furthermore, the strength of the local coalitions is linked to the strength of the technical expertise. However, the dissertation findings revealed that the strength of the local coalitions in Kazakhstan was based not on public managers' technical or analytical expertise to promote the policy but rather on the role of informal institutions in the public policy in Kazakhstan.

The poor expertise of the street-level bureaucrats is rooted in distinct patterns of center-periphery relations formed by Soviet nomenclature. Specifically, Kazakhstan's public service is characterized by a disparity in access to skills between the street-level bureaucrats and the decision-makers. The disparity is represented, for example, as a high concentration of Bolashak graduates in central public agencies, availability of training courses, and access to public service academies only for public managers in central apparatus or top management of Oblast level. Subsequently, due to lack of training leading to a lack of policy capacity, the street-level bureaucrats have taken their decisions at policy implementation, including distribution of the investments, based on the strength of influence of local large-scale farms on street-level bureaucrats ignoring arm's length transaction principle.

To address this implementation deficit, the decision-makers should ensure the training programs for complex policies and novel technologies in the future to address the informational needs of farmers and regional public managers. This finding is very important given the agriculture sector's transformation, which requires new instruments and a new vision as digitalization, one that captures the redefinition of the value chain of the whole sector. The training is essential for empowering the stakeholders in their roles and responsibilities and lowering ambiguity.

The dissertation findings also revealed the importance of the evaluation process in the policy implementation of the experimental policies. The digital policy did not include the component for monitoring, evaluating, and enforcing the policy. Therefore, the Ministry of Agriculture could not evaluate the operation of digital projects and replicate the best practices across regions. The absence of the evaluation and the lack of communication between the Ministries impede continuous progress assessment and block transparency and accountability (Mthethwa, 2012). As a result, there is no means available for obtaining feedback on the digital policy implementation progress. Subsequently, the policymakers did not take the required adjustments to their work or regulation as there is a complacency culture and no evaluation system embedded in public services.

The sixth contribution of the research is that in the context of transition countries with hierarchical administration systems, a key driver of the local coalition depends not on professionals but rather on the level of influence of informal institutions. This is due to poor policy capacity and public managers' poor stakeholder engagement practices.

In summary, the research confirmed that the strength of the coalitions argued by Matland (1995) is a key factor in the outcome of the policy. However, the research comes up with an interesting source of the differences. Matland uses professionals as a unit of analysis for the coalitional strength of local actors controlling available resources as the primary influence on

policy outcomes. In contrast, this research showed that in the context of transition countries with hierarchical administration systems, a key driver of the local coalition depends not on professionals but on the level of influence of informal institutions.

Capacity Building Mechanism. The dissertation uncovered that the capacity-building mechanism was missing in the digital policy implementation design. A capacity-building mechanism is considered critical in two aspects: support of farms by public managers and the improvement of the policy capacity of the regional public managers. However, the research revealed that the digital policy lacked a capacity-building mechanism because of the incompatibility goals of the decision-makers with the goals of the street-level bureaucrats.

The goal of the decision-makers was to increase productivity and export by letting the market forces guide digitalization. Hence the digital policy does not have incentive mechanisms regarding earmarked funding for expertise. The decision-makers considered the street-level bureaucrats best placed to create enabling environment using existing support mechanisms. Ministry of Agriculture designed the digital policy without any guidelines and training to implement it, which the street-level bureaucrats perceived as a project lacking political support. This was partially the byproduct of trying to provide flexibility to the local, regional public managers to collaborate with the agriculture sector key players and IT sector industry, but failing to do so given the traditional laissez-affaire approach usually taken in the agriculture sector. Therefore, the decision-makers proposed that the regional public managers use the network governance approach to implement the digital policy. However, the regional public managers have low policy capacity for such initiatives. First, there is a dearth of skills in the public service, a result rooted in distinct patterns of center-periphery relations that have directly led to a shortage of skills in regional public offices with low policy capacity. Second, the hierarchical administration system of Kazakhstan with a compliance culture based on a patron-agent relationship does not support creativity (Van der Wal, Z., Mussagulova, A., Chen.Ch., 2020).

Unfortunately, the street-level bureaucrats failed to support farmers via capacity-building mechanisms due to a lack of policy capacity. Instead of promoting digital transformation, they focused on the quick progress approach or reporting "good news." Furthermore, the regional akimats tend to bend guidelines when implementing components of digital policy to suit their own goals and hidden agenda when resources and capacities are not readily available.

It is widely acknowledged that the policy implementation success should be linked with the targets and goals based on design principles rather than a set of templates. However, the decision-makers did not provide either a set of templates or principles of how street-level bureaucrats should do things under the digital policy. As a result, due to a lack of expertise, the street-level bureaucrats used the investment-subsidy mechanisms to implement the digital policy relying on a set of existing templates—without regard to any principles. Specifically, the street-level bureaucrats used the template approach to allocate investment subsidies. In particular, they only selected large-scale farmers who were deemed eligible for incentives if they used the listed machines and technologies in investment subsidy regulation. This list mainly focused eligibility on the presence of automation of the business operation of farmers.

However, this approach did not address the change of economic-structural change in the agriculture sector—a digital transformation that would require new principles that promoted the development of the entire sector and social-economic change. Retrospectively, there is evidence that the decision-makers could have contributed more to the successful policy implementation of the digital policy if they had provided a set of principles for the design of the digital projects eligible for replication based on their proven ability to effectuate social-economic change. Instead, the street-level bureaucrats continued to use the principle of the provider of the subsidies. Instead of promoting the sector's development via a capacity-building mechanism, public managers supported society's "free rider" approach with high reliance on subsidies.

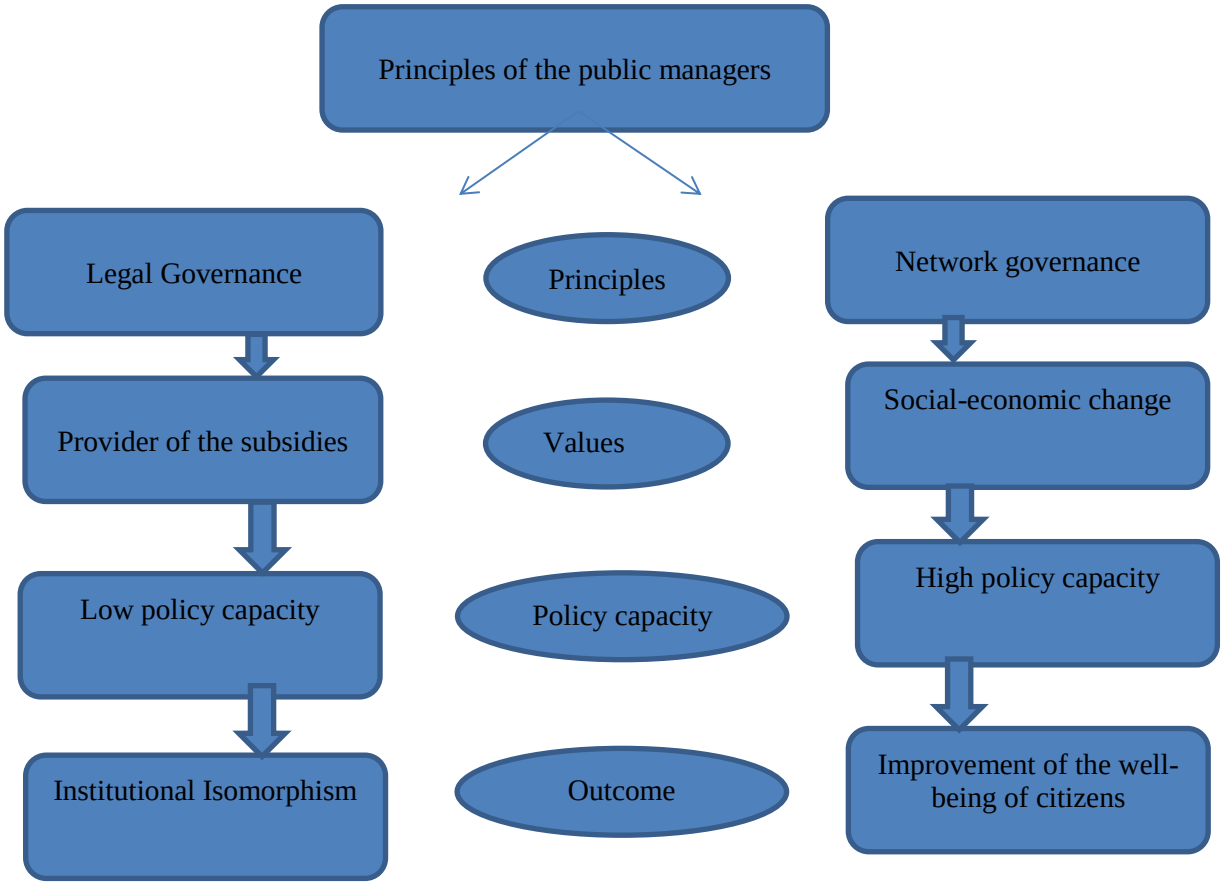
The research uncovered two key lessons related to the interaction between the street-level bureaucrats and the decision-makers in terms of capacity-building mechanisms. First, policy support from central government authorities is a key in policy implementation in transition and developing countries. It is widely acknowledged that effective policy support motivates implementers to perform their functions (Sabatier P. , 2007), (Pigot, M., Miller,C.E., Rockman,R.B., GrenyerB.F.S., 2019), (Van der Wal, Z., Mussagulova, A., Chen.Ch., 2020). However, the Ministry of Agriculture represented as the decision-maker, failed to provide support in training or workshops during the implementation process to increase the policy capacity of the regional managers—except at the beginning of the policy stage to selected Oblast regions. This inaction amplified the policy ambiguity and conflict in goals. The dissertation findings revealed that central government authorities' lack of policy support and engagement of street-level bureaucrats made regional public managers feel isolated and insecure. Subsequently, the street-level bureaucrats considered themselves to be the process facilitator and statistic department, reporting only on policy implementation performance with no focus on identifying an effective capacity-building mechanism function.

The second lesson of the research envisaged that the ambiguity of the policy means does not necessarily result in creativity. Without policy capacity available, the street-level bureaucrats such as the Oblast and Regional akimats kept working in their modus operandi, following strict instructions of the upper tier of the government. Hence, they use this ambiguity at their discretion to achieve their own goals and address a hidden personal agenda, report on the quick progress, and diminish the importance of the support to farmers.

Lack of policy support reflects the dynamics of the development of the public sector of Kazakhstan, associated mostly with inertia rather than profound changes (Knox, C., 2008). Namely, political inertia shapes the policy in the agriculture sector mainly due to a highly centralized state based on the elite form of decision-making (Knox, C., 2008) and the dominance of informal institutions (Junisbai, 2010;Collins, 2004). Knox stressed that despite these

substantial reforms, there is an in-built tendency toward isomorphism in public sector organizations in transition countries resulting in a high degree of resistance to change (Knox, C., 2008);O'Connor, K., Janenova, S., Knox,C., 2019). Namely, as part of institutional isomorphism or imitation, Kazakhstan has simply established structural changes as part of the wider (global) public management reform agenda for developing countries.

Figure 47. Capacity building mechanism in digital policy and governane

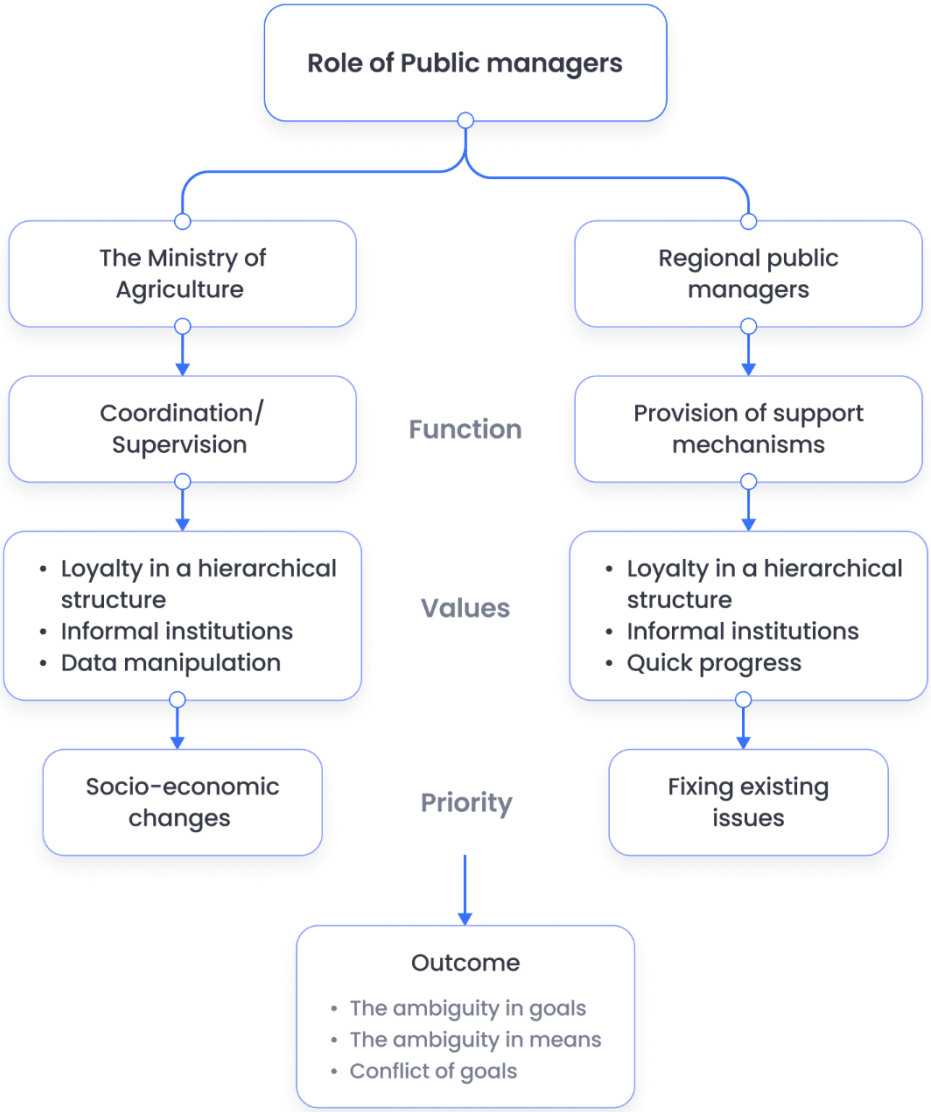


However, underlying interpretive schemas have not been changed (Janenova, S., Knox, C., 2017;O'Connor, K., Janenova, S., Knox,C., 2019). As a result, restructuring public service in Kazakhstan has been a part of the global menu of public management reforms, with the main focus on form, not content. As a result, Kazakhstan ignored the core functions of public service—to provide high-quality public services to its citizens, leading to an empty mimicry of the western led reforms (Janenova, S., Knox, C., 2017). In other words, while there have been

structural changes in the formal institutions, interpretive schemas and decision-making systems have not undergone substantial changes due to the key role of the informal institutions.

The capacity-building mechanism is crucial in implementing digital policy in developing countries. First, it provides comfort to the street-level bureaucrats that they have policy support from the decision-makers, which can mitigate the increasing role of the informal institutions. It can empower the regional public managers in terms of analytical skills.

Figure 48. Capacity building mechanism in digital policy and role key stakeholders



Second, it enables the street-level bureaucrats to alternate from the usual modus operandi and be creative in policy implementation, allowing the bottom-up approach to work effectively in the context of a developing and transition country environment.

Matland acknowledged that the decision-makers had limited power to monitor the actions of the street-level bureaucrats and structure activities at the local level. However, decision-makers can influence the allocation of incentives and resources and prioritize the issues. Therefore, Matland advocated for the bottom-up approach when implementing the policy (Matland, 1995). In addition, Matland argued that, under symbolic implementation, a high level of difference in the interpretation of symbols by professionals could lead to a high level of conflict.

The research revealed that in developing countries, the conflict of the policy is not based on the professionals' interpretation but rather on the different values of the street-level bureaucrats and the decision-makers. For example, in the case of digital policy, the decision-makers had an interest in the social-economic structure change. At the same time, however, the street-level bureaucrats were narrowly focused on quick progress. Consequently, the research uncovered that the bottom-up approach does not work in the context of the transition countries such as Kazakhstan due to weak policy capacity t the regional level. Therefore, it is critical to promote the capacity-building potential in the public service to address the policy implementation deficit.

This research dissertation highlighted the importance of expertise both at the level of the decision-makers and the street-level bureaucrats in creating an enabling environment for the agriculture sector's digital transformation. The regional peculiarities of public managers regarding sub-sectors and local, regional contexts require more attention in future analyses to gain deeper insights in new path development triggered by digitalization. The dissertation research focused on the street-level bureaucrats at the level of audan (regions) street and oblasts

together. Future research can focus on different approaches separately at the audan and oblast levels. The dissertation also acknowledges the leading role of academia and research institutes in stakeholder engagement and acquiring news expertise, which shall be further investigated in future studies.

Table 16. *Sources of the contribution of the current research to an extension of Matland's model*

	Original model	**Extended model**
Subject of Conflict	Symbols - interpretation of the symbols by professionals	Values - interests of the street-level bureaucrats and decision-makers
Coalitional strength	Important	Important
A key driver of the coalitions	Professionals	Informal Institutions
Conflict resolution mechanism	Coercive mechanism (Bargaining mechanism)	Remunerative mechanism Capacity building
Transition	Political implementation Ambiguity reduced	No transition No change in ambiguity
Reduction of ambiguity	Engagement of key stakeholders	No engagement mechanisms
Approach in resolution	Bottom-up approach	The bottom-up approach does not work
Policy capacity	Managerial capacity	Managerial capacity Analytical Capacity Political capacity

This dissertation research is the first attempt to uncover the role of the government in the promotion of digital technologies. Being part of the market economy, Kazakhstan is challenged as to whether the government should stay as a guard of the status quo or should it take an enabler role in the promotion of digitalization. This issue is more critical for developing agrarian countries. It is widely accepted that the agriculture sector is highly subsidized. However, who should lead digital transformation remains broadly an open question. The current study uncovered an ongoing debate between the state and large-scale farmers on a leading role in the digital transformation of the agriculture sector. With a high propensity to support the large-scale farmers and limited reforms in land and funding areas, small-scale farmers remain precluded outsiders to the digitalization movement. Policymakers should address the risk of the technological push and query themselves on what the role of the government should be and what

public policy they should shape in this area. There is also a question of small-scale farmers' interests versus the decision-makers' strategic vision of agriculture sector development. These questions comprise a future research agenda of the author.

