

**From Soil to Spoil: Analyzing the Effectiveness of
Agricultural Subsidies in Kazakhstan**

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Abstract

To what extent are government subsidies effective in developing agricultural production in Kazakhstan? Over the past decade, Kazakhstan's government has spent around 4 trillion tenge on agricultural subsidies. However, the rationale for such huge state support for the agricultural sector can be subject to scrutiny. The existing literature remains largely divided on the effectiveness of subsidies. Some authors argue that they increase agricultural productivity, while others claim that subsidies have no or even a negative impact on farm production. This research aims to contribute to this debate and provide context-specific evidence from Kazakhstan. To address the research questions, this paper employs a mixed-methods approach consisting of quantitative farm-level surveys and qualitative interviews. The results suggest that subsidies are not inherently irrelevant to agricultural production in the short run. Their positive contribution to output growth may be offset by factors such as alternative sources of financing, intermediary costs, environmental constraints, and farm technical capacity. Findings also identify a range of problems with the implementation of subsidies that policymakers can address to increase the effectiveness of the program.

Keywords: agricultural subsidies, crop production, state support programs.

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List of Acronyms

AIC	Agro-Industrial Complex
BNS	Bureau of National Statistics
EDS	Electronic Digital Signature
MoA	Ministry of Agriculture
MoJ	Ministry of Justice

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Chapter 1. Introduction

1.1 Background

Given the historical, economic, and social importance of agriculture, the government of Kazakhstan has long provided farmers with support in the form of subsidies. In Soviet Kazakhstan, agricultural producers received price support for fuel, fertilizers, and seeds (Pomfret, 2007). However, in the decade after the collapse of the Soviet Union, the state assistance to agriculture was virtually negligible as the country experienced a severe economic recession due to supply disruptions and hyperinflation. According to Petrick and Pomfret (2016), during this period, the agricultural industry demonstrated negative output. Over the six years from 1992 to 1998, grain production declined significantly, from 30 million tons to 6.5 million tons. Meat exports fell from 16 million USD in 1998 to 5 million USD in 2001, exhibiting a similar negative trend (Pomfret, 2007).

To stimulate agricultural production, in 2002, the government of Kazakhstan initiated the Agricultural and Food Program for 2003-2005 (MoJ, 2002), marking the beginning of agricultural subsidies in independent Kazakhstan. With the improvement of macroeconomic conditions, fiscal support for the agro-industrial complex (AIC) expanded. As illustrated in Figure 1, the agricultural sector began to recover at the turn of the century. Gross crop production has grown rapidly, increasing from less than 250 million tenge in 2000 to approximately 5 trillion tenge by 2024. Livestock production also grew, albeit at a more moderate pace, changing from almost 180 million to 3.3 trillion over the same period.

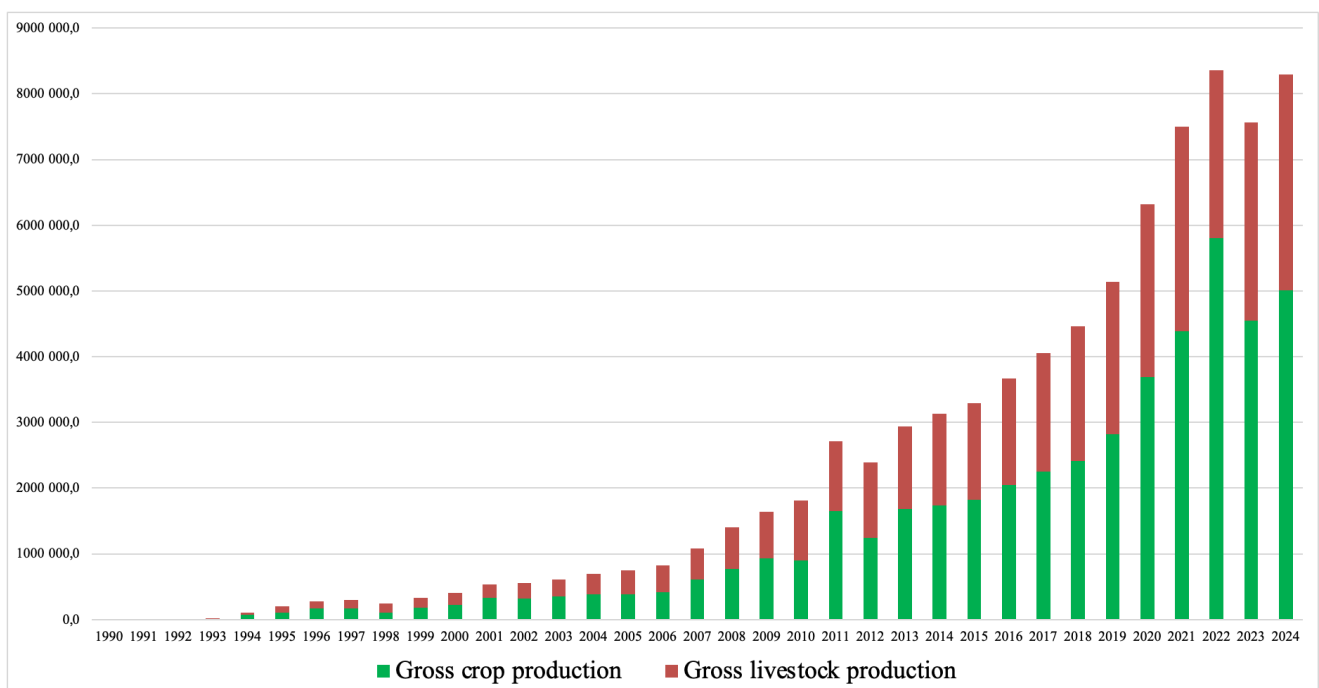


Figure 1. Gross agricultural output (in million tenge) in Kazakhstan between 1990 and 2024. Source: BNS (2025a).

Official policy documents often attribute this improvement in agricultural output to the direct effect of subsidy programs. In Kazakhstan, farm subsidies serve as a strategic policy instrument to stimulate production and increase sectoral competitiveness. Under the Concept for the Development of the AIC for 2021-2030 (later Concept), subsidies are intended to strengthen domestic agricultural production by providing financial support to local producers (MoJ, 2021a). The policy is structured to simplify access to various inputs, accelerate the modernization of agricultural machinery and equipment, and expand the use of agrochemicals. Further goals include incentivizing farm cooperatives, supporting the development of domestic seed production, and encouraging farmers to process their harvest (ibid.).

1.2 Problem Statement

Today, subsidies are the primary mechanism of state support for agriculture in Kazakhstan. According to the Ministry of Agriculture (MoA), the volume of subsidies distributed to agricultural production in 2003 amounted to 3.5 million tenge, and by 2025 it had reached 534.5 billion tenge (Akutionov, 2022; Ospanov, 2025). Among all available mechanisms of state support, including credits and leasing, subsidies take the largest share of the MoA's annual budget. In 2025, of the 646.6 billion tenge allocated to the AIC, more than 82% was directed towards subsidies (APK News, 2025). More specifically, 153.4 billion tenge for crop production, 131.1 billion for investment, 94.3 billion for livestock, 2.2 billion for fishery and forestry, and the remaining for other fields (Ospanov, 2025).

Moreover, in recent government programs, subsidies account for almost half of total expenditures. The National Project for the Development of the AIC for 2021-2025 designated nearly 5 trillion tenge across subsidies, leasing, credits, insurance, and investment for infrastructure and science to double agricultural exports, maintain the supply of essential domestic food products, and increase labor productivity and rural incomes (MoJ, 2021b). According to the program budget, given in Appendix 1, subsidies take the largest part of the total spending (46.8%). Also, Petrick et al. (2018) report that in the State Program for the Development of the AIC for 2017-2021, subsidies' share of the total budget was even higher (53.1%), as Appendix 2 shows.