Second, the dissertation uncovered the risk of the implementation deficit leading to a "digital divide" among farmers. Future studies might employ a farm perspective that looks in-depth to ascertain how digitalization is achieved by pioneers or champions of digital transformation of the agriculture sector. That research would guide how the farms implemented digital technologies and how they impacted the value chain transformation and new regional industrial path development. These issues require further conceptual advances and more in-depth empirical explorations in various geographical and sub-sector contexts. Exploring how digital transformation is implemented in different regions and sub-sectors with different capacities and endowments would be instrumental to understanding why some sectors are champions in digital transformation while others fall behind in addressing the new challenges.

In summary, this dissertation concludes that it is important to consider the challenges of balancing the top-down administration system and "bottom-up" development approaches in the policy solutions relating to the digital transformation in the agriculture sector in developing countries. The dissertation findings stress that existing relationships and structural arrangements shall be reconsidered to address the complexity associated with digital policies. Therefore, the dissertation's main contribution is that the "bottom-up" development approach is not appropriate for digital policies involving social-economic changes, including the whole value chain of the agriculture sector. Instead, digital transformation policies require well-defined frameworks developed by the decision-makers (or central-government authorities) for the street bureaucrats (regional managers) to follow within the developing country context. This should be coupled with strategies to improve the public managers' existing political and analytical capacity.

Moreover finally, the implementation of the digital policy demonstrates the importance of the diversity of the perspectives in the workplace of the public managers and stakeholder engagement. One of the main reasons for investment subsidy misuse was that there were no adequate checks and balances (i.e., an evaluation system). Most of the public managers working in the sector are all from the same training, intellect, and perspective. Unfortunately, they happen to be all men and are influenced by groupthink and tunnel vision. Currently, public managers pursue the common perspective derived from working in a hierarchical administration system. However, they need to develop a view that goes beyond just one group of people or immediate technology initiative.

The dissertation research provides valuable lessons to facilitate and guide the development and implementation of digital policy in other developing and transition countries. Based on the dissertation research findings, the following recommendations are advised to reduce goal conflict and ambiguity of goals and means to address implementation deficit challenges in the digital policy in the agriculture sector of Kazakhstan.

Detailed recommendations include the following measures:

- The implementation process should be assessed regarding realistic time and resources, objectives, and milestones with adequate timeframes and adjustment periods are provided prior to the stakeholder engagement;
- Adequate milestones with a gradual approach to the digital policy and sub-sectors considering the sub-sector's complexity level should be adopted.
- Regular processes and a system of monitoring and evaluating policy implementation based on an annual basis should be ensured in the Ministry of Agriculture, Oblast akimat, Audan Akimats, and village Akimats.
- The policy should clearly outline the roles and responsibilities of key stakeholders involved in the implementation process and put binding clauses into law.

- The decision-makers and the street-level bureaucrats' existing capacities and capabilities should be considered at the policy development stage.
- Continuous engagement and communication (between the Ministry of Agriculture, Oblast akimat, Audan Akimats, and village Akimats) should be improved to provide guidance and motivation.
- The involvement of key stakeholders (including farmers, street-level bureaucrats, academia, and the IT sector) should be ensured in the policy development and implementation processes. Furthermore, the feedback of key stakeholders should be taken into consideration both at the development and implementation stages regularly.
- Training, technology presentations, workshops, and awareness campaigns should be targeted at all relevant stakeholders to increase understanding and knowledge regarding the policy's goals and means of implementation on a regular base.
- Decision-makers should arrange the training for the street-level bureaucrats.
- On-the-job training and preference clause in allocating the Bolashak scholarships to the regional managers shall be implemented.
- Rotation of middle-range public sector managers (Ministry of Agriculture, Oblast akimat, Audan Akimats, and village Akimats) to increase knowledge and understanding of the policy's goals and means of implementation, thereby increasing the policy capacity within the public administration system. Rotation shall be held regularly for at least six months at each level. Public managers shall be rotated between the Ministry of Agriculture and the regional akimats), not solely within public organizations.
- The evaluation system of the policies should be embedded in the rotation process of top management cadre rotation.

- Support programs for small-scale companies on enhancing their capacity and willingness in digitalization shall be developed and earmarked for funding, using detailed prior research on sub-sector and regional to support specific funding choices.

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Annex 1. List of the documents used in the document analysis

1. Strategy “Kazakhstan 2050”. President speech from December 14, 2012.
2. Strategic plan on development of the Republic of Kazakhstan up to 2025. President Decree from February 26, 2021 No. 521.
3. State program on development of the agrarian complex of the Republic of Kazakhstan from 2017-2021 from July 12, 2018. No 423
4. State program “Digital Kazakhstan” from December 12, 2017. No.827.
5. Subsidy regulation on reimbursement of the investment expenses of the agro-industrial complex subjects from August 1, 2020.
6. Order on amendment to the order of Ministry of Agriculture of the Republic of Kazakhstan from Deccember 25, 2019, No. 461 « On creation of the working group on development of the proposals in the digitization of agriculture sector (IT-council)»
7. Presentation of Ministry of Agriculture on the development of digitization of agriculture sector 2020 (received by email November, 4, 2021)*.
8. Presentation on introduction of the investment subsidies for procurement of digital solutions (received by email November, 4, 2021)*.
9. Note of Ministry of Agriculture on education of the IT specialists for agriculture sector for the meeting of the Commission on the digitization (received by email November, 4, 2021)*.
10. Note from deputy to Akmola Oblast Akim on digitization of agriculture sector as of September 7, 2022.

*[8] Unofficial document

[8] Neither Ministry of Agriculture nor Oblast Akimats provided the data officially on the performance of implementation of digital policy[8].

Annex 2. Written Informed Consent Form Template

Introduction.

You are invited to participate in a research study entitled "Digital policy in agricultural sector of Kazakhstan – the policy implementation issues". The dissertation thesis is aimed to explore the reasons for the low uptake of digitization in agriculture sector. The purpose of this study is to understand what are the main factors that result in a large gap between stated goals at the policy formulation stage and their actual implementation of digital policy in agriculture sector.

Procedures.

The study will be held via semi-structured interviews of the relevant parties, including but not limited to the owners of the farms, public managers and researchers from the research institutes involved in the policy implementation. The interviews will take circa 60 minutes.

The following questions are formulated to conduct semi-structured interviews:

- What is your understanding the term Smart farming or Digital policy in agriculture sector?
- What are challenges and opportunities do farmers and public officials face at implementation of smart farming and digital policy in agriculture sector of Kazakhstan?
- What are risks and benefits do farmers and public officials face at implementation of smart farming and digital policy in agriculture sector of Kazakhstan?
- What future actions are required from farmers and public officials to proceed with implementation of smart farming and digital policy in agriculture sector of Kazakhstan?

R**isks.**

Potential risks of participating in this study are:

Risk of breach of confidentiality. The risk is mitigated that all names in the interviews will be codified in the documentation with no opportunity for third party to de-codify.

You do not need to answer questions that you do not want to answer or that make you feel uncomfortable. And you can withdraw (stop taking part) at any time.

Benefits.

It is unlikely that there will be direct benefits to you, however, by better understanding public policy researchers and others may be able to get following benefits.

- Benefits to Nazarbayev University is to raise the scientific contribution in the development of public policy as well as awareness of the public involved in agriculture sector on importance of digital solutions in the economic diversification.
- Benefits to Science is to contribution to development of public policy implementation theory via empirical study of developing countries as Kazakhstan.

- Firstly, the benefit to the participants is to raise awareness of importance of the digitization solutions in agriculture sector. Secondly, the benefit to the participants is to address the issue how can public managers (street-level bureaucrats and central government authorities) operate to improve their public services, to improve implementation deficit in digital policy.

Compensation. No tangible compensation will be given. A copy of the research results will be available at the conclusion of the study via electronic request from research via email sandugash.beisenbekova@nu.edu.kz.

Confidentiality & Privacy.

I will keep the information you tell me during the interview confidential. Information I put in my study that could identify you will not be published or shared beyond the research team unless we have your permission. Any data from this research which will be shared or published will be the combined data of all participants. That means it will be reported for the whole group not for individual persons.

Any information that is obtained during this study will be kept confidential to the full extent possible. All efforts, within reason, will be made to keep your personal information in your research record confidential.

Copies and originals of written or audio records with identified data will be destroyed after codifying. Codified records and interview data will be stored in the desktop as well as in hard copy by the researcher. Copy of the dissertation in electronic form and hard copy will be stored at PhD database of Nazarbayev University.

Voluntary Nature of the Study.

- Your participation in this study is voluntary.
- You can decide to stop at any time, even part-way through the questionnaire for whatever reason.
- If you decide to stop participating, there will be no consequences to you.
- If you decide to stop we will ask you how you would like us to handle the data collected up to that point.
- This could include returning it to you, or destroying it or using the data collected up to that point.
- If you do not want to answer some of the questions you do not have to, but you can still be in the study.

Points of Contact.

It is understood that should any questions or comments arise regarding this project, or a research related injury is received, the researcher, Sandugash Beisenbekova, +7 701 550 1156, sandugash.beisenbekova@nu.edu.kz should be contacted. Any other questions or concerns may be addressed to the Institutional Research Ethics Committee of GSPP at Nazarbayev University, gspp_irec@nu.edu.kz.

Statement of Consent.

I,_____,
Give my voluntary consent to participate in this study.
The researchers clearly explained to me the background information and objectives of the study and what my participation in this study involves.

I understand that my participation in this study is voluntary. I can at any time and without giving any reasons withdraw my consent, and this will not have any negative consequences for myself .

I understand that the information collected during this study will be treated confidentially.

Signature: _____ Date: _____

Researcher:

Signed_____ Date_____

Annex 3. List of respondents of semi-structured interviews

	Name	Region	Group	Position	Time	NDA
1	Respondent	Akmola region	Science expert Social	Consultant	May 13, 2021	Na
2	Respondent	Turkistan region	Large scale Farmer Cattle	General Director	May 24,2021	Yes
3	Respondent	Turkistan region	Large scale Farmer Crop	General Director	June 1, 2021	Yes
4	Respondent	Turkistan region	Public Manager	Senior public manager	May 26,2021	Yes
5	Respondent	Turkistan region	Public Manager	Lead Public Manager	May 26,2021	Yes
6	Respondent	Turkistan region	Science Expert Crop	Head of department	June 1, 2021	Yes
7	Respondent	Turkistan region	Large scale Farmer Crop	General Director	May 27,2021	Yes
8	Respondent	Turkistan region	Large Scale Farmer Crop	Operational manager	May 27,2021	
9	Respondent	Turkistan region	Public Manager Cattle	Lead Public Manager	May, 27, 2021	Yes
10	Respondent	Turkistan region	Public Manager Crop	Public Manager	May, 27, 2021	
11	Respondent	Turkistan region	Small scale farmer Poultry	Farmer	May, 31, 2021	Yes
12	Respondent	Turkistan region	Small scale farmer Crop	Farmer	May, 31, 2021	
13	Respondent	Turkistan region	Small scale farmer Crop	Farmer	May, 31, 2021	
14	Respondent	Turkistan region	Science Expert Crop	Scientist		
15	Respondent	Akmola region	Large Scale Farmer Cattle	General director	August 13, 2021	Yes
16	Respondent	Almaty region	Science Expert Crop/Cattle	Senior manager	June 7,2021	
17	Respondent	Almaty region	Business Expert (Automation)	Managing director	June 8,2021	Yes
18	Respondent	Almaty region	Business Expert	Consultant	June 8,2021	

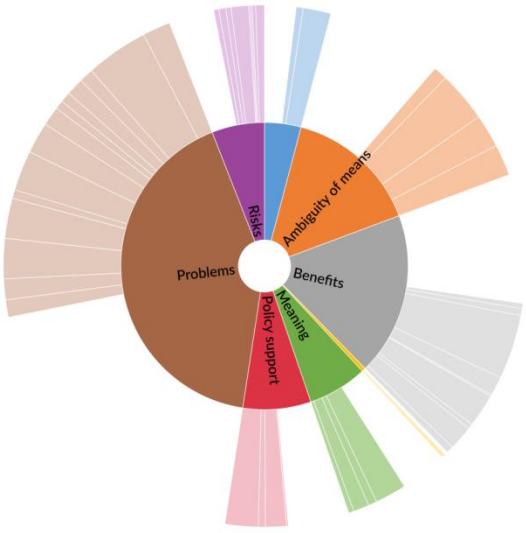
	Name	Region	Group	Position	Time	NDA
			(Consultant)			
19	Respondent	Akmola region	Business Expert	Manager	August 24, 2021	
20	Respondent	Akmola region	Public Manager Crop farming	Manager	June 9, 2021	
21	Respondent	Almaty region	Science Expert Cattle farming	Scientist	June 9, 2021	Yes
22	Respondent	Almaty region	Science Expert Cattle farming	Senior manager	June 9, 2021	
23	Respondent	Akmola region	IT company (Software)	General Director	June 24, 2021	
24	Respondent	Akmola region	Large cattle farmer	CEO	August 14, 2021	
25	Respondent	Akmola region	Public manager Crop department	Senior public manager	August 18, 2018	
26	Respondent	Akmola region	Public manager	Senior public manager	September 1, 2021	Yes
27	Respondent	Akmola region	Public Manager	Senior public manager	September 7, 2021	Yes
28	Respondent	Akmola region	Public Manager	Senior public manager	September 7, 2021	
28	Respondent	Akmola region	Public Manager	Senior public manager	September 9, 2021	Yes
29	Respondent	Akmola region	Large cattle farmer Business Expert	General Director	October 4, 2021	Yes
30	Respondent	Akmola region	Large cattle farm	Deputy to Director on scientific work	October 29, 2021	

Annex 4. Thematic and Content Analyssis

The dissertation thesis uses qualitative coding in Nvivo software using the deductive and inductive approaches to analyze the 30 semi-structured interviews. The thematic analysis and content analysis uncovered eight main discussion themes based on the interview transcripts, as provided in the Hierarchy Chart below. The analysis of semi-structured interviews is based on the conceptual framework provided in Chapter 3, covering Matland's model and the policy capacity concepts to address the dissertation's main research questions.

During content and thematic analysis of semi-structured interviews, public managers were categorized into two groups "decision-makers" or "central government authorities" as well as "street-level bureaucrats" or "regional public managers."Farmers were categorized into two groups large-scale and small-scale farmers. Respondents were also categorized into regions – Turkistan and Akmola oblast regions.

Figure 1. Hierarchy Chart on thematic and content analysis



Name	Files	References
Problems	26	180
Benefits	26	74
Ambiguity of means	18	67
Policy support	14	35
Meaning	18	27
Risks	14	26
Ambiguity of goals	9	18
Digital policy Implementation	2	2

The research revealed that respondents mostly reflected widely on themes of problems (180 references) in the agriculture sector and themes on benefits (74 references) of digital policy in particular. Namely, 26 respondents in semi-structured interviews reflected on themes of problems and benefits. Eighteen respondents reflected themes on the Meaning of digital policy and ambiguity of means. Interestingly 14 respondents covered the theme of risks during interviews. On the other hand, the ambiguity of the goals theme was reflected only by nine respondents out of 30 respondents. The higher number of references related to the perception of the key stakeholders on general problems compared to themes on Meaning and ambiguity of goals implies that key stakeholders are more likely to have more ambiguity in understanding and acknowledging digital policy or its priority in their daily operation.

Analysis of the themes and nodes in this Annex are provided in the following order based on theoretical assumptions provided in chapter 3 on the theoretical framework and the frequency of the references.

Table 1. Themes and Research Questions

	Theme	**Sub-Research Question**
1	Meaning	What were the roles of key stakeholders in the implementation process?
2	Ambiguity of goals	What were the roles of key stakeholders in the implementation process?
3	Ambiguity of means	How do key stakeholders describe their decision to implement or not implement digital policy?
4	Benefits	How do key stakeholders describe their decision to implement or not implement digital policy?
5	Problems	How do key stakeholders describe their decision to implement or not implement digital policy?
6	Risks	How do key stakeholders describe their decision to implement or not implement digital policy?
7	Policy support	How do key stakeholders describe their decision to implement or not implement digital policy?
8	Digital policy implementation	Has digital policy failed?

The themes on the Meaning of digital policy (further referred to as "meaning") and ambiguity of goals are generated with the purpose to address the sub-research question "what is the role of key stakeholders in the implementation process."

During the analysis, the discussion of the Meaning of digital policy, digitalization, and its components is used by the researcher as a start point for the analysis of the perception of key stakeholders on digital policy implementation and to explore key stakeholders' role in its implementation. Namely, dissertation research was targeted to explore if the Meaning of digital policy is clear for key stakeholders. The clarity in the Meaning of digital policy, its goals, and meanings imply that each stakeholder understands their role in implementing digital policy. The research revealed that key stakeholders have a diverse understanding of digital policy meaning and goals across regions and stakeholders. The diverse perception of meanings is supported by the findings of the document analysis provided in the document analysis section in chapter 4 on Methodology. Namely, comparing the findings of document analysis and thematic analysis revealed that different regions have a different track record of criteria for the performance of digital policy implementation, and there is no coherent approach to digital policy across the country.

Using the deductive method approach, the researcher distilled the main arguments of respondents related to the ambiguity of goals and the means related to the policy implementation general in the agriculture sector and digital policy implementation based on Matland's model details, which are discussed later in this Annex.

The themes of "policy support," "problems," "benefits," and "risks" are generated to address the sub-research question "how do key stakeholders describe their decision to implement or not to implement the policy ."Following arguments of scholarship on Matland's model, the “policy support” theme was discussed to explore the type of policy support from the government in digital policy implementation is perceived by the key- stakeholders.

The thematic analysis also envisages a “digital policy implementation” theme to assess how the respondents perceive the performance of the digital policy implementation. Interestingly, only two respondents reflected on their assessment of digital policy implementation: one respondent considered it a success, and the second respondent considered it an implementation deficit. Namely, one public manager considered the policy implementation a success, while an agriculture sector expert considered the policy implementation a failure.

Given the importance of context in the contentious policies as discussed in chapter 3 **on Theoretical Framework**, the research explored in details problems related to the agriculture sector in general and the risks related to the implementation of digital policy in particular to explore barriers that withhold decision of key stakeholders to implement digital policy.

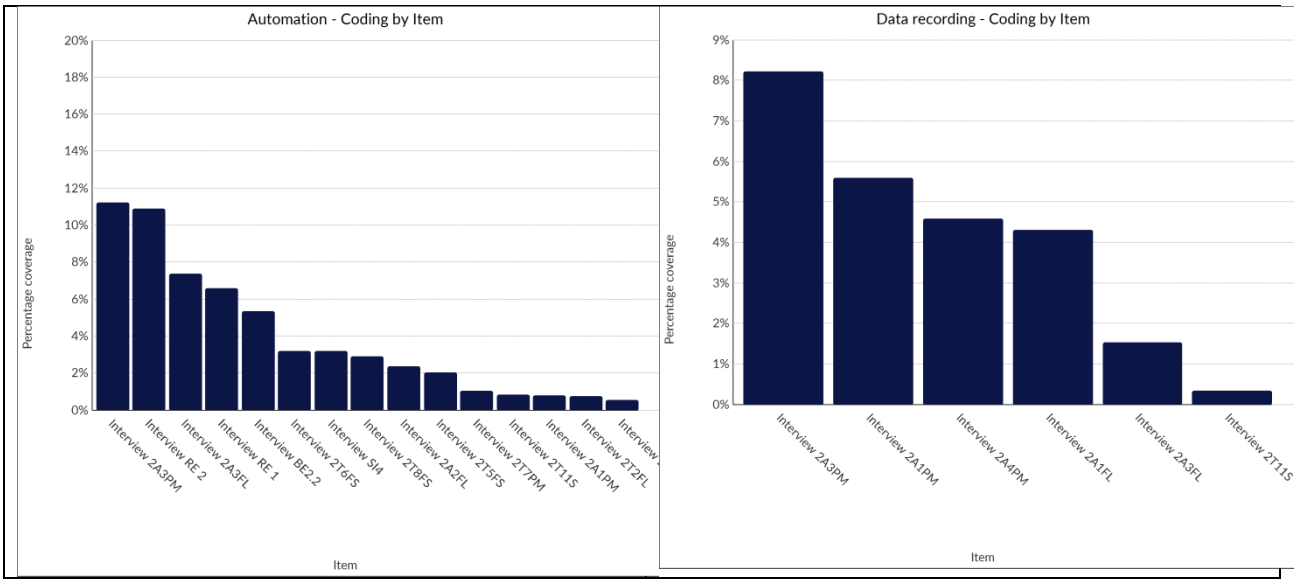
Table 2. The theme on the Meaning of Digital policy and components of digitalization

Theme	Files	References
Meaning	**18**	**27**
Automation	15	18
Data recording	6	9
Business process optimization	5	5
Precision farming	3	3

The theme of Meaning relates to key stakeholders' perception of the Meaning of the key components of digital policy. This theme was analyzed to uncover sub-research questions on key-stakeholders role in digital policy implementation. According to Matland, low ambiguity in goals leads to successful policy implementation. Hence it is essential to uncover that key stakeholders have a clear understanding of the goals of digital policy in terms of the Meaning of the policy itself and the role of key stakeholders. The interview respondents' understanding of the Meaning of digital policy mostly concentrates on automation, data recording, business process optimization, and precision farming.

Based on the number of references (27) and the number of respondents' (18) reflected, respondents, perceive automation as one of the key elements of digital policy implementation. The document analysis of digital policy supports this perception.

The data recording node relates to key stakeholders' perception of digitalization data collection and processing components. The research distilled the data recording node as a separate node which was not reflected in the automation theme, and revealed 6 references. Interestingly, the data recording node was reflected mostly by respondents from the Akmola region and one scientist in the Turkistan region. This can be explained or speculated by the dominance of the large-scale farmers in the Akmola region and the need for monitoring land issues via digital solutions.



The business process optimization node (5 respondents) and the **node on precision farming** (3 respondents) were not reflected by a larger number of respondents.

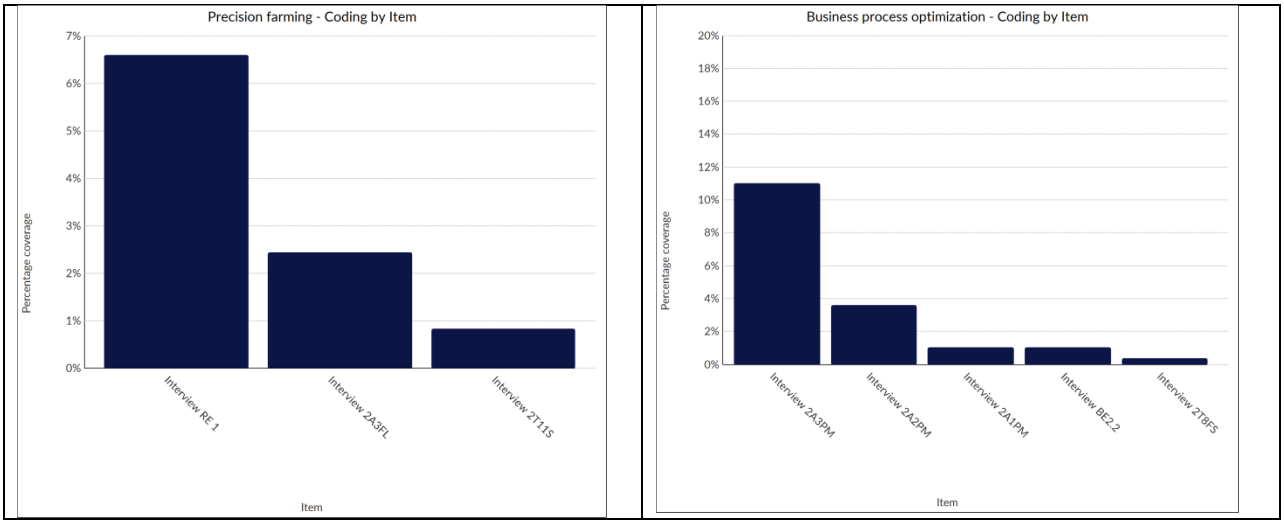


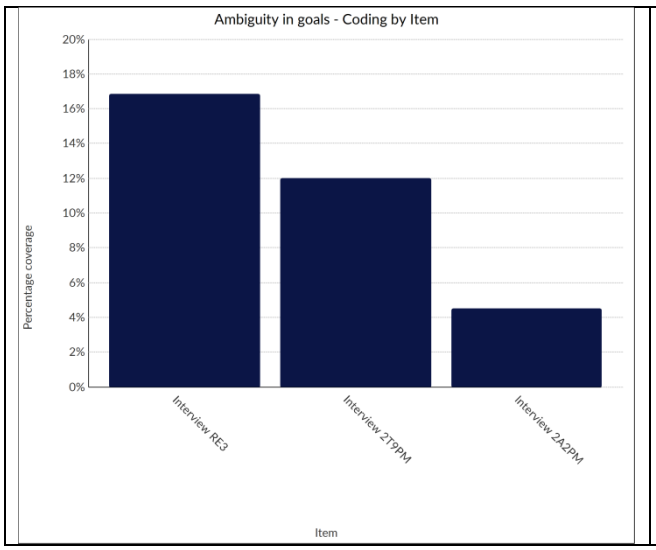
Table 3. The theme of Ambiguity goals

Theme	Files	References

Ambiguity of goals	9	18
Ambiguity in goals		4
Ambiguity in reporting	9	16

9 or less than 30% of total respondents reflected on the theme of the ambiguity of goals. The ambiguity of the goals theme was divided into two sub-sections. The first part of the theme is related to the ambiguity of the policy goals. The second part of this theme is related to respondents' perception in terms of tracking the performance of policy goals. Only three respondents, including two public managers and one business expert, reflected on their perception of the clarity of digital policy goals in particular and public policy goals in the agriculture sector. This reflects that majority of farmers are not aware about the digital policy.

On the other hand, 9 respondents shared ambiguity in reporting digital policy performance with 16 references. Five public managers in the Turkistan region, one public manager in the Akmola region, and one public manager in the central authority reflected on the issues with tracking the goals as the goals provided are not clear or ambiguous for them. It should be noted that 2 respondents had more than 25% of coverage of this issue. Public managers of Turkistan complained that there is an issue with tracking the policy goals' performance.



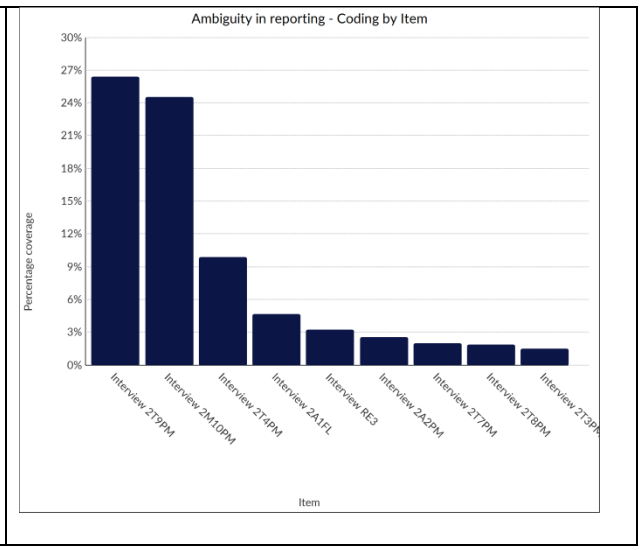
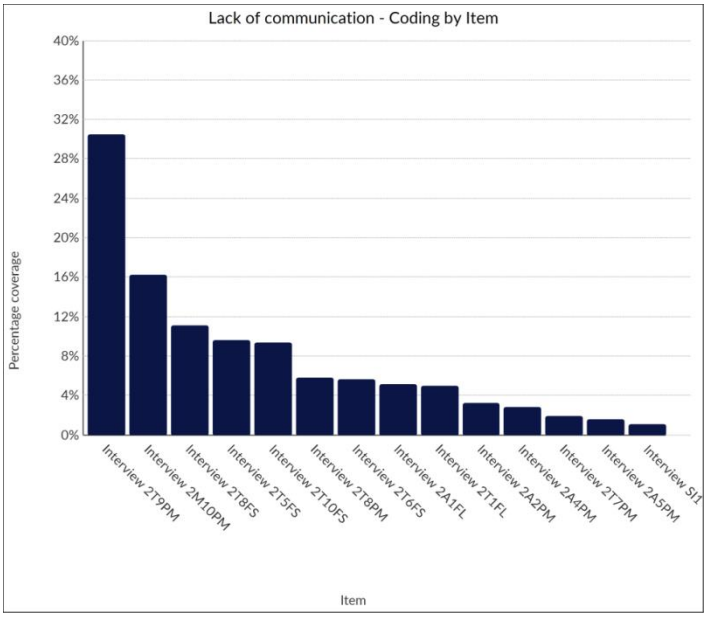


Table 4. The theme on Ambiguity of Means

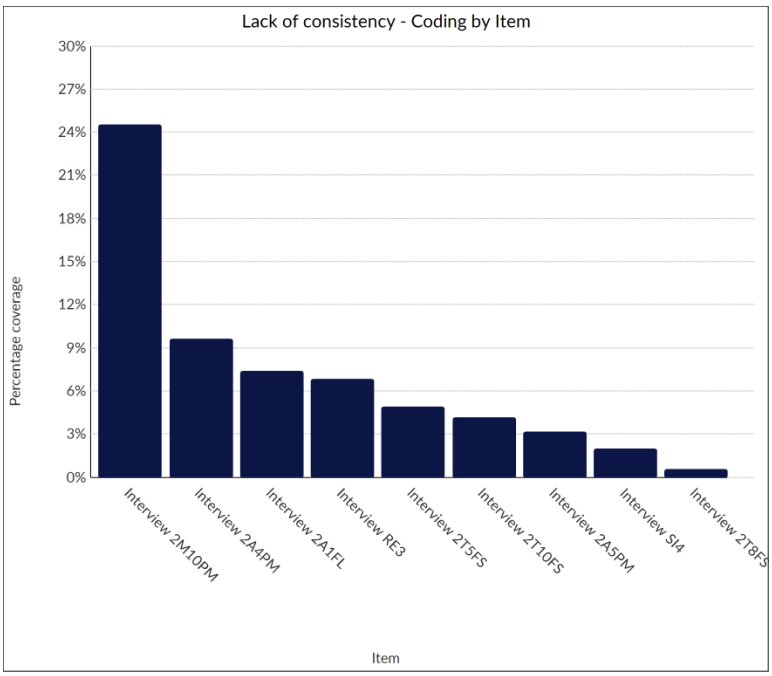
Theme	Files	References
Ambiguity of means	**18**	**67**
Lack of communication	*14*	*29*
Lack of consistency	*9*	*19*
Poor expertise of public managers	*10*	*18*

Lack of budget	*5*	*8*

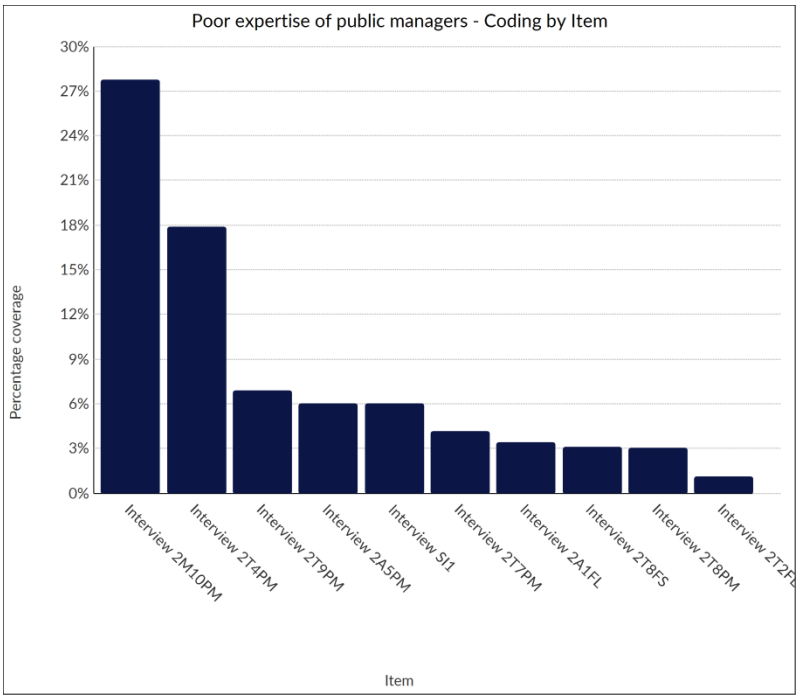
The theme of the ambiguity of means had a higher reflection of respondents than the ambiguity of goals with a total of 67 references. The ambiguity of the means theme was divided into four sub-sections. The researcher classified the ambiguity of means based on the findings of the interviews in terms of understanding of respondents of the source of ambiguity, which envisages the following nodes: (i) lack of communication, (ii) lack of consistency, (iii) poor expertise of public managers and (iv) lack of clarity in the funding sources. Nodes on lack of communication of public managers and lack of consistency of the public policies are related to reflection of respondents in general to the policies in the agriculture sector. These nodes are targeted to uncover the role of public managers, including the capacity to implement the policy in the agriculture sector. Nodes on poor expertise of public managers and lack of clarity in the funding sources are related to the reflection of respondents on digital policy implementation in particular.



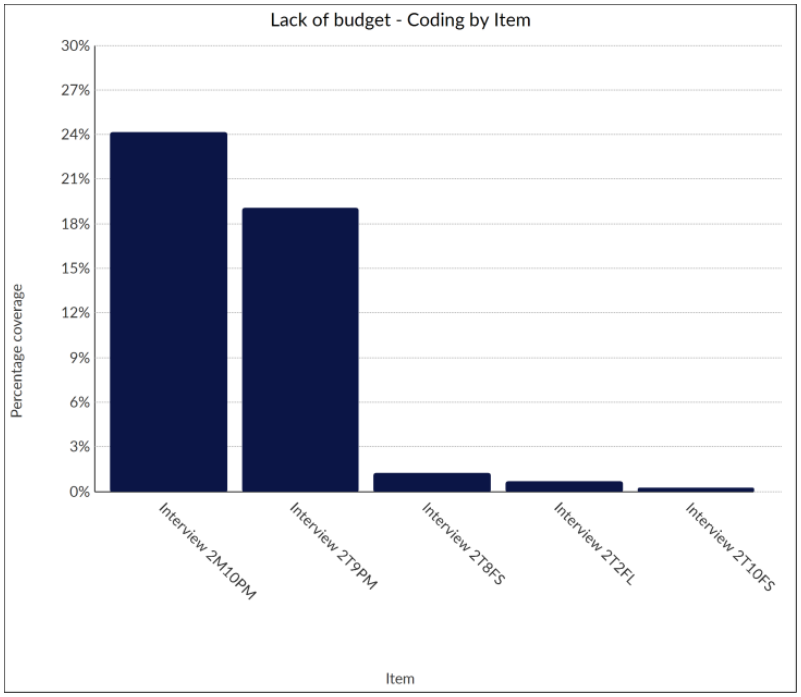
The node on lack of communication relates to key stakeholders' perception of how public managers can build up a relationship with key stakeholders in terms of communication, dissemination of the information on digital policy, provision of support, and increasing the capacity of farmers in the agriculture sector. Almost half of the respondents highlighted the lack of communication of public managers, higher than other ambiguities of 14 respondents. Interestingly enough, respondents highlight issues related to communication issues with public managers more than lack of funding issues. Most respondents, both farmers, and public managers, from the Turkistan region, lack communication with public managers. The highest coverage of the communication issues was discussed by a public manager, which envisaged 28% of the interview coverage. The lack of communication is also reflected in the analysis and findings of the participant observation provided in Annex 5.