Despite such substantial investments in agricultural subsidies, it remains unclear whether these funds lead to measurable improvements in farm productivity, and the link between agricultural subsidies and farm output remains poorly understood. Although previous studies report a positive correlation between the two (Siximbayeva et al., 2025; Petrick, 2022; Pomfret, 2007), the question of whether subsidies are the main drivers of agricultural production in Kazakhstan requires additional research. Determining if causality exists is essential for evidence-based policymaking, as decisions based solely on correlations risk wasting resources and missing opportunities for sustainable growth.

1.3 Research Questions

Considering this, the study explores the following research questions: (1) To what extent are farm subsidies effective in developing crop production in Kazakhstan? and (2) What factors affect crop production in Kazakhstan? This research targets crop production because it is the largest recipient of agricultural subsidies (Ospanov, 2025), and the farms that received subsidies are well documented in administrative records.

The research is based on a panel design using farm-level data for 2023 and 2024, and a mixed-methods approach, including primary quantitative data collected through surveys among local farmers and qualitative data through interviews with them. Research findings are expected to provide a regional perspective to the broader literature on agricultural subsidies and guide policymakers with evidence-based recommendations for the development of Kazakhstan's agricultural sector.

1.4 Thesis Structure

The rest of the paper is organized as follows. The subsequent section examines the existing debate in the literature on the effectiveness of agricultural subsidies. The third chapter presents the methodological approaches employed to analyze the relationship between farm subsidies and output growth in Kazakhstan. Section four outlines the empirical findings, followed by the discussion section. Finally, the paper concludes with research limitations, policy implications, and recommendations for improving the implementation of the agricultural subsidy program.

Chapter 2. Literature Review

2.1 Understanding Subsidies

The existing literature defines the concept of “subsidy” in different ways. Subsidies can be interpreted as government assistance that (1) enables consumers to purchase goods at a lower price or (2) increases producers’ income beyond what would be obtained without the intervention (Schwartz & Clements, 1999). Specifically, agricultural subsidies, as conceptualized by Seitov (2023a), are government-provided financial support or policy measures implemented to help farmers improve agricultural production. They can take various forms, including price support mechanisms, direct cash grants, input subsidies, tax concessions, and crop insurance (OECD, 2017). Tang et al. (2024) identify input and output subsidies as the two main types of subsidies that most developing countries grant to farmers. While input subsidies allow producers to reduce the cost of purchasing inputs, output subsidies act as a financial reward for producing certain crops or achieving a certain level of production (*ibid.*).

In Kazakhstan’s context, subsidies were first briefly mentioned in the text of the Conceptual Program for the Development of the AIC for 1993-1995 and up to 2000, where they were given to farmers to compensate for losses from natural disasters (MoJ, 1993). It was with the implementation of the Agricultural and Food Program for 2003-2005 that the government of Kazakhstan officially began providing agricultural subsidies for specific sectors such as crop production, livestock farming, and dairy production (MoJ, 2002). State programs adopted after 2010 emphasize the importance of subsidizing logistics, partial reimbursement of production costs, and interest rates on loans, while later programs, such as Agribusiness 2020 and the National Project, aimed to strengthen the competitiveness of the sector through subsidies (MoJ, 2016; 2021b). However, since four of the last five state support programs have been terminated due to inefficient budget use, it is difficult to conclude the impact of subsidies on the development of the agricultural sector (Trofimova, 2024). Therefore, a comprehensive literature review is necessary to preliminarily answer the question of how effective state subsidies are for the development of agricultural production in Kazakhstan.

2.2 Subsidies as Catalysts of Agricultural Production

Subsidies have long been utilized as an important tool for boosting agricultural production. Many studies support this positive relationship. In particular, they highlight that input subsidies, such as for fertilizers, seeds, irrigation, and implements, encourage farm households to increase agricultural production (Lal et al., 2023; Nguyen et al., 2023). As these authors argue, input subsidies minimize costs for farmers by providing them with inputs at reduced prices. Furthermore, findings from Mamun

(2024), Nguyen et al. (2023), and Narayanamoorthy (1997) demonstrate that after receiving subsidies, farmers have more incentives to improve farming practices and adopt productivity-enhancing technologies. This means that subsidies serve as a source of income for farmers, who can then use them to invest in revenue-generating activities (Lal et al., 2023). In their research for the World Bank, Nguyen et al. (2023) report an 18% increase in yield and a 16% increase in household income of farmers who benefited from input subsidy programs. Thus, these observations claim that subsidies enhance agricultural efficiency by making inputs affordable, which subsequently facilitates farm modernization and the growth of producer incomes.

Besides subsidies' impact on increasing agricultural output, numerous authors argue on their significance in ensuring national food security. Yang et al. (2023), Liu et al. (2024), and Sha et al. (2024) emphasize that subsidies help maintain food security as they lead to increased food production following investment in agricultural activities. They even acknowledge food security as the main purpose of subsidies. For example, Sharma (2012) writes that the Indian government maintains high agricultural subsidies to ensure food availability by keeping prices below world market prices. Furthermore, Li et al. (2022) and Sha et al. (2024), citing the case of China, argue that subsidies are a tool to prevent "large-scale return to poverty." According to this group of authors, subsidies help the state avoid food instability by increasing agricultural output.

2.3 Subsidies as Barriers to Agricultural Production

In contrast, there is a considerable body of literature that casts doubt on the effectiveness of subsidies. One of the main arguments against subsidies is the so-called "income effect," which refers to the negative influence subsidies can have on farmers' productivity due to their role as a guaranteed part of income (Minviel & Latruffe, 2016; Staniszewski & Borychowski, 2020; Zhi & Wong, 2020; Zhu & Lansink, 2010). According to these authors, a constant flow of subsidies may diminish farmers' incentives to implement more efficient production mechanisms, which may also lead to dependence on subsidies and further deterioration of self-sufficiency.

The implementation of subsidies is followed by other problems as well, from limited technical utilization to reduced agricultural productivity. A meta-analysis by Minviel and Latruffe (2016) shows that in 76% of the existing empirical studies, agricultural subsidies have a negative or no considerable effect on the technical efficiencies of farms. These findings are supported by Sotnikov's (1989) research on government support for agriculture in Russia, which also reveals that subsidies negatively affect farmers' technical efficiency. In the words of Trendov et al. (2017), subsidies decrease agricultural productivity as well, which was detected from the reduced output from the farmers

despite the growing financial support. There is also a group of scholars who argue that the effectiveness of subsidies is dependent on their objectives. Since subsidies are designed to address specific issues and have different target indicators, a simple dichotomous division of subsidies into effective and ineffective at increasing output can be flawed (Alem et al., 2018; Minviel & Latruffe, 2016). Therefore, the studies on agricultural subsidies require a more nuanced approach.

2.4 Subsidies in the Context of Kazakhstan

The debate on the effectiveness of subsidies continues also in the context of Kazakhstan. While some authors argue that existing government support policies lead to positive output growth in agriculture (Kulmaganbetova et al., 2023; Petrick, 2022), others highlight the negative impact of subsidies on farming efficiency due to reduced incentives of local producers to modernize their technologies, as well as unequal access to government aid for marginal and remote farms (Seitov, 2022, 2023a, 2023b; Tleubayev et al., 2022; Uskelenova et al., 2017; Zhanaltay, 2023).