The node on lack of consistency relates to the perception of key stakeholders on what extent the existing public policies in the agriculture sector are consistent and have a positive or negative impact on digital policy implementation. The analysis of the interviews revealed that most respondents find public policies in agriculture inconsistent and have adverse effects on digital policy implementation and the use of means for implementation. Lack of consistency as a matter of ambiguity of means is reflected by 9 respondents of both regions evenly with 19 references.



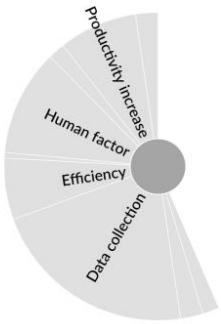
The node on Poor expertise of public managers relates to the perception of key stakeholders on what extent public managers in the agriculture sector are knowledgeable and capable of providing public support to key stakeholders in digital policy implementation. This theme reflects the capacity-building concept discussed in chapter 3 on a theoretical framework. 10 respondents reflect poor expertise of public managers as a matter of ambiguity of means in 19 references. Most of the references come from respondents from the Turkistan region, with only 2 respondents from the Akmola Region. Interestingly the highest coverage of the issues with 27% is related to public managers from the central apparatus, reflecting a more critical position of decision-makers. One-third of respondents were able to reflect and assess public managers' capacity to provide public services. This ratio might also highlight an inclination to the apolitical position of respondents towards public policy in Kazakhstan or fear of having potential repressive consequences of the interview. Comparing two regions, respondents from the Turkistan region are more critical in terms of the expertise of the public managers.



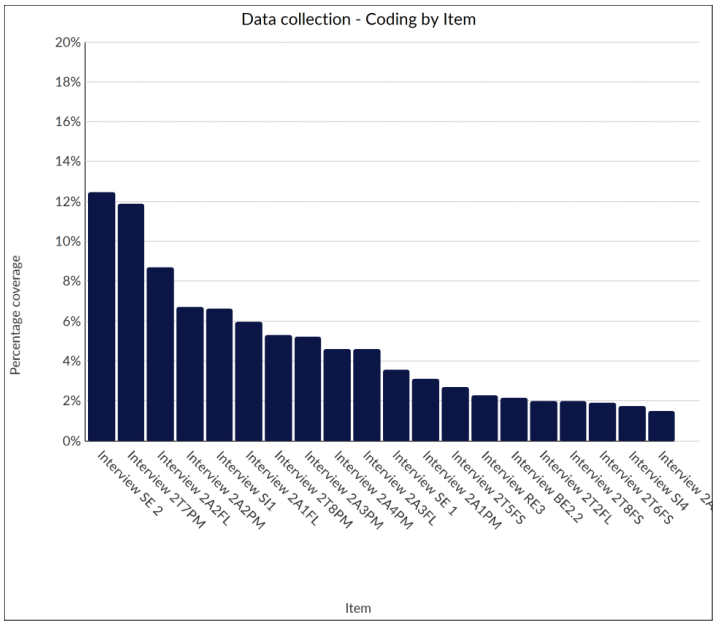
The node on lack of budget relates to the perception of key stakeholders on what extent key stakeholders responsible for the implementation of digital policy in the agriculture sector have budget funds provided by the government. Lack of budget as a matter of ambiguity of means is reflected by only five respondents, mainly from the Turkistan region and one public manager from the central authority. The highest coverage of the lack of budget issues was discussed by the public manager from the central authority, who devoted 24% of his discussion to this issue. Comparing the two regions, respondents from the Turkistan region are more critical in terms of the expertise of the public managers.

Table 5. The theme on Benefits of Digital policy and digitalization

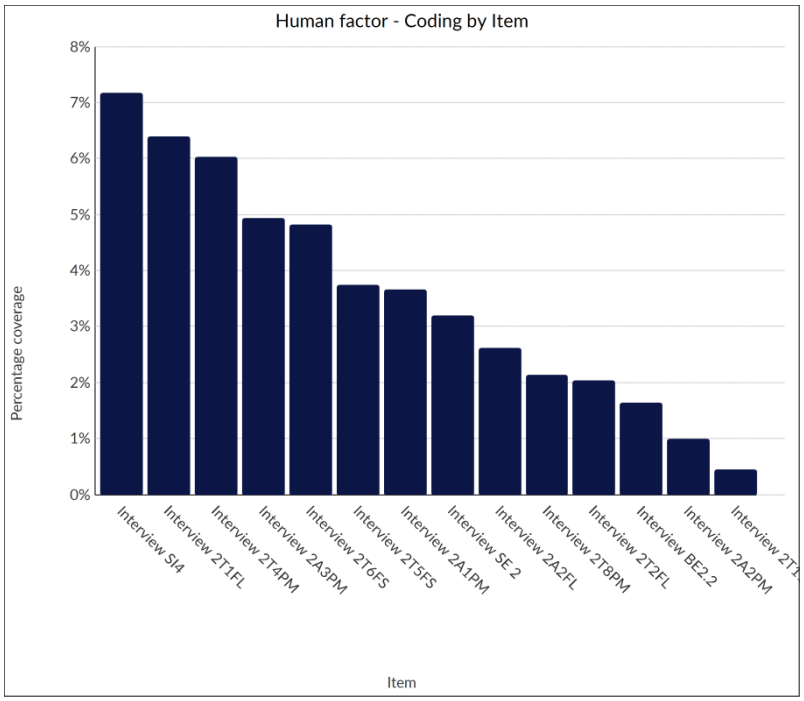
Theme	Files	Refs
Benefits of Digital policy	**26**	**74**
Data collection	22	37
Human factor	14	19
Productivity increase	7	14
Efficiency	8	11
Communication	3	4
Subsidy allocation	4	4
Big data	3	3
Planning and forecast	3	3
Food security	1	1



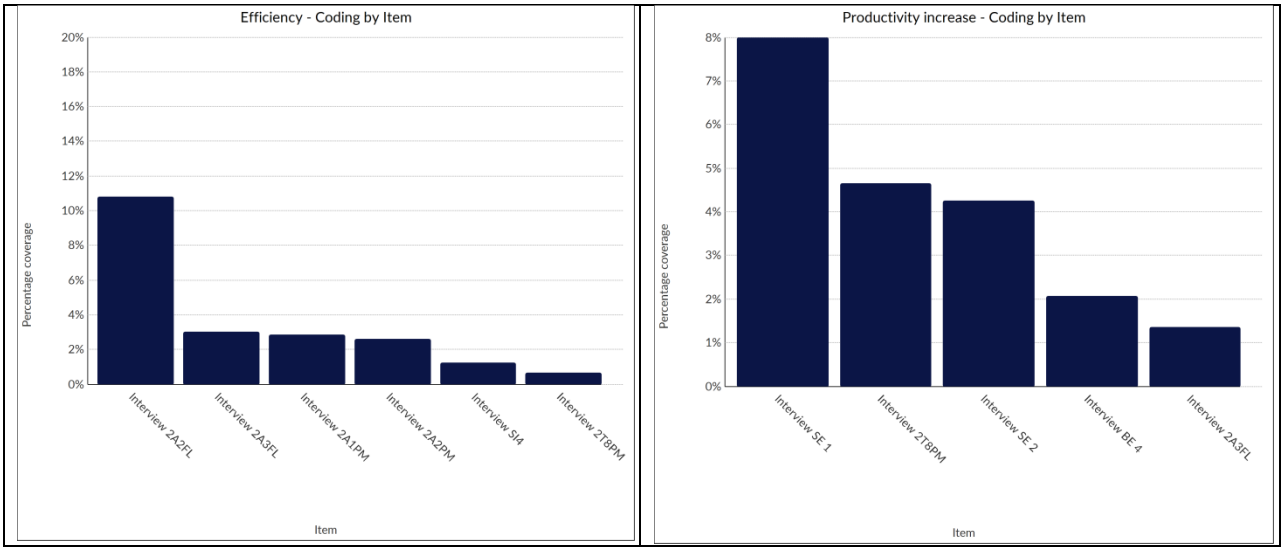
The theme of benefits was analyzed to uncover the research question on the role of key stakeholders in digital policy implementation. It is essential to uncover to what extent key stakeholders have a clear understanding of benefits related to digital policy, which might spur them to implement or impact their willingness to implement digital policy.



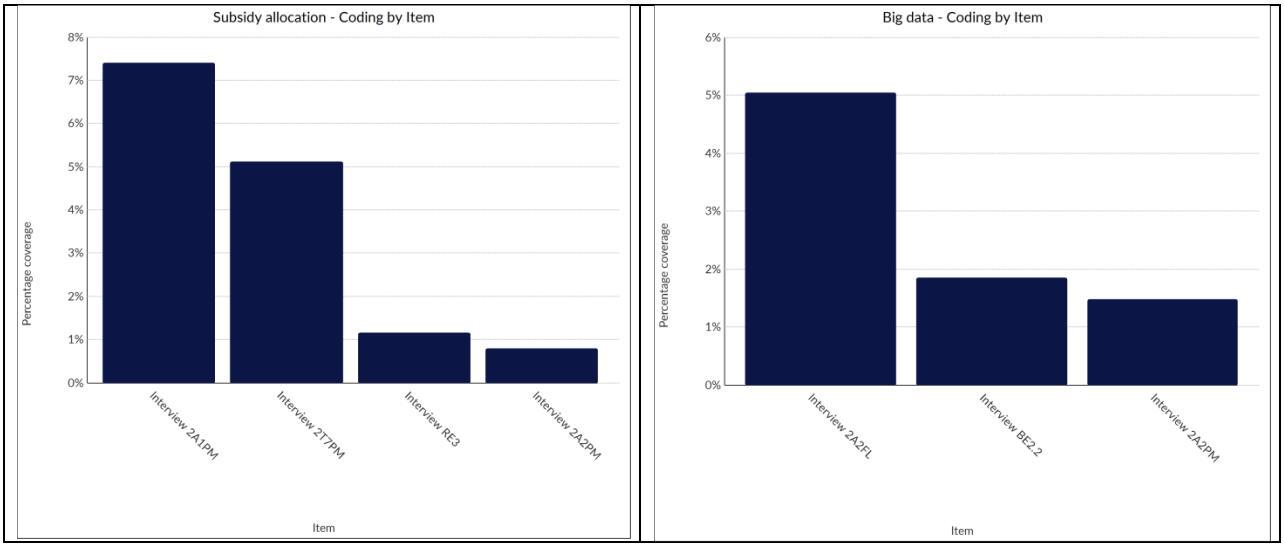
Node on the Benefit of digital policy in data collection was highlighted by 37 references from 22 out of 30 respondents, including public managers and farmers in both regions. The reference coverage was highest at 12% and lowest at 1%. Comparing two regions, number of respondents from both regions reflected evenly about benefits.



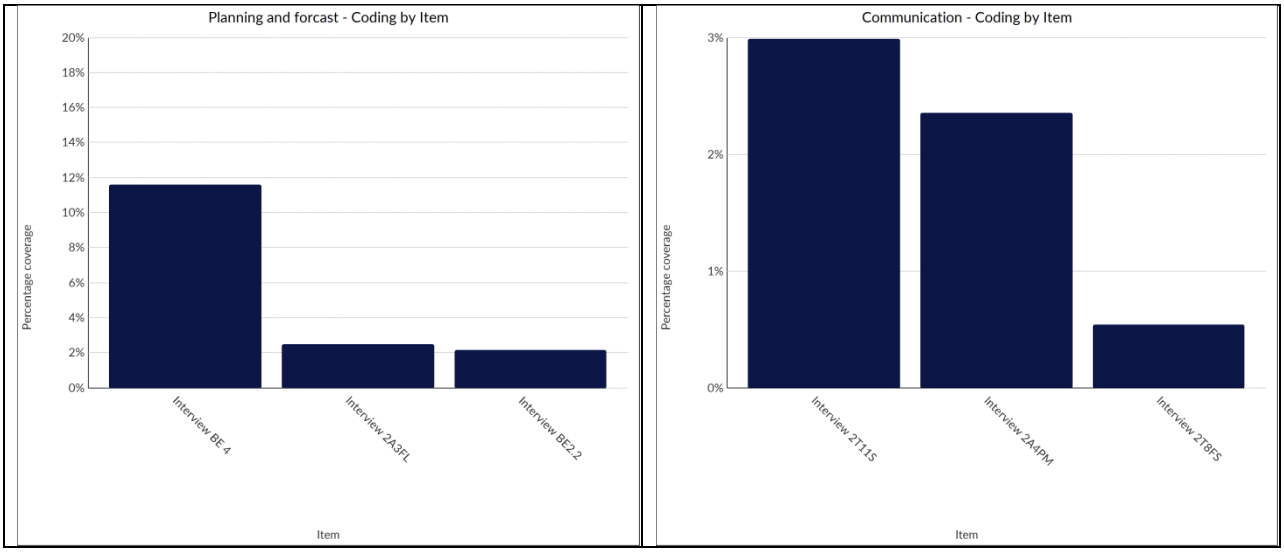
The human factor node was discussed in 20 references by 14 respondents, with the highest coverage of 7% of the respondent from the business expert. Interestingly, most references come from public managers, followed by large-scale farmers. Two small-scale farmers indicated that the human factor is essential in preventing fraud. Interestingly, comparing two regions, respondents from the Turkistan region are more critical in terms of human factor issues in the sector. Namely, they consider the digital solutions to address the human factor issues as theft or lack of labor.



Productivity increase node as the Benefit from the digital policy was mentioned 9 times by 5 respondents by mostly sector experts, one large scale farm in Akmola region, and one public manager. On the other hand, 6 respondents referenced 8 times efficiency as the main Benefit. Most respondents included respondents from the Akmola region with 2 large-scale farms and 2 public managers. Respondents referred to cost optimization and efficient use of the resources without indicating that it would result in productivity. This refers to the free-rider mentality rather than productivity or profit increase, ensuring food security as the digital policy proposes. Comparing two regions, respondents from the Akmola region are more aware about benefits of the digital policy.



Interestingly, the Benefit of digital policy in subsidy allocation was mentioned only by public managers. This reference implies that public managers use data collection as a crucial factor in promoting digital policy. Therefore the thematic analysis considers the analysis of this node with nodes on corruption and falsification of the data under the theme of problem. Interestingly, the big data was referred to only by respondents from the Akmola region, which mostly large-scale farms dominate.



Node on Planning and communication benefits of digital policy and digitalization was referenced at least 3 times. However, the planning forecast was referenced only by sector experts and large-scale farmers in the Akmola region, implying that public managers do not appreciate and acknowledge this Benefit. Communication was referenced by farmers of the small scale farmers in the Turkistan region, which referenced the power of social networks in disseminating information. However, respondents mentioned this Benefit in their interview in less than 4% of the coverage, indicating lower importance of the factor.

Table 6. The theme on Problems in the agriculture sector

	Theme	**Respondents**	**References**
No	**Problems**	**26**	**180**
1	*Skills*	17	36
2	*Corruption*	9	23
3	*Disparity*	15	23
4	*Financial constraints*	13	23
5	*Free rider mentality*	10	18
6	*Structure of the agriculture sector*	11	16
7	*Connectivity*	10	12
8	*Ignorance*	8	11
9	*Access to markets*	6	10
10	*Obsolete infrastructure*	7	10
11	*Poor Subsidy allocation*	5	8

	Theme	Respondents	References
No	**Problems**	**26**	**180**
12	*Land issue*	5	6
13	*Falsification of data*	5	5
14	*Informal institutions*	3	5

In terms of several references, respondents highly discussed the issues of lack of skills (36), followed up by corruption, disparity and financial constraints (23 each), free-rider mentality (18), the institutional structure of the agriculture sector (16), ignorance (11), poor access to internal and external markets (10), obsolete infrastructure (10), poor subsidy allocation (8), land issue(6), falsification of data (5) and role of informal institutions (5).

Based on the policy capacity concepts, 3 clusters of the nodes were grouped based on the issues related to (i) society, (ii) legal governance, and (iii) economic structure.

Schedule 2. Problems and public capacity

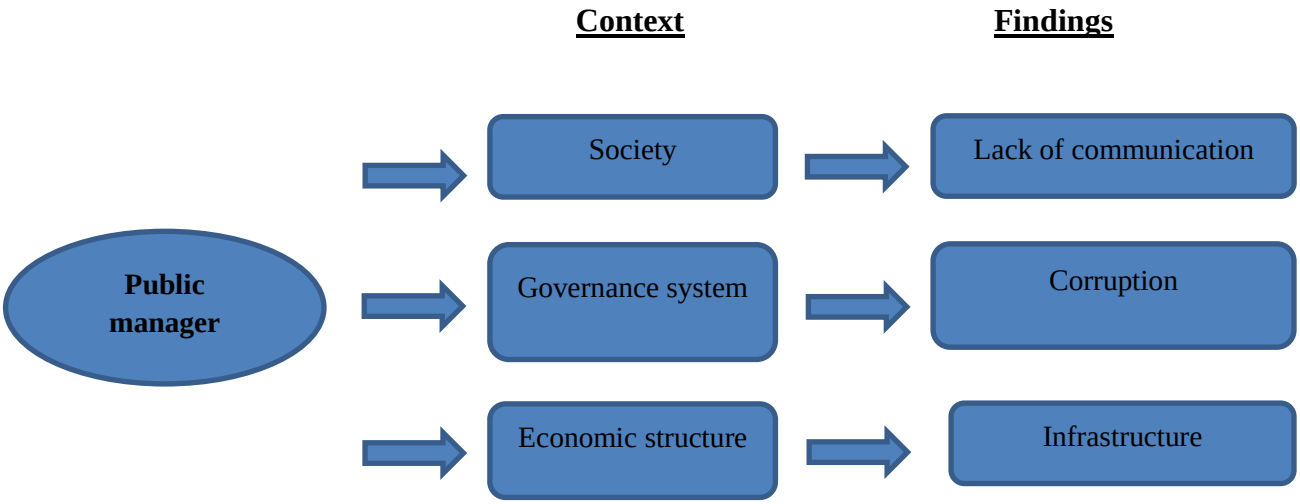
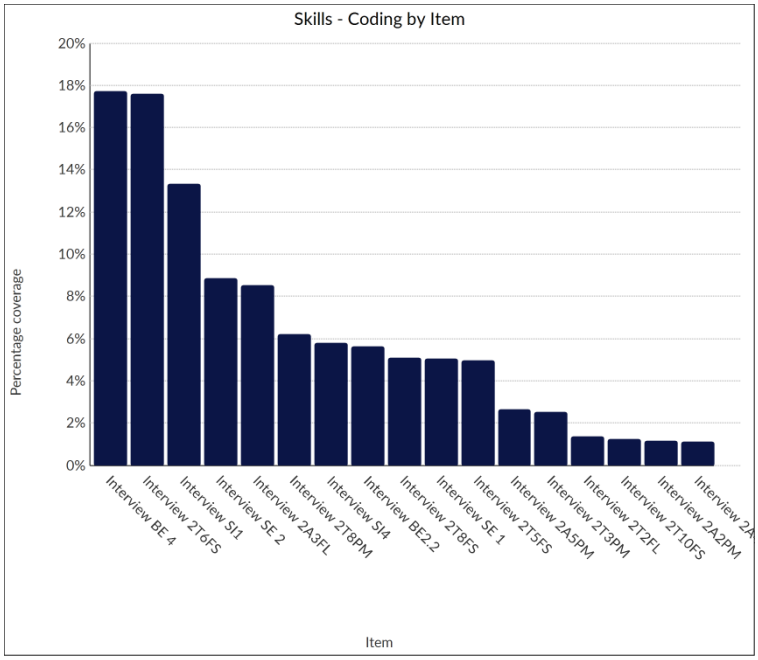


Table 7. Three clusters of problem nodes

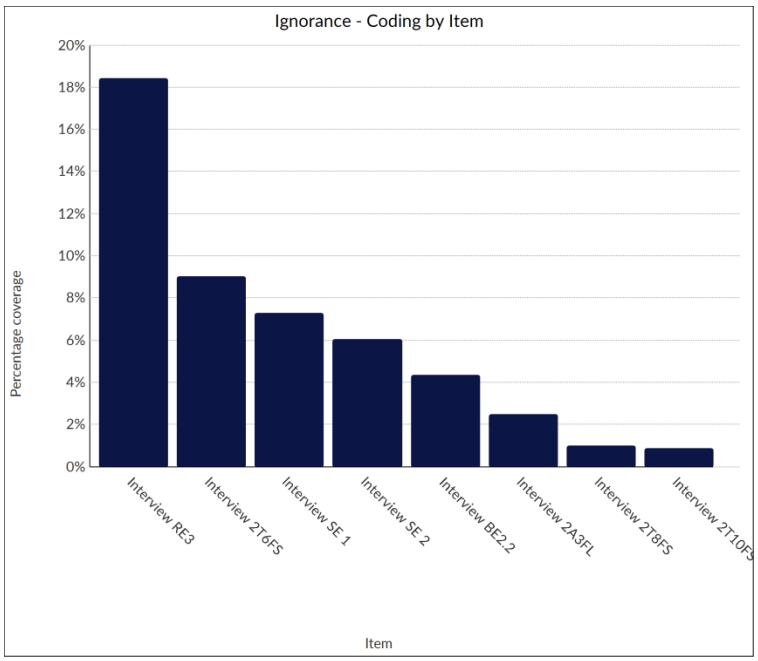
Society	Economic structure	Legal governance
Skills	Financial constraint	Institutional structure
Ignorance	Connectivity	Corruption
	Access to markets	Disparity
	Obsolete infrastructure	Free-rider mentality

	Land	Poor subsidy allocation Falsification of data Informal institutions



Skills node relates to key stakeholders' perception of the extent to which there is an issue in the lack of expertise and specialists in the agriculture sector. The skills issue is discussed by more than 60% of respondents or 17out of 30 respondents. The structure of respondents is heterogeneous, but there are only three public managers who discuss this issue. The highest coverage includes 18% from a business expert.

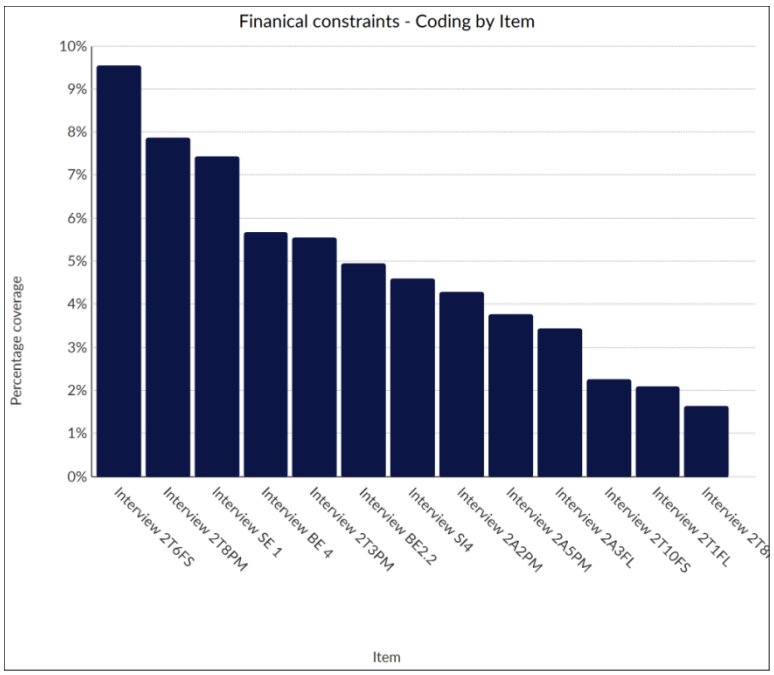
Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node under the Society cluster together with the Ignorance node.



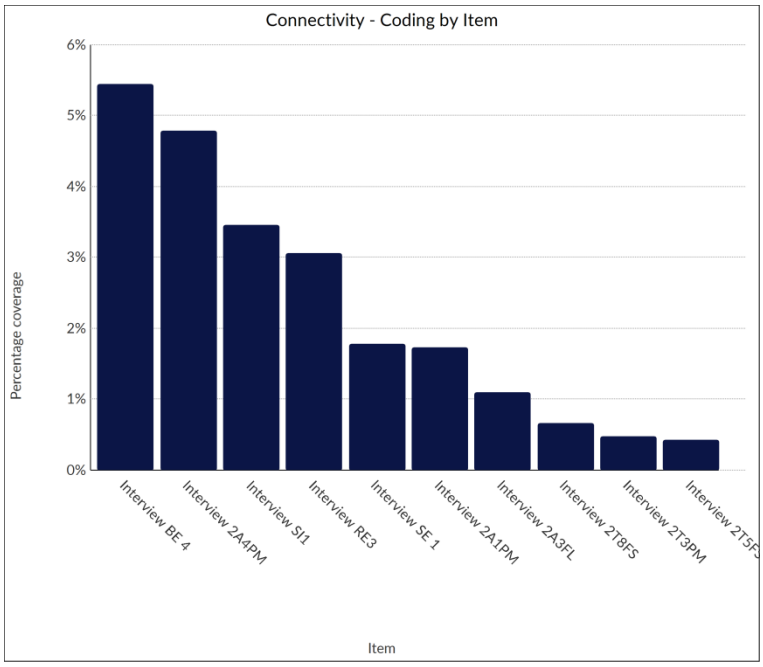
The ignorance node relates to respondents' lack of knowledge of digital policy meaning, advantages, and opportunities. Eight respondents, mostly farmers and agriculture sector experts, discussed the node, indicating that public managers are less likely to acknowledge the low level of knowledge and expertise in the agriculture sector. Respondents acknowledged that they are reluctant to implement the policy as they do not have (i) required expertise, (ii) priority, or (iii) knowledge of available support programs, technologies, and purpose of use of digital technologies.

Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the lack of a communication node.

Society	**Economic structure**	**Legal governance**
Skills	Financial constraint	Institutional structure
Ignorance	Connectivity	Corruption
	Access to markets	Disparity
	Obsolete infrastructure	Free-rider mentality
	Land	Poor subsidy allocation
		Falsification of data
		Informal institutions



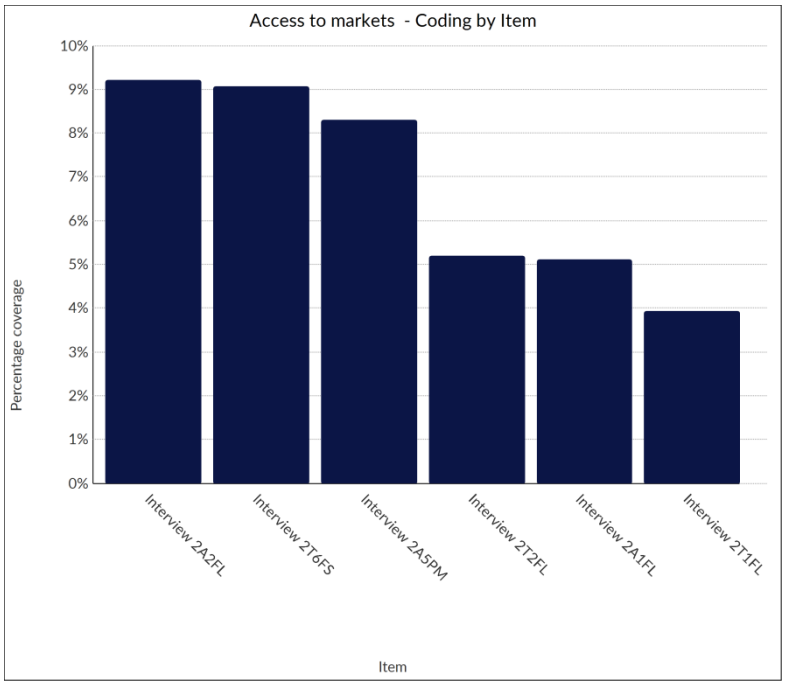
The financial constraint node relates to key stakeholders' perception of the extent to which farmers have issues with funding in the implementation of digitization. The financial constraints problem is discussed by 43 % of respondents (13 respondents) and reflects all key stakeholders in both regions - public managers and farmers, reflecting the broader issue as the institutional setup in the agriculture sector. Interestingly, stakeholders' share of the coverage during the discussion is around 9% . Comparing two regions, respondents from the Turkistan region are more critical in terms of the financial constraints.



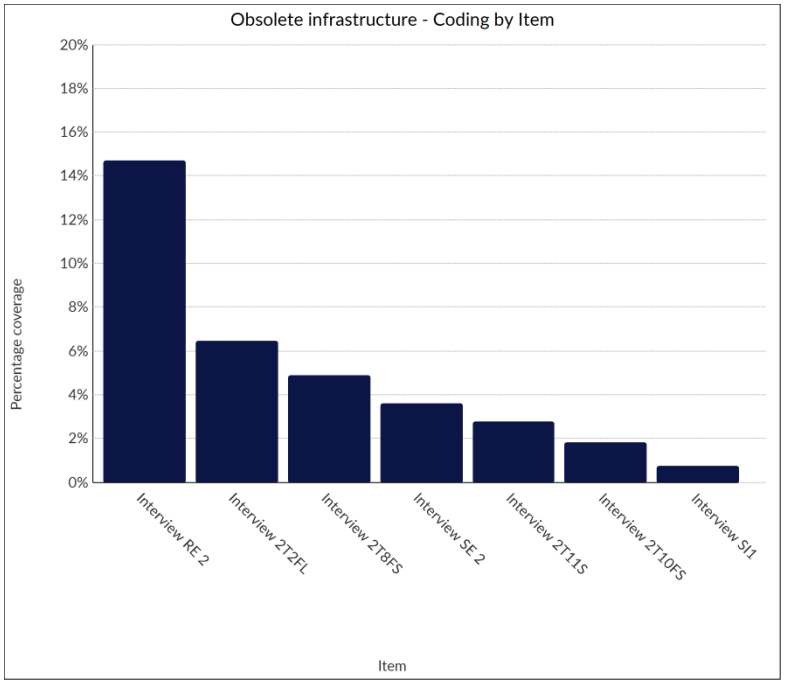
The connectivity node relates to key stakeholders to what extent key stakeholders experience issues of internet connection and communication via digital outlets. 10 respondents have discussed connectivity from all regions and public managers and farmers. Respondents

highlighted both the connectivity of the websites and the availability of the network as the key issues in the agriculture sector and barriers to digital policy implementation. This issue some respondents relate to future risks for the implementation of digital policy.

Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the institutional structure node.

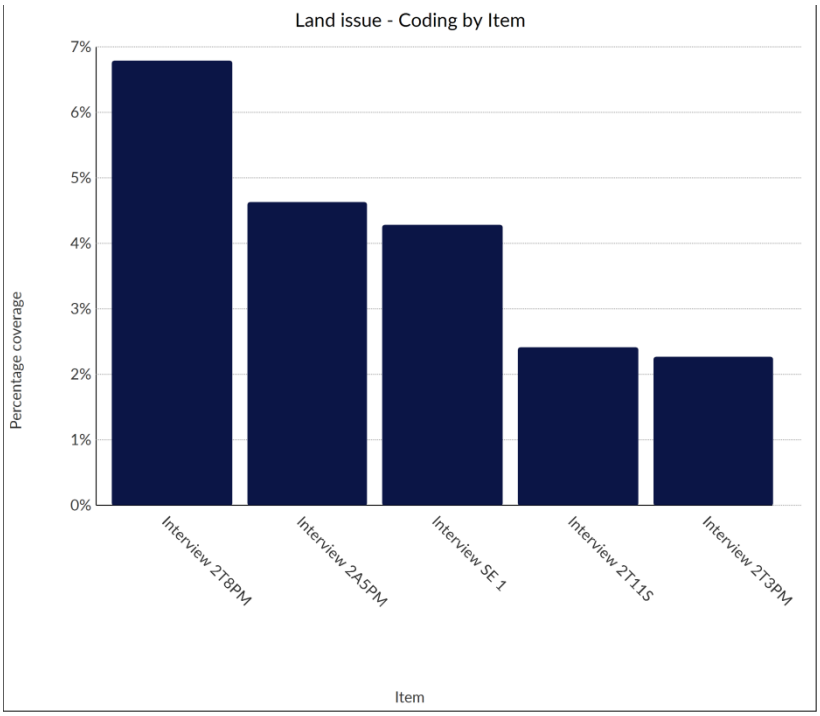


Node on Access to markets problem relates to the issues of farmers' Access to the market and their role in the supply chain. The node was discussed mostly by large-scale farmers out of 6 respondents.



Obsolete infrastructure node relates to the existing issues in the agriculture sector related to infrastructures such as water, connectivity, electricity supply, and others. The node was discussed by mostly farmers and experts as well. However, again public managers do not indicate the obsolete infrastructure as the key issue for the agriculture sector. Instead, respondents highlight water and electricity access as one of the key issues in the agriculture sector. Comparing two regions, respondents from the Turkistan region are more critical in terms of the obsolete infrastructure.

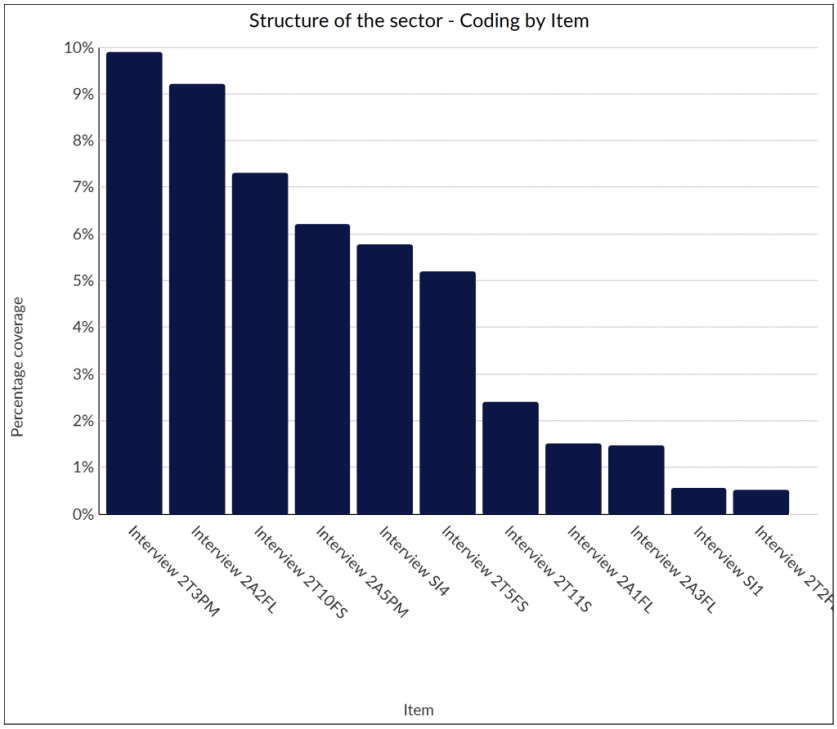
Obsolete infrastructure problems analysis indicates either (i) poor communication mechanisms of public managers to learn about the needs of farmers or (ii) unwillingness of public managers to acknowledge the importance of key infrastructure issues, undermining the function of public managers to create enabling environment in the agriculture sector. Therefore, based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the institutional infrastructure node.



Node on land issue relates to the issues on land allocation to farmers. The land issue was discussed by 5 respondents and predominantly public managers, with an average 3% of coverage in their interviews. Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the institutional infrastructure node. Comparing two regions, respondents from the Turkistan region are more critical in terms of the land availability issue.