In favor of state support, some scholars emphasize the absolute necessity of subsidies to increase agricultural productivity. In his comparative study of Kazakhstan, Russia, and Ukraine, Petrick (2022) assesses Kazakhstan's 2013-2020 agricultural subsidy policies as effective, as the country's farm production experienced the strongest growth during this period. As he observes, over these years, the state increased the size of subsidy payments significantly, and, in turn, agricultural output grew by more than 20%.

Kulmaganbetova et al. (2023) share this view on the importance of subsidies, but they mention some of their limitations. In their opinion, the efficiency of subsidies should be analyzed considering farm sizes, and for them, medium farms benefit the most from such state support programs. The authors assert that while small and large agrobusinesses often treat subsidies as an additional source of income and rarely use them for technical investment, medium-sized businesses are more incentivized to spend subsidies on purchasing innovative equipment. Overall, Kulmaganbetova et al. (2023) evaluate agricultural subsidies positively and contend that if the government decides to remove subsidies, it will result in a huge reduction in agricultural production.

Opposite perspectives can be found in the writings of other researchers, who argue that the negative consequences of providing state subsidies outweigh the benefits. In his works, Seitov (2022, 2023a, 2023b) consistently criticizes agricultural subsidies for their limited effectiveness in creating favorable conditions for farmers to adopt more innovative and sustainable modes of production. The author underlines a series of problems related to subsidies. He claims that subsidies diminish the financial discipline of local producers, making them dependent on state support. Seitov (2023a) also

notes that, compared to Russia, the return on subsidies in Kazakhstan is considerably lower. Besides, he writes that since the government provides subsidies on a “first-come, first-served” basis, large agroholdings are often the first to take a significant share of the subsidy, and farmers who apply later may not receive any funding (Seitov, 2023b).

2.5 Gap in the Literature

Despite their valuable contribution to the literature on agricultural subsidies, the papers reviewed above do not provide a clear answer to the question of interest, creating a need for further research. Most of these studies rely on secondary data collected from external sources (Kulmaganbetova et al., 2023; Minviel & Latruffe, 2016; Petrick, 2022; Seitov, 2022, 2023a, 2023b; Zhanaltay, 2023; Zhu & Lansink, 2010), while even if some studies collected survey data, their results are context-specific and cannot be generalized to Kazakhstan (Lal et al., 2023; Li et al., 2022; Narayanamoorthy, 1997; Sha et al., 2024).

Exceptions are research done by Tleubayev et al. (2022) and Siximbayeva et al. (2025), who conducted surveys among farmers in Kazakhstan and found somewhat conflicting results. Based on a study of wheat producers in the Akmola region, Tleubayev et al. (2022) find a negative relationship between technical farm efficiency and agricultural subsidies. Siximbayeva et al. (2025) expand this argument with a more nuanced take, using national agricultural statistics and a wider survey sample to find that subsidies have positive effects on agricultural productivity unless farmers become too dependent on them, which would result in inefficiencies. However, the conditions that determine the effectiveness of subsidies, as well as the farmers’ decision-making process, remain underexplored. Aside from that, neither of these studies differentiates between output and input subsidies, conducting their studies on aggregated data. Considering the key differences in when and how these subsidies are administered, examining them separately would enable more precise analysis of their effects.

In order to fill this gap in the literature, this paper conducts mixed-methods research that uses primary data collected from farmers in Kazakhstan. The study combines quantitative analysis of survey responses with in-depth interviews to develop a comprehensive understanding of the factors determining agricultural production. This research design allows for capturing measurable outcomes and understanding the underlying dynamics that led to conflicting findings about the effectiveness of subsidies. As a result, this study contributes to the existing debate by offering a nuanced assessment of Kazakhstan’s agricultural subsidy policies, which would be useful for policymakers.

2.6 Hypotheses

As the literature review shows, the effectiveness of farm subsidies in producing desired outcomes has long been questioned by scholars. The absence of consensus on the matter is not a coincidence and could be explained by competing mechanisms of the policy instruments that lead to different results depending on which one dominates. Subsidies can act simultaneously as (1) a solution to resource constraints that incentivize increased production by reducing costs and risks, and (2) an unregulated source of additional income that can be misallocated into inefficient endeavours and create dependencies by crowding out private financing. Therefore, to provide a nuanced analysis of the issue at hand, this research is designed in a way that allows for testing hypotheses through quantitative analysis and verifying them with qualitative findings.

The first group of studies argues that subsidies are a valuable tool that allows farmers to invest in additional revenue-generating activities by covering part of their expenses (Lal et al., 2023; Narayanamoorthy, 1997; Petrick, 2022). The idea is that the additional profit resulting from subsidies provides an opportunity for farmers to improve their production capacity, allowing them to acquire inputs such as seeds, fertilizers, technologies, and machines. If this mechanism is more dominant in Kazakhstan's context, the results will support the first hypothesis, which aligns with an optimistic view on subsidies.

H1: Government subsidies positively affect agricultural production and increase crop yield.

Arguing in the opposite manner, the second group of scholars asserts that subsidies harm farmers' self-sufficiency by making them dependent on ongoing government support (Minviel & Latruffe, 2016; Staniszewski & Borychowski, 2020; Zhu & Lansink, 2010). This set of authors suggests that instead of incentivizing investment in productive avenues, the income effect creates opportunities for resource misuse. Reflecting on their observations, this study proposes a second hypothesis that underscores the negative impact of subsidies on agricultural efficiency.

H2: Government subsidies negatively affect agricultural production and reduce crop yield.

In this delicate balancing act, if the positive and negative mechanisms offset each other, the impact of subsidies could be marginal or non-existent (Nguyen et al., 2023). The availability of alternative mechanisms that reduce production costs or increase profit may remove the need to rely on subsidies to increase output. Therefore, the ineffectiveness of subsidies may be another possibility.

H0: Government subsidies have no effect on agricultural production.

Chapter 3. Methods

3.1 Description of Research Design

This research employs a mixed-methods approach: quantitative regression analysis complemented by qualitative insights. The quantitative component is based on survey data, obtained from farm representatives across Kazakhstan. The questionnaire allows the researchers to collect important farm-level information used for empirical analysis of the relationship between farm output and the receipt of subsidies, as well as to study the influence of other factors, such as ecological issues, education, labor, technical capacity, farming structure, experience, and other financial resources, on agricultural production.

The qualitative part includes semi-structured interviews with the experts in the field of subsidies and agriculture. As a Delphi panel, interviews grant a deeper understanding of the mechanisms through which subsidies may affect agricultural production, as well as validate the quantitative findings. Qualitative insights obtained from interviews with specialists provide an explanation for the limited impact of subsidies on agricultural output growth and help the researchers obtain a better grasp of everyday realities and challenges farmers face in order to make evidence-based and nuanced policy recommendations.

3.2 Participants and Sampling

Since the study requires the participation of farmers with specific knowledge and experience in agricultural production, it uses a purposive non-probability sampling approach. According to the MoA's classification, farms in Kazakhstan can be divided into (1) agricultural enterprises, (2) peasant or farm enterprises, and (3) private households. This matches the categorization of Dudwick et al. (2007). By their definition, agro-enterprises or corporate farms typically exist as limited liability partnerships and, on average, farm at least 10,000 hectares of land, dominating grain production in Kazakhstan. Household producers are unregistered households that typically grow food crops or keep livestock in their backyards, while individual or family farms are registered producers that have a separate plot of land used for agricultural activities.