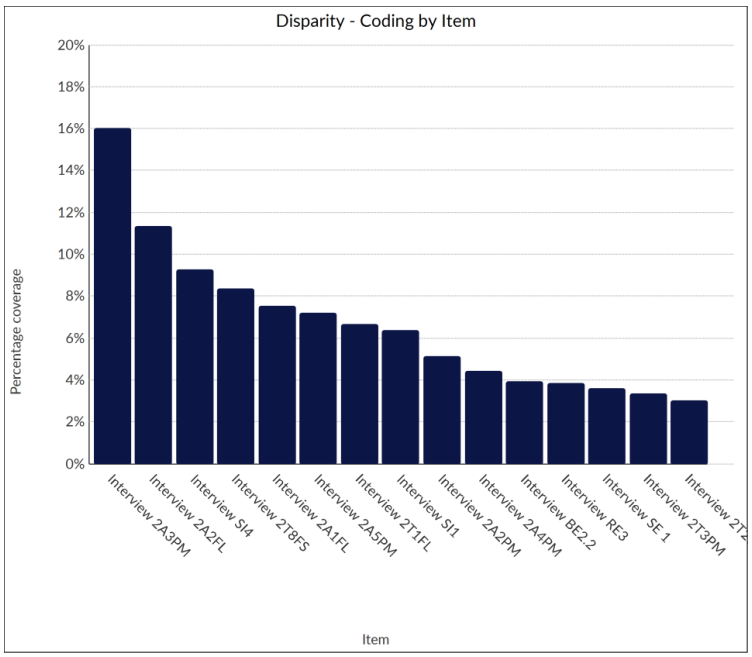
Society	Economic structure	Legal governance
Skills	Financial constraint	Institutional structure
Ignorance	Connectivity	**Corruption**
	Access to markets	Disparity

	Obsolete infrastructure Land	Free-rider mentality
		Poor subsidy allocation
		Falsification of data
		Informal institutions



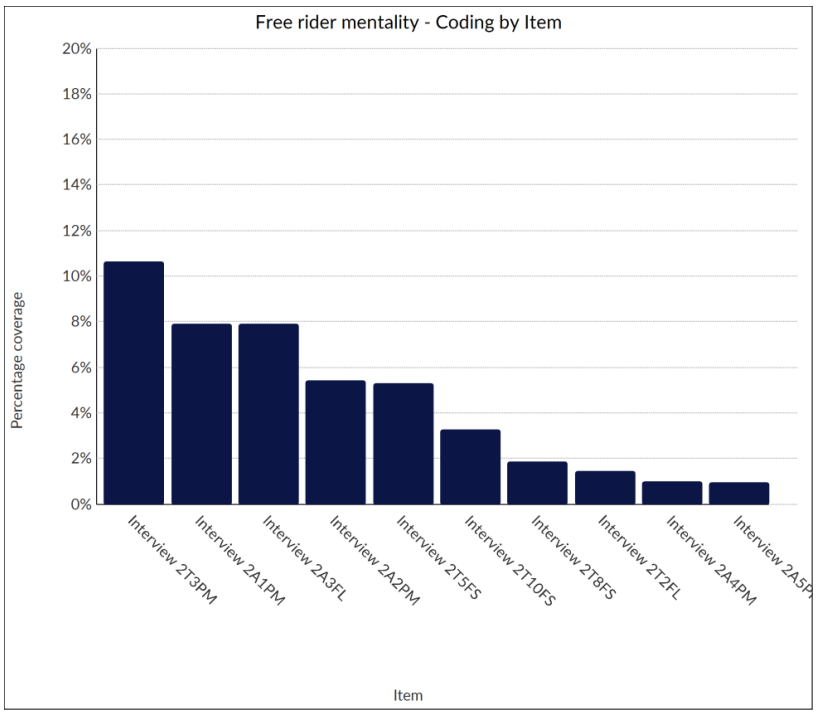
11 or almost 30% of respondents discuss the institutional structure node and reflect all key stakeholders in both regions - public managers and farmers. Interestingly, the share of the coverage by stakeholders during the discussion is around 10% indicating less importance of the issue for key stakeholders than skills and disparity. The agriculture sector's institutional structure is considered a problem by respondents in terms inability of the small farms to be incorporated into the existing structure of the agriculture sector as one of the key issues. Respondents discuss problems of the cooperatives and the policies driven by the government to increase the efficiency of the agriculture sector by uniting the small-scale farmers to compete in the market and increase agriculture sector productivity.

Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the corruption node.



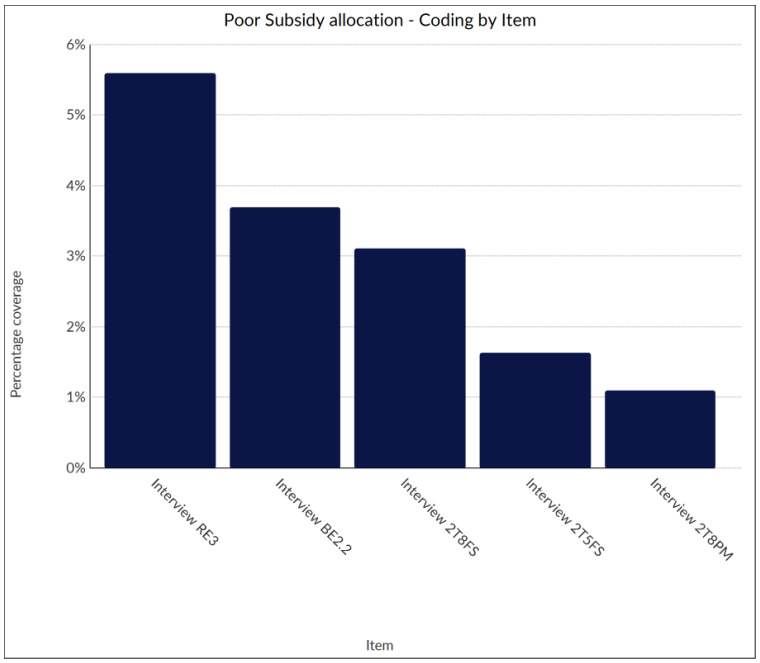
The disparity node relates to how key stakeholders perceive disparity between large-scale and small-scale farmers, the government support to address this disparity, and the need for digitization. 15 respondents, including sector experts, public managers, and farmers in both regions, discussed the disparity problem reflecting the broader issue of the institutional setup in the agriculture sector. The highest coverage includes 16% from public managers, with average coverage among respondents of around 6%. Comparing two regions, respondents from the Akmola region are more critical in terms of the disparity in the sector.

Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the Corruption node.



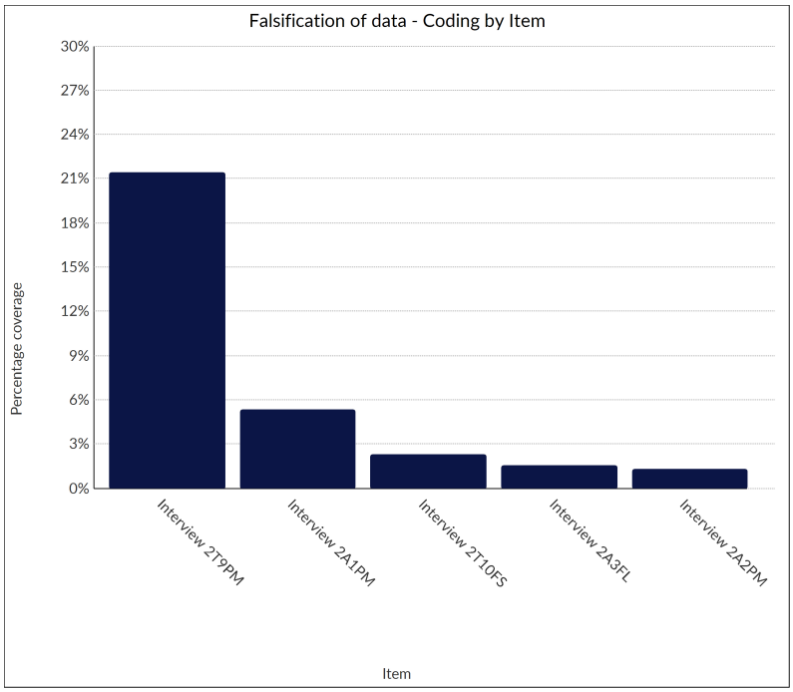
Free-rider mentality node relates to the perception of key stakeholders on what extent farmers have issues with the reliance of their decision-making on public support rather than increasing the profitability of their operation. 10 respondents have discussed the free-rider mentality issue from all regions and public managers and farmers. Comparing two regions, respondents from both regions are critical in terms of the corruption evenly.

Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the corruption node.

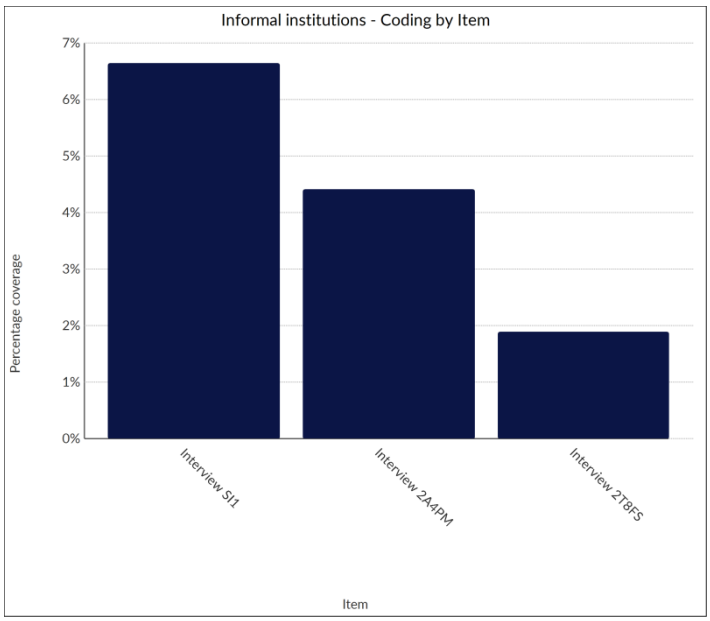


Poor subsidy allocation node relates to the issues stemming from farmers' constraints to obtain government subsidies. Node on poor subsidy allocation was discussed mostly by small-scale farmers out of five respondents from Turkistan region.

Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the corruption node as well disparity node. It should be noted that the issues related to the subsidy are mentioned as less than 5 %. However, abstract issues such as disparity and corruption were discussed by respondents in a larger share of more than 15% of coverage. This might indicate that farmers fear coercive or repressive measures from public managers in case their identity during the interview is uncovered, but not lack of importance of this issue.



Node on falsification of the data relates to the issue of the poor culture of public managers in the recording of agriculture sector performance and culture on falsification of data provided by the junior public managers to superior public managers. The issue was discussed mostly by public managers in both regions. Based on thematic analysis (with a focus on the context of digital policy), the researcher provides an analysis of this node in conjunction with the corruption node and informal institutions node. Comparing two regions, respondents from the Akmola region are more critical in terms of the falsification of the data.



The node on informal institutions relates to the role of the informal institution in the performance of the agriculture sector. The issue was highlighted by 3 respondents - one small

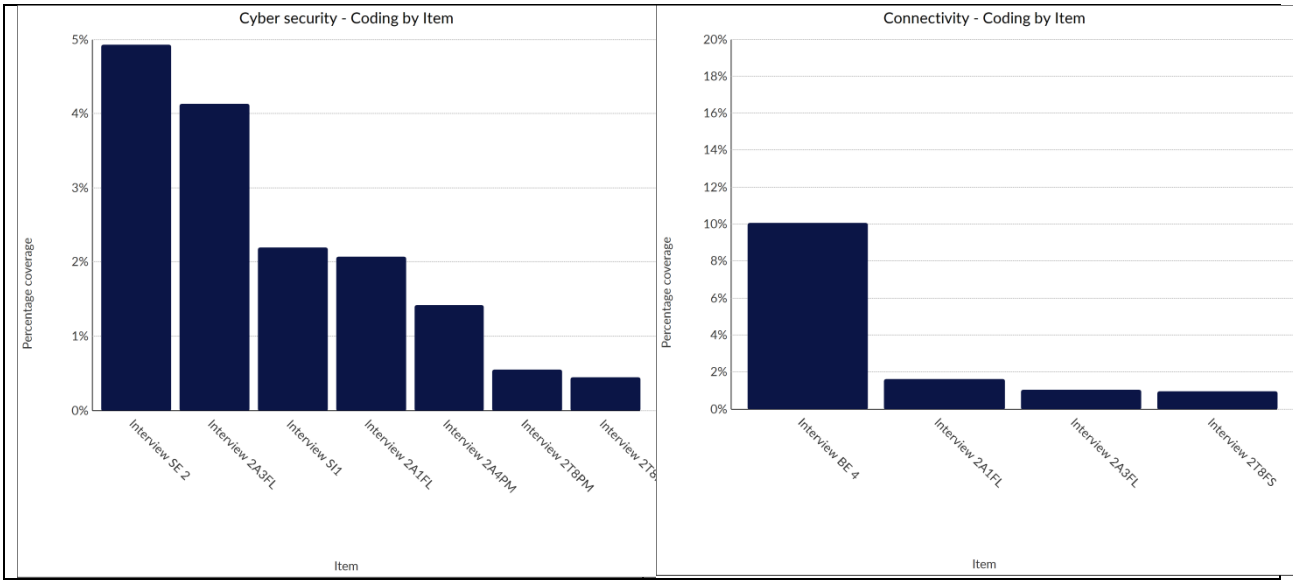
farmer in the Turkistan region, one public manager in the Akmola region, and a science expert. Based on thematic analysis (with a focus on the context of digital policy), the researcher provides analysis of this node in conjunction with the corruption node and disparity node.

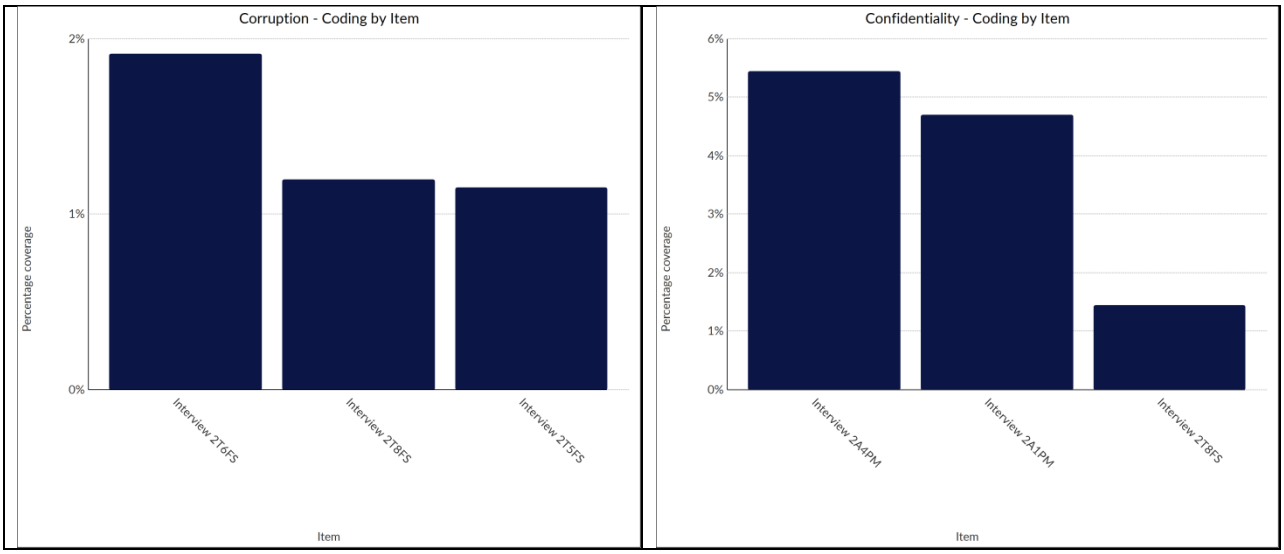
Table 7. The theme on risks related to digital policy implementation

Theme	Files	References
Risks	**14**	**26**
Cyber security	7	10
Unemployment	4	5
Connectivity	4	4
Confidentiality	3	3
Corruption	3	3
No risk	2	2
Lack of funding	1	1
Lack of skills	1	1

The theme on Risks relates to the perception of key stakeholders to what extent key stakeholders in the agriculture sector perceive risks associated with digitalization and digital policy implementation. This theme uncovers a level of impact of the risk on the willingness of key stakeholders to implement digital policy. This theme was analyzed to uncover sub-research questions on "how the stakeholders describe their decision to implement or not to implement the digital policy". Matland argues that low ambiguity in means might impact positively on policy implementation. Therefore it is essential to uncover to what extent key stakeholders have a clear understanding of the risks related to digital policy, which might prevent them from implementing or impact their willingness to implement digital policy.

The data analysis shows that only 7 respondents out of 30 respondents reflect the risks associated with digital policy implementation cyber security. Risks associated with unemployment of the rural area population, connectivity disruptions, break of confidentiality and leak of private information, corruption as nodes reflected by less than 5 respondents. Interestingly two respondents do not see any risks associated with the digital policy. It is more likely that a low reflection of respondents on the risks implies that the perceived risks do not prevent the stakeholders - farmers' willingness to implement digital policy. However, rather the unwillingness of farmers to implement digital policy is more associated with the existing problems in the agriculture sector.





The theme of Problems relates to key stakeholders' perception of how the existing problems and issues in the agriculture sector support or prevent the policy implementation. For example, does digital policy address the existing issues in the agriculture sector so that key stakeholders have a higher willingness to implement digital policy? Or do the existing problems and issues conflict with the goals of digital policy, which result in the conflict of the goals in line with Matland's model? This theme was generated to address sub-research questions on key stakeholders' perceptions of digital policy implementation. Namely, how do key stakeholders describe their decision to implement or not to implement digital policy? According to Matland, a high conflict of goals might result in a policy implementation deficit. Hence it is essential to uncover that the key existing problems stemming from higher priority goals for key stakeholders in the agriculture sector than digital policy goals.

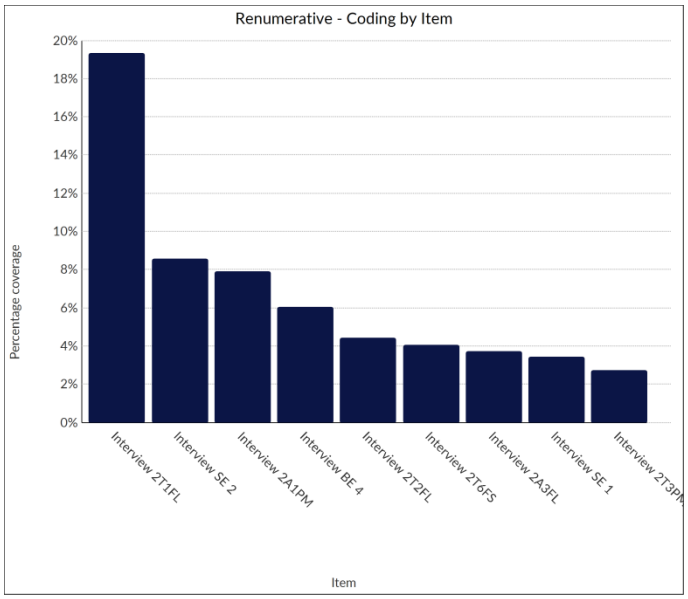
Respondents highlighted more than 14 existing problems in the agriculture sector, which might reflect the context of the operation of the agriculture sector. For example, more than 17 respondents highlighted issues as skills, 15 respondents highlighted disparity, 13 respondents highlighted financial constraints, 11 respondents highlighted the poor institutional structure of

the agriculture sector, 10 respondents highlighted free-rider mentality and connectivity, 9 respondents highlighted corruption, 8 respondents highlighted the lack of knowledge in the agriculture sector.