The research focuses on farmers from peasant or farm enterprises, or individual or family farms, as Dudwick et al. (2007) name them. According to Article 41 of the Entrepreneurship Code of Kazakhstan, the government considers peasant or farm enterprises as labor associations of individuals who have registered land used for the production of agricultural products, as well as the processing and marketing of these products (MoJ, 2015), and the same definition is used in this research. In Kazakhstan, the largest share of farms is individual farms. As of 2026, there are more than 250,000

individual farm enterprises in the country in agriculture, forestry, and fisheries, registered mainly in the Turkistan, Almaty, and Karaganda regions (BNS, 2026; Zubov, 2025). These farms contribute enormously to agricultural output. Over the past decade, peasant or farm enterprises have occupied a leading position in crop production, producing 41.5% of the total harvest in 2024 (Figure 2). They also own about 49% of all livestock (BNS, 2025b). Moreover, they are the largest recipients of agricultural subsidies. For example, in 2025, family farms received 74% of the total subsidies for priority crops, 53% of subsidies for water supply and irrigation, 37% of subsidies for seed production, 28% of subsidies for fertilizers, and 17% of subsidies for pesticides and bioagents (GosAgro.kz). Due to their critical importance to Kazakhstan’s agricultural sector and their relative comparability with other farms in terms of labor force size, technical capacity, land size, and subsidy levels, individual farms were selected as the primary participants in the study.

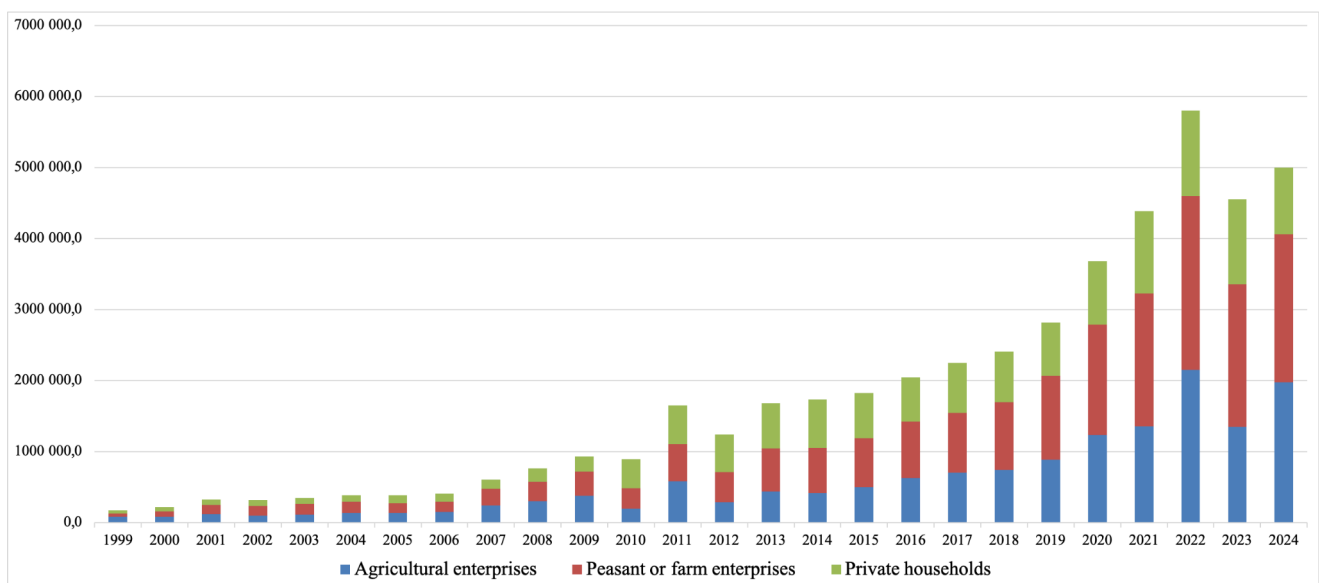


Figure 2. Gross crop production (in million tenge) by farm category in Kazakhstan between 1999 and 2024. Source: BNS (2025a).

In addition, the study focuses on input subsidies, particularly for fertilizers and seed production. According to the Concept, there are 51 different types of agricultural subsidies in Kazakhstan. Of these, subsidies for priority crops, perennial crops, fertilizers, pesticides, water supply and irrigation, and seeds are the main subsidies for crop producers. From the 2020 Ministry of Agriculture Regulation on Subsidies, only fertilizer and seed subsidies can be considered as pure input or ex ante subsidies, as their provision starts at the beginning of each agricultural season. Farmers can use these subsidies before or during the planting stage, and their impact is limited to a specific growing season. Thus, the effect of these subsidies can be localized to a specific year, allowing their impact to be more clearly linked to farm output.

The inclusion of other types of crop subsidies in the analysis makes it difficult to study their

impact on crop yields in a given year, creating a blurred picture. For example, the priority crops subsidy is an output subsidy usually provided to farmers at the end of the farming season, from November to December, as an income reward. Subsidies for pesticides, perennials, and water and irrigation services are provided from April to May until the end of the year, only after the start of planting, and serve to offset costs. They cover only those expenses that farmers have already incurred during a particular growing season. In this case, the relationship between the subsidy and crop yield is blurred and often inverse, as their impact can extend into the following year. Since this study aims to examine the impact of subsidies on crop production, the paper only considers those types of subsidies that are used by farmers before harvest. Accordingly, the sample includes individual farmers who did and did not receive fertilizer or seed subsidies in the 2023 and 2024 growing seasons.

3.3 Data Collection Methods

Collecting quantitative data involves several stages. First, the researchers visited GosAgro.kz, the MoA's official website for submitting subsidy applications, to obtain a list of farms that had applied for subsidies in 2024, the only year available. Next, contact information for farmers who received subsidies or were denied them was obtained through a Google search of the official procurement websites of the Ministry of National Economy and the Ministry of Finance. Since the online sources used to collect farmers' contact information are publicly available, their confidentiality was not compromised. Then, farmers were contacted via WhatsApp Messenger and/or email and asked to participate in a survey and interview. They were also asked to distribute the questionnaire to other farmers involved in crop production. Thus, some of the responses were collected using the snowball method. During the outreach, farmers shared the contact details of an agronomist and an employee of the private subsidy provision agency, who were also interviewed.

3.4 Measurement of Variables

In this research, the independent variable of interest is farm *subsidies*. To conceptualize this term, the study uses the definition given by Seitov (2023a). In Kazakhstan, distinct types of subsidies exist, but the research limits them to input subsidies, in particular, subsidies for fertilizers and seed production. This variable is operationalized by the amount of funding provided to farmers, and this information is available on GosAgro.kz.

The dependent variable is *yield growth* taken as yield growth per hectare, which is the difference between farmers' 2024 output and 2023 output divided by land size. Yield growth per hectare is used instead of pure yield growth to ensure the comparability of yield from different crops

and land sizes. This data is calculated by the authors from farmers' responses to the questionnaire.

To isolate the impact of subsidies on agricultural production, the research controls for other independent variables that may influence it. According to existing literature, crop production is greatly affected by *environmental issues* such as low soil fertility and poor water availability (Suchkov et al., 2022). These are explicit factors that directly shift plant growth and can lead to crop failure, regardless of external intervention.

Meanwhile, *agricultural education* and experience, measured by the *years of farming*, can have a positive impact on crop production by enabling better management of farm operations due to a deeper understanding of production processes (Danso-Abbeam & Baiyegunhi, 2019). Aside from that, the paper also controls for membership in *cooperatives*, as this is expected to improve farmers' access to various agricultural inputs and capital (Golovina et al., 2019). Using *other financial tools*, such as bank loans and borrowing, can also influence crop output by allowing farmers to buy high-quality seeds and invest in riskier but more productive technologies (Tleubayev et al., 2022)

Another important set of variables that can significantly affect agricultural output includes production factors such as *labor* (the number of people working in the field), the *number of machines*, and the use of *special technologies* (vertical farming, the use of drones or satellite imagery, special irrigation technologies) (Korsa & Labata, 2022). Empirical analysis also controls for the *subsidy type* and the *subsidy amount*. Ultimately, by holding these variables constant, the paper singles out the impact of the main independent variable on farm output.

3.5 Data Analysis Procedure

To test the hypotheses, the paper conducts a difference-in-differences (DiD) method of empirical analysis. This approach allows researchers to see the interaction effect of subsidy receipt and time (*post*) on changes in farm yields after receiving input subsidies. Based on their response to the questions about receiving subsidies, farmers are divided into two groups: those who received subsidies in 2024 but not in 2023 (treatment group) and those who did not receive subsidies in either year (control group). The equation for the DiD is as follows, where X represents the control variables:

$$Yield\ Growth_{it} = \beta_0 + \beta_1 Subsidy_i + \beta_2 Post_t + \beta_3 (Subsidy_i \times Post_t) + \gamma X_{it} + \epsilon_{it}$$

Chapter 4. Results

4.1 Data Presentation

In total, 97 survey responses were collected through the online questionnaires, and 10 semi-structured interviews were conducted for a Delphi panel. After data cleaning and removing incomplete survey responses, 61 valid observations were left, which were used for the empirical analysis. As shown in Figure 3, among these respondents, 29 farmers reported not receiving any subsidy in the 2024 agricultural season, 18 received a subsidy for seed production, and the remaining 14 received a subsidy for fertilizers. In addition, out of 17 administrative regions in Kazakhstan, the sample covers 12 regions. The largest number of respondents comes from the Turkistan region, followed by Kyzylorda and Kostanay, which are leaders in crop production. Although the dataset does not cover the entire country, it is relatively broad to enhance the external validity of the research findings. It captures diverse climatic conditions, agricultural practices, crop types, and access to government support across the country.

To complement the quantitative findings, 10 semi-structured interviews were conducted, including one agronomist representing a farm in the Almaty region, one employee of a private subsidy provision company, and eight farmers from five different regions. The interviewed farmers come from the regions of Kyzylorda, North Kazakhstan, East Kazakhstan, Zhambyl, and Turkistan. Five farmers reported receiving at least one type of input subsidy in recent years, while four reported receiving no subsidy. A detailed description of the farms' background information is given in Appendix 3.

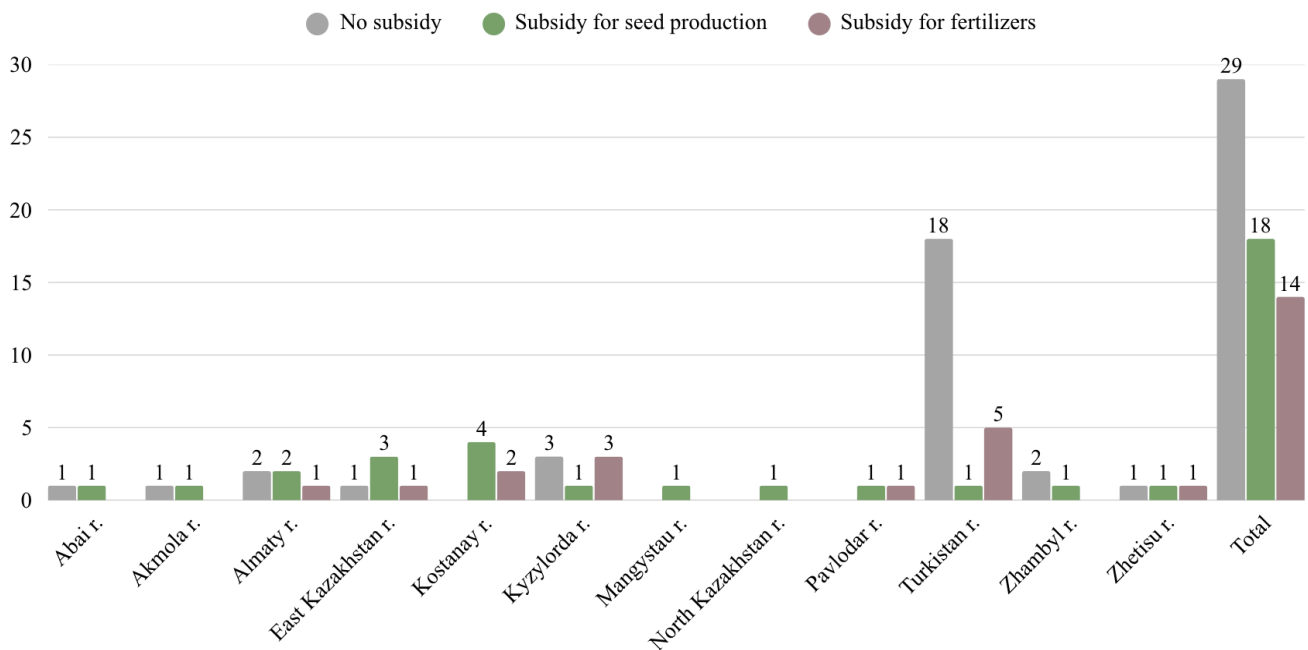


Figure 3. Descriptive summary of survey results.

4.2 Quantitative Findings

The results of the difference-in-differences regression are given in Table 1. The interaction effect of subsidy#post has a positive coefficient, meaning that on average, receiving the subsidy increases agricultural output by 153 kilograms per hectare, holding other factors constant. As shown in Figure 4, from 2023 to 2024, both groups of farmers experienced a positive growth in their yield per hectare, with subsidized farms having a steeper slope. In this regard, empirical results do not provide any evidence to support Hypothesis 2. However, the interaction coefficient is not significant ($p=0.684$), presenting no statistical evidence to support Hypothesis 1 either. Therefore, the quantitative part of the research fails to reject the null hypothesis that subsidies do not affect agricultural production.

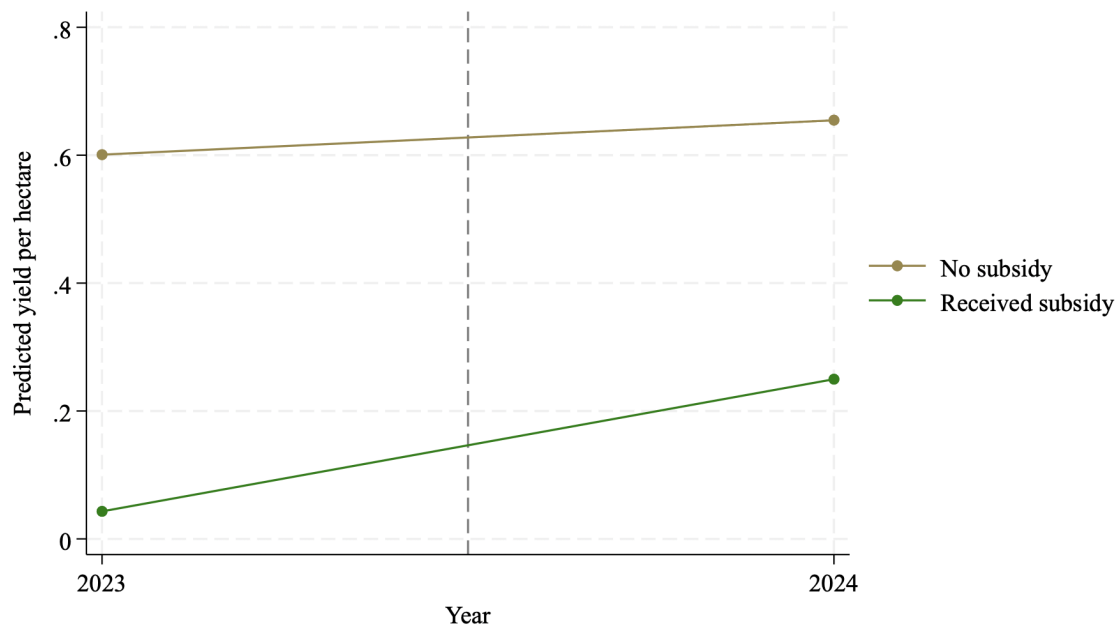


Figure 4. Difference-in-differences (DiD) plot of predicted yield per hectare by subsidy status.