Table 7. The theme on policy support in the policy implementation

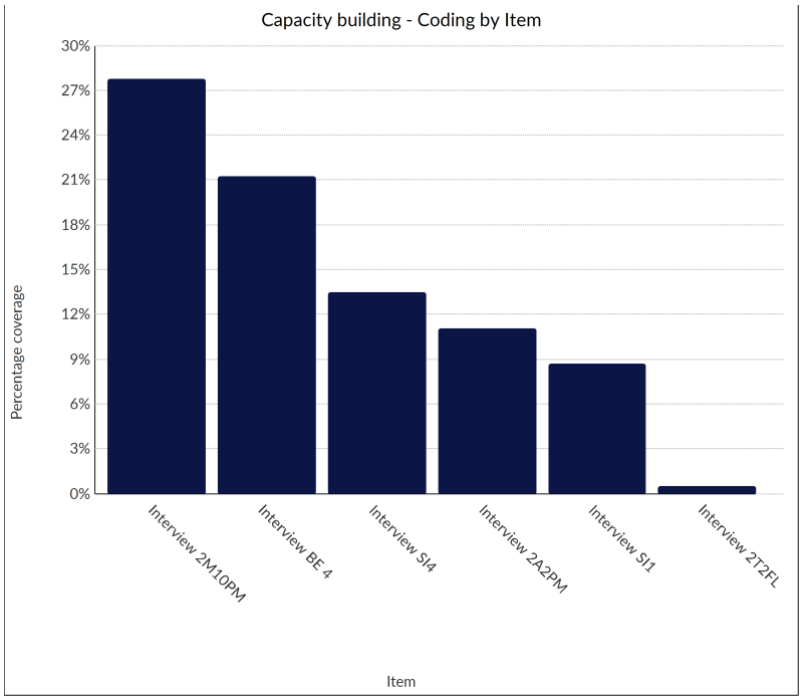
Theme	Files	References
Policy support	**14**	**35**
Remunerative	9	19
Capacity building	6	12
Coercive	2	4
Bargaining	1	1

The policy support theme consists of four sub-sections developed based on Matland's model via the deductive method. The theme addresses the sub-research question on "how key stakeholders describe their decision to implement or not to implement digital policy ."According to Matland, the public support measures envisage remunerative, coercive, and bargaining methods. Interestingly, respondents also raised the capacity building measure as key public support they would expect from the government, which lacks in the Kazakh digital policy, which is in line with implementation scholars such as Choi, and Schultz as discussed in chapter 3 on a theoretical framework. The theme uncovers the perception of key stakeholders' perception of their willingness to implement the policy and the impact of the policy support on their decisions.

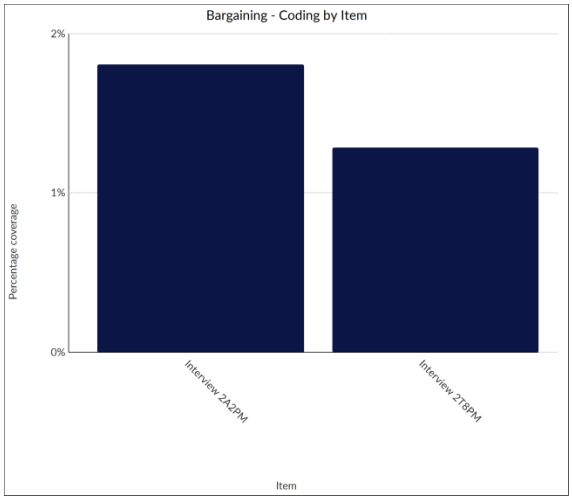


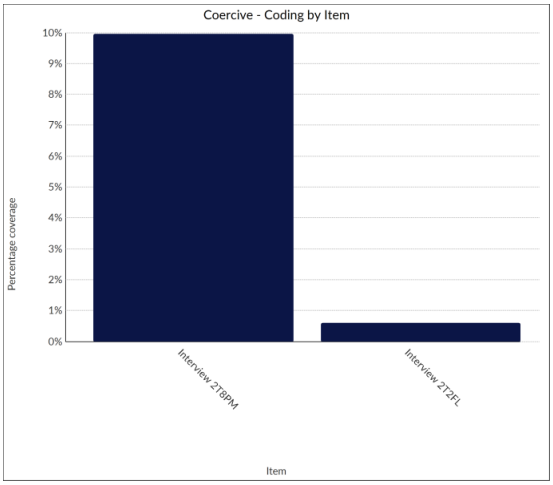
As discussed in the chapter on the theoretical framework, the node on remunerative policy support has mixed reflection from respondents - from positive support of the incentives

provided by the government to the critical view of the subsidy purpose. Respondents mostly represent the Turkistan region (7 respondents), with only 2 respondents from the Akmola region. Respondents reflecting their views include both public managers and farmers.



The node on Capacity-building relates to the perception of key stakeholders to the extent to which public managers in the agriculture sector have the willingness and available tools to increase the capacity of key stakeholders to support the policy implementation. 6 respondents reflected on capacity building. Interestingly only one public manager in the central authority and Akmola region reflected the need for capacity building as a policy support measure. Respondents reflected the policy support measures in terms of general sector development. A few were willing to comment directly on digital policy implementation either due to fear of repressive measures in case of critics or lack of experience dealing with digital policy.





Bargaining and coercive measures node are related to the Meaning provided in chapter 3 on a theoretical framework. Respondents have a limited reflection on the bargaining and coercive measures, with only two respondents reflecting on each theme. Coercive measures were

reflected by respondents in the Turkistan region, while both Akmola and Turkistan regions reflected the bargaining measures.

There is a trend toward minimal criticism and recommendations for improvement. Respondents reflected less on improving the policy support rather than on highlighting problems. Only two out of 30 respondents assessed digital policy implementation: one positively assessed as a success, the second one assessed as a failure. Therefore the researcher looked at problems respondents highlighted during interviews in the agriculture sector and how these problems influence the implementation of digital policy.

Table 1. Themes and Research Questions

	Theme	**Sub-Research Question**
1	Meaning	What were the roles of key stakeholders in the implementation process?
2	Ambiguity of goals	What were the roles of key stakeholders in the implementation process?
3	Ambiguity of means	How do key stakeholders describe their decision to implement or not implement digital policy?
4	Benefits	How do key stakeholders describe their decision to implement or not implement digital policy?
5	Problems	How do key stakeholders describe their decision to implement or not implement digital policy?
6	Risks	How do key stakeholders describe their decision to implement or not implement digital policy?
7	Policy support	How do key stakeholders describe their decision to implement or not implement digital policy?
8	Digital policy implementation	Has digital policy failed?

Annex 5. Participant observation

Participant observation aimed to understand public managers' capacity to engage key stakeholders in digital policy implementation. The dissertation research envisaged non-systematic participant observation. During this observation, the researcher uncovered the communication patterns of 14 public managers with third parties (a list of the respondents is provided in Table 1). This approach enabled the research to learn about the role of public managers in the implementation of digital policies and their perception of public managers' role via behavior and communication patterns. In addition, participation observation uncovered the specific features of public managers that indicate the effects of institutional behavior on the implementation of digital policy.

Communication

Participation observation started in December 2020 and ended in November 2021 from communication. Namely, the dissertation research starting point is the date of sending letters and contacting public managers' offices. The researcher sent the request via official letters, emails, and online applications via the "e-government" system starting from December 2021 (details on online communication are provided separately). The researcher requested the meeting to provide the initial data on digital policy performance. Unfortunately, none of the Ministries and Akimats in the Oblast level responded to the researcher and arranged the time for the interview meeting at the requested time. Hence the researcher met with respondents via a physical appearance in the local office of the relevant akimats without any notice.

In Turkistan oblast akimat, the meeting was held on an ad hoc base despite the researcher sending the meeting request via official letter and applying via "e-government" system one month in advance. Nobody in Turkistan oblast Akimat confirmed on receiving the letter. Turkistan Oblast Akimat arranged meetings with junior-level public managers once the

researcher arrived at respective Akimats at Audan and Oblast levels. A meeting was arranged for neither Akim of Oblast nor Deputy to Akim of Oblast.

On the positive side, Akmola Oblast Akimat arranged the meeting based on the meeting confirmation letter Akmola Oblast Akim. Namely, Akmola Oblast Akimat arranged four meetings with different levels of regional public managers, including junior-level and senior-level public managers at Oblast and Audan akimats levels. Furthermore, the deputy to Akim of Akmola oblast replied to interview questions via email broadly with neutral language and minimum data.

Setting

The participant observation was held during semi-structured interviews during the fieldwork. The participant observation enabled the researcher to regularly observe the behavior of decision-makers and street-level bureaucrats via analyzing how various state agencies handle communication with third parties, including farmers. Research visits lasted 1 or 2 days due to different access levels. The researcher met with each respondent only once. However, the common feature was tracked in the setting and the stakeholder's behavior.

Except for Turkistan Oblast akimat, all meetings were held in public managers' office rooms. However, locations and the interior of the offices of public managers were not convenient as the offices were tiny and full of folders with papers. In addition, the equipment and furniture of the offices of the regional akimats were outdated with broken chairs. As a result, public managers have no room or space for cultivating or enabling a culture of cooperation with third-party stakeholders in the agriculture sector. One exception was the office of the Turkistan oblast akimat, which had a brand new interior with glass walls indicating transparency.

The meetings with public managers were mainly undertaken with 5 top managers holding political positions (Akim, Deputy akims, and Minister), three senior-level public managers

(Head of departments), and six junior-level public managers (including managers, lead managers). Top managers and senior-level public managers met with the researcher with constrained timing limits (for a maximum of 30 minutes) with constant interview interruption. Junior-level public managers could spend 40-60 minutes during the meetings.

Interestingly in the Akmola region, the researcher met with top management at both audan and oblast levels but did not meet with junior managers at the audan level. On the other hand, in the Turkistan region, the researcher did not meet with the top managers of the Oblast level but met with senior and junior managers in both audan and oblast levels. More likely, the difference in the diversity of public managers in the meetings implies that small-scale farmers highly dominate the Turkistan region, and regional managers are in a better position to cover the sector's issues. In the same vein, the role of the large-scale farmers in the Akmola regions is so essential that the senior public managers are eager to communicate on the issues as they control the relationship with the farmers based on informal institutions discussed by the scholars (Oshakbayev, 2018), (Petrick, M., Oshakbaev, D., and Wandel, J., 2014).

Item	Turkistan region	Akmola region
Sectors	Crop farming, vegetable farming	Crop farming, Cattle farming
Farmers	Majority of small-scale farms	Majority of large-scale farms
Communication	Poor No meeting confirmation No meeting arrangement	Poor Meeting confirmation Meeting arrangements
Setting Oblast level Audan level	 Conference room Office room of the public manager	 Office room of the public manager Office room of the public manager
Diversity	Limited gender diversity	No gender diversity

Item	Turkistan region	Akmola region
Oblast level **Audan level**	Senior & Junior managers Top, Senior & Junior managers	Top, Senior & Junior managers Top, Senior
Communication including digital communication	Passive communication Meetings at senior and junior levels No official response	Active communication Meetings at top, senior and junior levels Official response with limited information
Behavior	Constrained, closed	Constrained, closed

Digital communication

The researcher sent the application to meet with the management of Oblast Akimats and the Ministries via the open government function of the online e-government platform on June 14, 2021. However, none of the public authorities responded to the request except the Ministry of Digitalization. According to the regulation, each authority head has a meeting with the public once a month.

Only the Ministry of Digitalization confirmed online meetings via the zoom application. Within two months, the online meeting was postponed four times due to the heavy workload of the Minister and last-minute cancellation due to meeting with the Prime the Minister or President of the country. During the zoom meeting, the researcher did not have access to the voice and the call. Hence the Minister did not respond to the researcher's questions.

The Minister mentioned that the digitalization of the agriculture sector is not the Ministry of Digitalization's responsibility, which contradicts the digital policy adopted by the government in 2017. According to digital policy (2018-2021), the Ministry of Digitalization is responsible for

the overall supervision of the digitalization Kazakhstan program. Nevertheless, the Minister advised contacting Mr. Manatayev, vice-the Minister of agriculture. At the same time, the Ministry of Agriculture has not responded officially to the researcher to date. None of the Ministries responded to the researcher on the performance of digital policy officially. A copy of the request letter of the researcher is provided as **Annex 2** for this dissertation.

	Position	**Region**	**Education**	**Sex**	**Time**	**Age**	
1	Deputy to Akim	Turkistan region	Veterinary specialist	M	May 26,2021	50-60	Top
2	Senior public manager	Turkistan region	Engineer	M	May 26,2021	40-50	Senior
3	Lead Public Manager	Turkistan region	Livestock specialist	F	May 26,2021	30-40	Junior
4	Lead Public Manager	Turkistan region	Livestock specialist	F	May 27, 2021	30-40	Junior
5	Public Manager	Turkistan region	Agronomist	M	May 27, 2021	25-35	Junior
6	Minister	Central Authority	IT specialist	M	July 3, 2021	40-50	Top
7	Deputy to Akim	Akmola region	Economist	M	August 18, 2018	40-50	Top
8	Lead manager	Akmola region	Agronomist	M	September 1, 2021	35-45	Junior
9	Public manager	Akmola region	Agronomist	M	September 7, 2021	35-45	Junior
10	Senior public manager	Akmola region	Veterinary specialist	M	September 7, 2021	40-50	Senior
11	Lead public manager	Akmola region	Livestock specialist	M	September 9, 2021	40-50	Junior
12	Akim	Akmola region	Lawer	M	September 9, 2021	40-50	Top
13	Deputy to Akim	Akmola region	Veterinary specialist	M	September 9, 2021	50-60	Top
14	Senior public manager	Central Authority	IT specialist	M	November 4, 2021	40-50	Senior

Representation

Theories of workforce diversity in the public sector assume that organizations more representative of the population they serve are more likely to foster an inclusive work climate in which individuals from different sections of society can thrive. Findings of the participant observation suggest that gender representativeness is not associated with an inclusive work climate in public offices in the agriculture sector. The respondents consisted mostly of male public managers, with only two women in Turkistan oblast. In the same vein, findings suggest that there is no diversity in the background of the public managers. All regional public managers had technical backgrounds predominantly in the agriculture sector, including livestock and veterinary specialists. Only two respondents from the central government authorities had an IT background, one lawyer, and one economist in the region akimats. In addition, the workplace at akimats does not represent an inclusive workplace in terms of age. The average age of the junior staff is 30-40, and the average age of senior managers and top managers in the regions is 40-50 years old. Workforce diversity theory suggests that representativeness is positively related to higher perceptions of inclusion and lower levels of discrimination (Andrews,R., Ashworth,R., 2015). However, this is not the case for public managers in agriculture.

Behavior

During interviews, public managers' behavior seemed to be constrained as they responded to the questions very narrowly within their competence, and no criticism or suggestion for improvement was highlighted. In general, public managers appeared to be very conscious about expressing their personal opinion and mostly referred to the citations of the President or yelbasy. The participant observation findings suggest that public managers cannot immerse themselves in the minds of the stakeholders to flip the lens back and look at themselves with fresh clarity. Due to the high workload, it is more likely that the public manager will ignore thinking about the farmers' issues and focus on the performance of the akimat indicators. Namely, the public managers looked bored when the researcher raised issues on the possible risk of unemployment due to digitalization or disparity in the sector between small-scale and large-

scale farmers. The public managers tend to overlook potential risks because they are so familiar with issues of the sector, which have not been unresolved to date, and labeled them boring and routine.

The public managers did not demonstrate any interest and imagination in the forward-looking risks. This finding was supported by the findings of the semi-structured interviews, which represent the limited number of risks highlighted by the public managers. The issues and problems exist between the cracks of the existing institutions. The participant observation suggests that the public managers ignore the importance of the incentives, tribal behavior, social dynamics, and cultural patterns of their groups and the farmers.

The participant observation revealed that a pattern of intense tribalism, groupthink, and tunnel vision has emerged in the agriculture sector. In the same vein, the research revealed a propensity to ignore the social factors and stakeholder engagement around digital policy implementation. Today, the government has been ignoring some of the big ethical questions created by digital disparity and finance in the agriculture sector.

The public managers frankly also ignore many of the issues around the financing of the small-scale farmers in the agriculture sector, creating a dependency culture in general in the sector. In addition, technical knowledge is held in the hands of a tiny group of elite technocrats, whom the rest of the world ignores because their activities are labeled as ambiguous, boring and geeky, and dull, and therefore not of interest to everybody else.

The concentration and attention of top public managers in the level of oblast and regional akimats during interviews were low as they were interrupted constantly by the telephone calls either by the superior manager or colleagues. This behavior is characterized by inadequate resources, the unpredictability of the counterparties, and the high workload of public managers.

During the conversations, public managers generally kept a stiff upper lip. Respondents appeared not to be open in semi-structured interviews in expressing their views. Respondents had mixed reactions to inconvenient or critical questions. In some cases, they demonstrated ostentation of the state's achievement in providing the subsidies. In some cases, they demonstrated an abstain position on policy failure.

Junior public managers expressed their worry that what they say or do may get back to their superior managers or colleagues in their organizations. This behavior represents the agent-patron relationship between senior and junior public managers and supports the findings of the semi-structured interviews on the effect of the hierarchical administration system on the decision-making process of the public managers.

Farmers

The research interviews were taken from May 2021 to November 2021 via visiting farmers and attending exhibitions in the agriculture sector. The researcher interviewed heads of farms, chairpersons of agrarian holding companies, and farmworkers informally. In addition, the researcher listened to the workers talk about their experiences and reactions to those experiences.