Several control variables present statistically significant associations with crop growth in the studied period. Among them, experiencing environmental issues of any type significantly decreases farm yield, on average, by 850 kilograms per hectare, at 99% confidence level. Regarding the various technologies farms use, those who adopt special irrigation technologies ($\beta=0.974$) and drones or satellite imagery ($\beta=0.889$) on average have significantly higher per-hectare output growth than those who do not have any technology, *ceteris paribus*. Also, being a member of a certain cooperative is positively associated with output growth. Especially, members of cooperatives that share equipment and resources have the largest per-hectare yield growth by 1.445 tons. For other control variables, highly positively significant are having from 3 to 5 pieces of machinery ($\beta=0.824$), obtaining bank loans ($\beta=0.328$), and being an experienced farmer. Farming experience greater than 20 years is associated with the second-highest yield growth rate among all factors ($\beta=1.164$).

Table 1. Results of the difference-in-differences (DiD) regression.

VARIABLES	Yield growth per hectare	Standard error	p-value
Subsidy	-0.558	0.581	0.340
Post	0.0539	0.175	0.759
Subsidy#Post	0.153	0.374	0.684
Agricultural education	0.253	0.236	0.288
Environmental issue	-0.850***	0.263	0.002
Subsidy amount	-0.0886	0.0981	0.370
Subsidy for fertilizers	0.592	0.421	0.164
Subsidy for seed production	0.566	0.421	0.183
Technology: Drones or satellite imagery	0.889*	0.533	0.100
Technology: Special irrigation technologies	0.974*	0.523	0.067
Technology: Vertical farming	0.00117	0.191	0.995
Cooperative: Collective distribution and sales of products	0.259	0.275	0.350
Cooperative: Joint purchase of resources	0.205	0.269	0.449
Cooperative: Shared equipment and resources	1.445**	0.669	0.034
Cooperative: Training programs and knowledge-sharing	0.0795	0.509	0.876
Labor: 6-10 people	0.256	0.314	0.418
Labor: 11-20 people	0.202	0.336	0.550
Number of machines: 1-2	0.165	0.341	0.629
Number of machines: 3-5	0.824**	0.362	0.026
Number of machines: 6-10	0.322	0.375	0.394
Other financial tools: Bank loan	0.328*	0.188	0.085
Other financial tools: Borrowing	0.254	0.171	0.144
Years of farming: 1-5	0.293	0.385	0.449
Years of farming: 6-10	0.549	0.335	0.106
Years of farming: 11-20	0.903***	0.288	0.002
Years of farming: more than 20	1.164***	0.326	0.001
Constant	-2.213*	1.126	0.053
Observations	122		
R-squared	0.753		

*** p<0.01, ** p<0.05, * p<0.1

4.3 Delphi Panel Findings

Empirical evidence does not reveal a statistically significant positive relationship between farm subsidies and agricultural production, as opposed to the popular literature (Lal et al., 2023;

Nguyen et al., 2023; Petrick, 2022). Since surveys do not provide a complete picture of the subsidy program in the country, additional interviews with practitioners were conducted to understand the causes of ineffective subsidies. The Delphi panel results shed more light on how agricultural subsidies work in practice. The interviewed farmers report that they find subsidies to be useful and crucial for covering production costs. Interviews also reveal existing shortcomings of the policy, barriers to access and uptake of subsidies, administrative problems, and external constraints that limit the effectiveness of subsidies.

4.3.1 Barriers for Access and Uptake

The responses reveal various stumbling blocks to the subsidy implementation. First, farmers expressed dissatisfaction with the complex application process. While digitalization of services streamlined the process, for rural farmers with poor digital literacy, it made the application even harder. As shared by the private agency employee, “Many farmers struggle with the application because they need a special Electronic Digital Signature (EDS) for their farm. Not everyone knows how to open it.” Besides, farmers can get rejected if there are mistakes in their documents, which may discourage them from applying in the future, as they do not see a payoff after going through this long process. Application is even more difficult for small farms. Farmer 2 from a large farm reported that their applications have never been rejected since they have a lawyer who manages the documentation. Whereas smaller farming enterprises have to figure it out on their own or have to rely on private agencies that assist in the application process.

Second, information gaps and a lack of awareness about available subsidy programs emerge as a common issue among farmers. Several farmers expressed that they either lacked clear information or were unaware of some types of subsidies. Farmer 3 reported, “As ordinary workers, we do not know about such things,” referring to subsidies other than for fertilizers. Whereas Farmer 7 complained that “there is a little chance that this help [subsidy programs] will reach the farmers who really need the subsidy,” implying information asymmetries. Such limited awareness was particularly pronounced among small-sized farms.

4.3.2 Context Constraints

Even if farmers receive subsidies and put them into effective use, there are other external factors that limit their production capacities, such as environmental constraints, unstable market prices, and high input and logistics costs. One of the major sources of stress is dependence on the weather. Unexpected weather changes harm the yield as they prevent farmers from effectively

planning their farming operations. For example, Farmer 9 reported, “When we plant fertilizer, thinking it will rain, the sun comes out, or hail falls right under our feet. The risks are very high.”

Another challenge is dependence on market prices and the high cost of input products. Many farmers complained that the hard labor that goes into producing agricultural products is not valued fairly. Farmer 3 said, “No matter how well we produce the product, the factory sets a certain price, and our income will depend on it. If the price is low, we may only cover our costs.” Considering the limited storage period for fresh produce, farmers have no choice but to sell at the prices set by the market. In the same vein, the high cost of input also limits the farmers’ income. Farmer 4 claims, “Cotton is very cheap, but the vitamins and fertilizers needed to grow it are expensive.” As a result, despite the demanding work of agricultural operations, farmers’ profit remains limited due to such external constraints.

High logistics and transportation costs also emerged as one of the frequent challenges that farmers face. According to the subsidy provision agency worker, fertilizers are delivered to regional supply centers, and farmers are required to collect them themselves. Transportation vehicles are costly, and only large farms can afford them, while smaller farms have to rent trucks from outside. For example, farmers from the Turkistan region complained that fertilizers (saltpeter, carbimide, etc.) manufactured in the city of Aktau (Mangystau region) are delivered by train only to the city of Saryagash, since the railways terminate there (Figure 5). After that, farmers from the Shardara and Zhetisai districts and other remote villages must travel hundreds of kilometers to Saryagash to obtain fertilizers. As shared by Farmer 2, “many small farmers do not have their own transport and rely on private carriers, whose prices are very high.” Due to problems with the transportation of fertilizers, some farmers said it was easier to buy them at full market prices.



Figure 5. The map of the Turkistan region.

Chapter 5. Discussion

This section presents a deeper interpretation of empirical findings by incorporating qualitative data. Interviews with farmers provide various possible explanations for the similar output growth of subsidy recipients and non-recipients. Building on the results, the research claims that factors such as the use of alternative funding, environmental constraints, intermediary services, and differences in technical capacity undermine the positive impact of agricultural subsidies on output growth.

5.1 Alternative Sources of Financing

One explanation for the insignificance of subsidies for farm output growth is that farmers denied subsidies typically rely on alternative sources of funding to support their agricultural activity. This shows that the absence of subsidies does not mean the absence of investment in agricultural production. This interpretation is consistent with the broader research that suggests that agricultural productivity is largely influenced by farmers' access to capital (Khan & Kim, 2025; Kurdyś-Kujawska et al., 2025; Sanka & Makhura, 2025). Even after rejection, farmers maintain resilience and may use funding from other sources. As interviews reveal, they may turn to bank loans, borrow from relatives and friends, use personal savings, or cancel investment plans.

First, when farmers get rejected, they are often forced to rely on bank loans. Empirical findings indicate a marginal but positive association between bank loans and yield growth, suggesting that formal lending acts as a partial substitute for subsidies. This is further supported by interview data. Several farmers reported relying on bank loans to afford essential inputs such as fertilizers, seeds, and machinery. However, Farmer 7 emphasized that since repayment obligations persist despite production outcomes, bank loans “create additional pressure on farmers.” Nevertheless, lending from banks remains one of the limited practical ways for farmers to sustain production.

Second, when both subsidies and formal credit are absent, farmers usually resort to informal borrowing from relatives and friends. However, regression analysis and interview evidence indicate that this type of financing exhibits limited impact on agricultural productivity, serving mainly as a short-term coping mechanism. These funds are typically small, irregular in availability, and insufficient for financing productivity-enhancing inputs, so they are used to cover recurring costs. Accordingly, Farmer 8 reported that despite his relatives and friends helped him financially at certain times, he “felt embarrassed to keep asking them for money to cover big expenses.” In contrast, Farmer 7 complained that because the majority of income goes to repay these loans, farmers usually end up without sufficient funding “to invest in other things, such as better tools, seeds, and technology.”

Therefore, the role of informal lending remains limited to supporting immediate production expenditures only.

Third, when they are denied subsidies, initially, farmers mostly use their personal savings to cover basic costs. In many cases, the source of these savings could be excess output subsidies received in previous years. Farmer 8 shared that he “would cover the expenses for the new season with the subsidy given for the previous year’s crop.” When his farm was receiving guaranteed subsidies for produced output, he was less reluctant to sell his cabbage for a lower price buyers asked because they “would still make a profit after receiving the subsidy.” As such, subsidies acted as a source of income. However, after output subsidies stopped in 2019, his farm incurred huge losses and almost went bankrupt. To cover the costs for seeds, machinery, irrigation, and employees’ salaries, Farmer 8 used his personal savings that were easily depleted. Before, when he was consistently receiving subsidies, he would replenish his savings regularly, but since subsidies were terminated, he quickly ran out of personal savings. As a result, he had to seek help from his family, friends, and local financial institutions.

In addition, farmers may cancel their investment plans to cover basic expenses that they expected subsidies would cover. When asked about how the rejection of subsidies affected the farm activities, Farmer 6 said that he had “planned to use subsidies to build a greenhouse from steel, which requires a lot of money, but since [his] application was rejected, [he] had to pause the construction of the greenhouse.” Following the unsuccessful attempt, at first, he used his own money to fund the construction, but in the end was forced to ask for a loan from his friends personally and via Facebook. Due to the rejection, his greenhouse plans were delayed for years, and only in 2025 could he collect enough to invest in the development of his farm.

5.2 Dependence on Intermediaries

The impact of subsidies could also be diminished due to the invisible cost of intermediaries in both the application process and delivery of subsidized inputs. The formal design of input subsidies implies cost reductions for farmers with up to 40-60% compensation for the purchase of seeds and fertilizers (MoJ, 2020). In reality, a considerable share of these benefits is absorbed by additional costs for private agents facilitating application procedures and transportation services, reducing the real amount of compensation.

The first bottleneck that reduces the effectiveness of subsidies is the demand for administrative assistance in the application process. As interviews show, acquiring and managing corporate EDS is hard for farmers who lack technical capacity. Considering that errors in the documentation act as the

main reason for rejection, these farmers have to seek assistance from private agents to ensure compliance with formal requirements. Although these intermediaries increase access, it creates additional costs that are not included in the calculation of subsidies. Consequently, farmers do not receive the full benefits of subsidized inputs. The second channel through which the value of subsidies is diluted comes from transportation costs. According to interviews, many small farms have to rent large trucks to transport seeds and fertilizers from regional input distribution centers back to their farms. As a result, this system also redistributes a share of subsidy benefits from small farmers to private agencies.

Together, these interview findings provide reasonable explanations for statistically insignificant effects of subsidies despite the overall consensus expressed by the farmers about the benefits of subsidies. On the one hand, the unintended redistribution of benefits could act as a positive factor that creates new job opportunities by necessitating private intermediaries that provide these services. However, the existing system disproportionately affects smaller farms, making the effective rate of subsidies significantly lower than the nominal levels established by the government. This can push such farmers away from subsidies, as going through the demanding application process might not be worth the marginal deduction in prices. Generally, this implies that subsidies could be selectively beneficial only for larger farms. Hence, this research calls for revisions in the current implementation system to ensure the effectiveness and equity across farms with different capacities.

5.3 Environmental Constraints

Another factor that may have outweighed any strong positive contribution of subsidies on yield growth is environmental issues. As regression results demonstrate, output growth is highly dependent on natural constraints. This finding contributes to the broader literature that claims that climate and ecological conditions are crucial determinants of agricultural production (Habib-ur-Rahman et al., 2022; Suchkov et al., 2022). Factors such as temperature fluctuations, water scarcity, and high levels of pests may directly affect plant growth and lead to crop failure, regardless of external intervention.

When asked about the hardships of farming activities, almost all interviewees mentioned weather volatility. The agronomist from the Almaty region (Farmer 9) shared that “the biggest difficulty that all farmers face is the dependence on weather.” Farmers from various regions confirmed this worry. For instance, Farmers 3 and 7 from the Turkistan and East Kazakhstan regions, respectively, reported that the sowing process usually starts in April, but if the weather is not favorable, then it is postponed to May, which may result in the harvesting season starting later than

usual. This may place farmers at a disadvantage in water access, as earlier-sown farms may deplete available water resources.

Water shortage and low water quality are other frequently mentioned problems that hinder plant growth. Water is a key input in crop production, and yield directly depends on its availability (FAO, 2023). A substantial body of literature confirms that water scarcity threatens agricultural productivity and sustainability (Chartzoulakis & Bertaki, 2015; Naeem et al., 2024). Water shortage is a pressing issue in Kazakhstan. The agricultural sector is the major consumer of water in the country, with about 98% of consumption coming from the southern regions (Kwan, 2025). In line with these statistics, farmers from the south consistently emphasized the issue of water scarcity during interviews. Farmers from the Turkistan and Zhambyl regions said that they have long suffered from the issue, and some of them even developed drip irrigation systems to halt the deficit.

Farms also reported suffering from various pests. Insects like worms, mites, and locusts damage crops, thus significantly reducing the yield. They transmit plant diseases, and a severe pest infestation can destroy an entire crop, causing huge production costs and losses of 20-40% of the global crop (FAO, n.d.). Farmers 3 and 4 shared that they use various pesticides as well as fertilizers to prevent the crop from being eaten by insects. Most popular fertilizers include saltpeter or ammonium nitrate grade B (NH_4NO_3), carbimide ($\text{CO}(\text{NH}_2)_2$), and ammophos plus ($\text{NH}_4\text{H}_2\text{PO}_4$).

5.4 Farm Technical Capacity

The regression results suggest that farm-level technical capacity is a stronger determinant of agricultural output than subsidy support. Several indicators, such as the use of special technologies, the number of machines, and experience that together form the technical capacity of farmers, proved to have a statistically significant relationship with yield growth, supporting the existing literature (Korsa & Labata, 2022).