Most interviews were held in the working space of farmers in the case of small-scale farmer interviews. Except for one farmer, the researcher had interviews with large-scale farmers in restaurants or via zoom. Despite the researcher's insistence on the field visit, large-scale farmers seemed to avoid visiting the researcher their farms by referring to the busy workload and long distance from the city or capital.

Access

In general, the public organizations in Kazakhstan seem to be closed to any research. Hence, the researcher used a covert role to remove some difficulties in observing public managers' behavior. So, while the researcher sought access through an overt route, there were

many people with whom the researcher was in contact who was not aware of the status of the observer. That setting itself is part of the research, not only the interviews.

As most akimats ban using mobile phones, the researcher developed personal covert participant–observation skills. As it was impossible to remember until the end of the interview, the researcher took notes on the room setting and behavior during the interview.

To get access to the akimats, the researcher used friends, contacts, and colleagues to help to gain access. The researcher acknowledges the disadvantage of covert participatory observation as an ethical problem. Firstly, it does not provide the participants with the opportunity to informed consent, and it entails deception. It can also envisage the violation of the principle of privacy. However, the researcher operated in the public domain, which does not contain any illegal action or threat to the activity or operation of both public managers and farmers.

Getting access to farmers was very challenging as well. The researcher wrote 40 letters to farmers and public managers in Almaty, Turkestan Region, Akmola region. The researcher sent the letter, which included the description of the dissertation research aims and rough ideas as to the content of the interview questions. Unfortunately, the strategy did not work out, as nobody from the recipients responded neither to calls or letters. Hence, the researcher walked around the respondents ' offices and asked for interviews straightly. Respondents were more likely to agree when not given the easy choice of arranging or postponing the interview. The researcher also listed and engaged in the conversation of each respondent. The researcher found common features in interactions with the researcher based on this.

Day participant observation enabled the researcher to grasp how the akimats meet, interact and communicate with third parties, including farmers. The access to Akimats at oblast and audan level management was not easy as they have security restrictions due to COVID 19 safety requirements. The application for the meeting was made in place as no telephone works in the Akimats, and nobody responded by phone for the meeting arrangement. The meetings with

the departments of agriculture were easier to access as they operate in a separate building from the akimat management, and no security arrangement is ensured there. The departments of agriculture included the civil servants and superior staff, and the Head of units. This participant observation does not aim for a structured analysis of the stakeholder's role in implementing digital policies. Instead, observation of public managers in their daily work allows understanding the operation of public managers that shapes the habitus in which engagement with farmers is undertaken.

Besides following public managers' everyday work, observations also included the attendance of the exhibitions and conferences and studying the authorities' internal documentation materials to analyze public managers' use of the knowledge and ability to share with farmers and concerned stakeholders. Many voices were captured and represented through anecdotes throughout the field research and writing. Following general ethical guidelines, all participants and places are handled anonymously, including the participant's gender. The names have been changed, and capital letters are used. The researcher's position was one of participant observer.

Findings

The main findings of the participant observation revealed that public managers lack the communication skills required for stakeholder engagement both at the decision-maker and street-bureaucrat level.

Firstly, none of the responsible Ministries responded to the researcher on the performance of digital policy officially. A copy of the request letter of the researcher is provided as Annex 2 for this dissertation. At the regional level, Akimat of Akmola oblast was exceptional and officially provided a full set of information, arranging a time with all requested parties. At the same time, public managers in other regions and the Ministry of Agriculture did not appear to be prepared for such reporting.

In the same vein, the operation of the e-government portal, which is part of the digital transformation of public services initiative of the Kazakh government, appeared to be poor as no communication was established via this channel. The researcher failed to arrange any meeting via the e-government portal within one year, except for only one online meeting arranged with the Ministry of Digitalization via e-government. This meeting itself was postponed four times within two months, and finally, no two-way conversation happened with the Minister of Digitalization. The public managers do not want to have an online track record on communication by avoiding accountability. In other words, public managers prefer to work with traditional channels to avoid blame for unprofessional or substandard services, which might be easily tracked in the online system if it is the case. The research applications on the meeting request did not reach the counterparty (one the Ministry and three oblast akimats). This finding is in line with the findings of semi-structured interviews on the propensity of public managers to report "good news" or "outperformance," nurtured by the culture of faking policy results. This experience proves the argument that data manipulation has become routine for public managers due to pressure from superior public managers and their interest in career advancement.

Secondly, most meetings were arranged with junior public and middle-range managers who have limited responsibility and grasp of information on the sector and issues. In the same vein, the junior public managers referred that they are not in a position to express their opinion and assessment openly and professionally due to limited experience and responsibility. Their lack of confidence and frequent referral to superior managers or colleagues in their organizations uncovered that the public managers lack policy capacity in terms of analytical skills and political skills and reflect the dominance of the patron-agent relations in the workplace.

The third finding of the participant observation revealed that public managers are not open in their interactions. During interviews, public managers' behavior seemed constrained as they responded to the questions very narrowly within their competence. No criticism or suggestion for improvement of the policy was highlighted, demonstrating the compliance culture

of public managers in the public spaces. As Lipsky noted, uncertainty, conflict of goals, and the tendency to cope with high workload modify the behavior of public managers to match the performance. As a result, constrained communication skills are part of public managers' routines behavior, enabling them to cope with uncertainty and work pressure. Hence instead of implementing the goals and objectives, they tend to modify the objectives to cope with their current job functionalities, which leads to simply recording and reporting (Lipsky, M., 1980).

Finally, the findings of the participant observation suggest that public managers suffer from groupthink and professional tribalism. The research revealed that it is important to understand the context in which digital policies are developed and implemented and, the context of the people, the tribalism of the public managers who are allocating funds for digital policies matters. The research revealed that the public managers had embedded biases in the lack of diversity in the decision-making teams. The research also revealed the importance of the way the digital policy is implemented and developed in terms of the policy initiative and whether the people who are implementing it have the ability to understand the social and ethical context. The digital policy puts enormous amounts of power in the hands of a small group of computing and public manager elite, who operate in silos, do not necessarily want that level of power and probably are not equipped to deal with it.

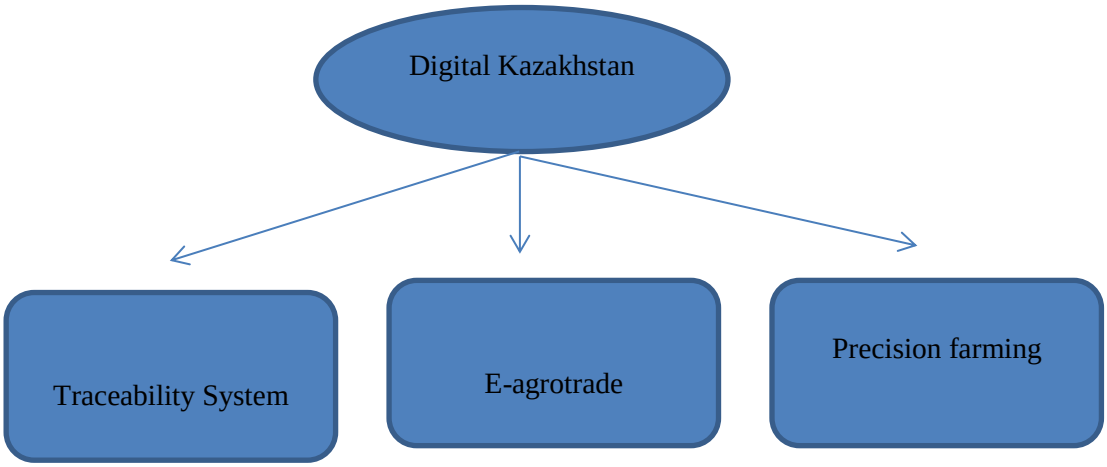
Annex 6. A summary of Digital Policy goals and means

The goal of the digital policy was to increase the export and productivity of the agriculture sector. Digital policy envisaged the following nationwide KPI targets regarding productivity and export indicators. However, no detailed KPI targets were developed based on regions or sub-sectors. Based on the three elements of digital policy, decision-makers targeted enhancing the agriculture sector's value chain.

The list of the KPI targets according to digital policy

No	Item	2018	2019	2020	2021	2022
1	Labor productivity increases "Agriculture, forestry and " (in relation to 2016) in %	9,4	29,4	44,8	62, 4	82,0
2	Increase of the export volume of the food products in relation to 2017) in %		27	44	61	69

Key components of digital transformation of the agriculture sector



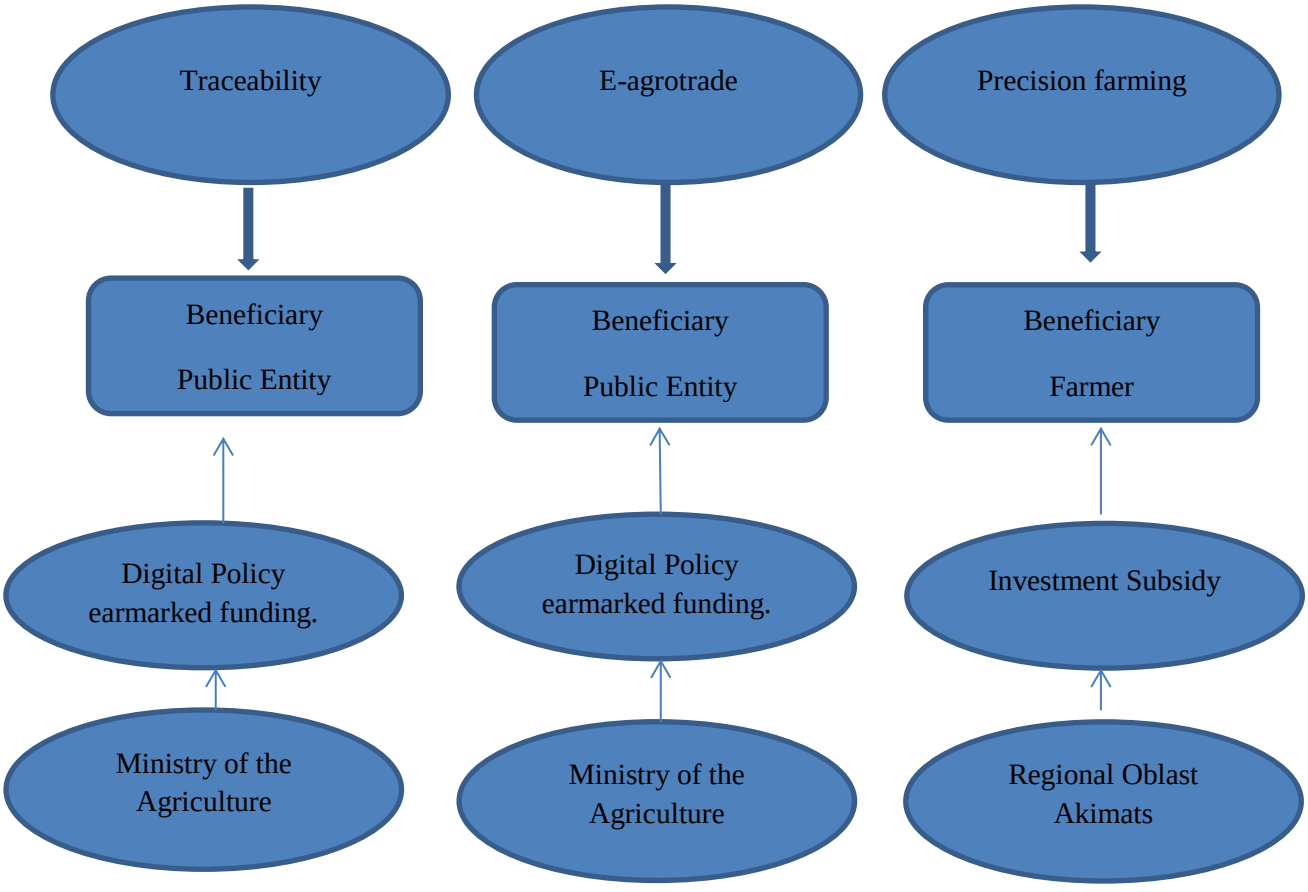
The means of digital policy was defined via funding sources. The government assigned earmarked funding for implementation only (i) online product traceability systems and (ii) e-agro trade systems. Both components were supposed to be implemented by the public entities.

The digital policy did not provide implementation mechanisms or earmarked funding for introducing digital technologies in precision farming to enable or facilitate farmers' implementation of digital policies. The detailed review of digital policy revealed that digital policy did not envisage any incentive mechanisms for farmers in the digitization sourced from decision-makers - the Ministry of the Agriculture. The elements of precision farming were supposed to be funded by farmers using their funds without any earmarked support assigned to digital policy (prime Minister.kz., 2021) (Skalei, 2019).

Government funding under the digital policy in KZTthousands

No	Item	2018	2019	2020	2021	2022	Recipient
1	Product traceability system implementation in thousand tenge	Na	181 669	Na	Na	181 669	Public entity
2	Implementation of the elements of the precision farming	Na	Na	Na	Na	Na	Farmers
3	Implementation of the electronic trade in the agriculture sector (e-agro trade)	Na	Na	Na	Na	Na	Public entity

Policy means – funding sources.



In 2018, to facilitate the implementation of digital policy, the Ministry of Agriculture defined three levels of farms, depending on the stage of digitalization– (i) digital farms, (ii) advanced farms, and (iii) basic farms. This classification was approved by the internal The Ministerial document presented to the Prime Minister in 2018 (prime minister.kz, 2018) (agroprom.kz, 2009). Initially, it was planned to introduce 4000 basic and 20 digital farms (prime Minister.kz, 2018). According to the Ministry of Agriculture, a digital farm is defined as a farm using new technologies and without human operation. The Ministry of Agriculture aimed to establish digital farms in every district to replicate the hands-on experience of digital technologies across the country.

The advanced farm was defined as the farm at the preliminary stage of digitization with available infrastructure systems.

Cattle farming	**Crop farming**
Basic farms Index pricing of the cattle Milking room with the herd management system	**Basic farms** Digital mapping Agrochemical survey of the soil
Advanced farms Electronic weight, chips Automatic system of dung removal Computer selection of the bulls in the information and analytical system Automatic cattle bowl	**Advanced farms** Gasoline consumption detector GPS trackers Software usage Electronic map of field weed Agrarian meteorological stations
Digital farms Monitoring of the cattle activity Integration of commercial dairy farms with the IAS Milking robots, Feeding machine Alternate power sources	**Digital farms** Crop yield sensors Variable-rate seeding and pesticide technology Variable-rate plant protection agents technology

Source: *Internal document of The Ministry of Agriculture as of October 27, 2021*

A basic level farm was defined as a farm with no technological infrastructure and capacity available in its operation (Gridneva,G.A, Kaliakparova,G.Sh., 2019). Basic level farms envisaged only digitizing all croplands data in the dataset of the Ministry of Agriculture, including data on agrochemical soil conditions. The detailed elements of the classification of digital farms are provided below. Data is sourced from the Ministry of Agriculture.

Annex 7. Code manual of semi-structured interviews

No.	Category	Dimension
1	Nature of the digital technology used/referred (Public manager, Farmer Large Scale, Farmer Small Scale, Expert, Industry)	1. Precision farming 2. Automation 3. Traceability
7	Implementation of digital policies reporting	1. Recorded 2. Not recorded 3. Mandatory 4. Not mandatory 5. Report only certain technologies 6. Reporting only in ad hoc basis
	Farmer willingness Digital policy objective and goals	Clear Not clear
	Farmer willingness Acceptance of digital policies	Acceptance high Acceptance low Resistance High Resistance low
2	Resources to facilitate policy implementation	1. Clear regulation on government support 2. Not clear regulation on government support

No.	Category	Dimension
		3. Clear message on government support 4. Not clear regulation on government support 5. Complicated process of obtaining subsidy 6. Easy and straightforward process of obtaining subsidy 7. Complicated process obtaining technical certification 8. Easy and straightforward process of obtaining technical certification 9. Benefits from the operation of the digital technology are clear 10. Benefits from the operation of the digital technology are not clear 11. Benefits from the cooperation with the government 12. No benefits from the cooperation with the government 13. Access to the local market 14. Access to the export market 15. Pressure and demand from the consumer 16. Lack of competition in agriculture sector 17. No opportunity of getting subsidies 18. Opportunity of getting subsidies
5	Digitization Benefits (Public manager, Farmer Large Scale, Farmer Small Scale, Expert, Industry)	1. Decrease of human factor 2. Efficiency 3. Productivity

No.	Category	Dimension
		4. Export 5. Traceability 6. Accessibility to the information stored 7. Recording 8. Modeling risks and profits 9. Control of the business process 10. Remote monitoring 11. Cutting cost
6	Risks (Public manager, Farmer Large Scale, Farmer Small Scale, Expert, Industry)	1. Confidentiality 2. Corruption 3. Connectivity
3	Public manager role (Public manager, Farmer Large Scale, Farmer Small Scale, Expert, Industry)	1. Provision of the subsidies 2. Provision of the educational support 3. Reporting and recording 4. Part of cleptocracy/bureucracy 5. Enabler of the change 6. Communication
	Digital policy objective and goals	Clear Not clear
	Acceptance of digital policies	Acceptance high Acceptance low Resistance High Resistance low
	Resources to facilitate policy administration	Available

No.	Category	Dimension
		Not available For everyone For selected companies For large scale companies For small scale companies
8	Government support in digital policies	1. Only large scale farms 2. Only small scale farms 3. Both small and large scale farms 4. Only selected large scale farms 5. Only selected small scale farms 6. No support 7. Consistent 8. Not consistent
9	Disparity	1. Small scale farmers need the digitization 2. Small scale farmers to not need the digitization 3. Large scale farmers need the digitization 4. Large scale farmers to not need the digitization 5. Both Large scale and Small scale farmers need the digitization 6. Both Large scale and Small scale farmers to not need the digitization 7. Only selected Large scale farmers need the digitization 8. Only selected Small scale farmers need the digitization

No.	Category	Dimension
10	Barriers for the public support	1. Lack of communication of public managers 2. Rotation 3. No consistent policy 4. Corruption 5. Connectivity 6. Operation of online public services 7. Mediators 8. Lack of cooperation between the public institutions 9. Lack of communication between the Ministry and farmer 10. Lack of communication between the MinAgri and MIR 11. Lack of communication between the Ministry and Scientists 12. Values