One of the important dimensions of technical capacity that increases output is the use of special technologies. Namely, the regression analysis shows that special irrigation technologies and drone imagery have positive effects on yield growth. Interview evidence reveals that adoption of special systems does not necessarily depend on subsidy support but rather on individual initiative. For instance, Farmer 6, who never received subsidies, implemented drip irrigation by independently using online resources and personal funds. Overall, it can be argued that technologies increase output, and their adoption does not require subsidies, yet it could be connected to other factors since not many farmers use them.

Secondly, the availability and amount of machinery also serve as an integral part of technical capacity that conditions agricultural output. It directly affects production costs, efficiency, and the correct timing of agricultural operations. As it was already mentioned, not owning machinery drives up the cost of certain production processes, such as transportation, since farmers have to rent it. Aside from that, reliable access to equipment means that farmers can prepare land, sow crops, and harvest at the optimal time windows. Farmer 2 explained that one of the most important aspects of their job is completing sowing on time, which is dependent on machinery functioning properly. This supports the regression results that moderate levels of machinery increase output, while minimal amounts were not significant.

Lastly, farming experience was found to be a significant determinant of yield growth, which validates earlier studies (Danso-Abbeam & Baiyegunhi, 2019). This shows that accumulated knowledge and skills serve as an important form of human capital that enables optimal decision-making. The examples could include strategic and informed choices about risk management measures, input selection, handling subsidies, and production planning. As Farmer 2 with 14 years of experience reported, the results depend more on the level and quality of investment per hectare than on subsidies. Therefore, experience serves as an indispensable form of human capital that enables optimized resource use to maximize output.

Chapter 6. Conclusion

6.1 Research Summary

This study examines the effectiveness of agricultural subsidies on developing crop production in Kazakhstan using quantitative analysis followed by qualitative insights. While the results of the difference-in-differences method indicate a positive association between subsidies and yield growth, the estimated effects remain modest and statistically insignificant in the short term. However, the paper finds that subsidies do not inherently have an insignificant impact on agricultural output. Qualitative evidence points to the broader value of subsidies in improving farmers' short-term resilience by alleviating financial burdens and reducing input costs. Interviews reveal that the yield growth of those who did and did not receive subsidies may have no major difference because the rejected farmers remain resilient and often turn to other financial sources to compensate for the loss of subsidies, hence maintaining a sustainable level of production.

Overall, the research argues that in the short term, agricultural subsidies have a limited effect on farm output growth, not because they are necessarily irrelevant, but because their impact may be offset by farms' access to substitute financial instruments, high costs of intermediary services, environmental constraints, and farm technical capacity. In addition, the study demonstrates that the implementation of subsidies is also constrained by administrative complexity, information-access barriers, and logistical bottlenecks. Therefore, reforms to the implementation process and additional support mechanisms for farmers are crucial to ensure that subsidies effectively lead to meaningful productivity gains in Kazakhstan.

6.2 Policy Recommendations

Although the quantitative analysis failed to confirm the effectiveness of agricultural subsidies, the qualitative part reveals underlying barriers that prevent the subsidies from being used to their full potential. Moreover, interviews present subsidies as an essential form of government support on which many farmers depend for subsistence, income, and basic coverage of production costs. Therefore, considering that the problems in subsidy provision arise mainly at the implementation stage, the study suggests that the Ministry of Agriculture continue the subsidy policy with targeted improvements. Based on the findings, the following cost-effective and system-optimizing recommendations are provided to increase the effectiveness of agricultural subsidies.

First, the indirect application and transportation costs have to be internalized, shifting the financial burden from small-sized farmers to the MoA. This would make the existing system more fair and accessible. To achieve this, the functions of district-level agricultural departments could be

expanded to include local one-stop service centers and district-level input distribution. Currently, without counting the big cities, there are a total of 176 districts in Kazakhstan, and each has its own agricultural department under the MoA (BNS, 2025c). Thus, the proposed solution would not require large structural changes as it works on the premises of existing governmental bodies. The one-stop service centers would help farmers understand program requirements and apply for subsidies independently, streamlining the provision of subsidies. Whereas district-level input distribution would remove the need to arrange transportation by delivering inputs directly to villages. In this process, public-private partnerships with private intermediaries are strongly encouraged. The government could sign contracts with accredited logistics firms and reimburse their costs. Bringing subsidies closer to farmers would remove transportation costs and ensure that farmers receive inputs promptly, enhancing the reliability and predictability of the subsidy program.

Second, a targeted information and awareness campaign is necessary to facilitate farmers' access to relevant subsidy programs. As regression analysis shows, factors that constitute the technical capacity of farms, such as machinery and special technologies, have a positive impact on output growth. Consequently, subsidies that aim to incentivize investment in capacity-increasing activities should be given more attention. This logic can also be backed by existing literature that argues that technology-oriented investments can be even more effective than input subsidies (Kumar & Joshi, 2014). However, many farmers are not sufficiently aware of the available subsidy programs, as was identified during interviews. These information gaps disproportionately disadvantage small producers, hindering their access to eligible support. Therefore, a proactive information and awareness campaign is recommended. Farmers registered on the GosAgro.kz portal could receive automated notifications via mobile phone, either through SMS or WhatsApp, about new subsidy programs and the opening of applications. Such targeted communication would enable farmers to access more beneficial subsidy programs in a timely manner and minimize the likelihood of missing application deadlines.

Third, the GosAgro.kz portal should be optimized amid the persistent information asymmetries regarding available agricultural subsidy programs. Specifically, the current requirement to use a farm-registered EDS even for accessing basic information, such as eligibility for subsidies and provision terms, creates additional barriers. To strengthen the service delivery of the portal, an alternative authentication mechanism, as exemplified by verification through SMS or login via one-time password, should be introduced. Additionally, essential information, including required documents and deadlines, should be provided in open-access pages, while EDS authentication should be required only for application submissions.

The Ministry of Agriculture could further improve this platform by creating a dedicated

section on the official website for the experience-sharing of successful farming cases. This page could present detailed examples of how different farms have successfully utilized subsidies to boost productivity, farm modernization, and invest in innovative technologies. Experience-sharing could be demonstrated through interviews with farmers from different backgrounds. To facilitate this process, the MoA could also conduct targeted research, focusing on areas with high returns on agricultural investment. This is essential to provide farmers with information on where to direct capital to achieve self-sufficiency in the long term. Such an initiative would promote peer-to-peer learning and informed decision-making among farmers.

6.3 Limitations and Future Research

While the study provides valuable insights, several limitations should be acknowledged. First, the panel design involving only two years does not allow for observing the long-term impact of subsidies. Long-term availability or nonavailability of subsidies may influence the farming activities and farmers' decision-making in different ways, not revealed in this study. Thus, the authors suggest that future research should study the effect of subsidies across many years to present a comprehensive picture.

Next, due to the complex nature of agricultural subsidies, the paper focuses only on crop subsidies. Agricultural subsidies in Kazakhstan are provided for various other purposes such as the development of livestock, fisheries, and forestry, enhancement of agricultural processing, reimbursement of interest rates on loans, involvement of small- and medium-sized farms in agrocooperatives, etc. Examining only crop subsidies means the findings cannot be generalized to make conclusions about the effectiveness of subsidies distributed for other purposes. Besides, the research sample covers only input subsidies for fertilizers and seed production, leaving output subsidies and ex post reimbursement subsidies, such as for pesticides and water and irrigation services, outside the study's scope. The fact that farmers often receive such subsidies after harvest or towards the end of the growing season makes it difficult to study their impact on production in conjunction with input subsidies. Hence, future research should examine ex post subsidies to complement the existing research.

Lastly, the sample size for the survey and interviews is limited. The regression analysis has been conducted using 61 responses, and only 10 interviews were held as a Delphi panel. Therefore, future research should involve more respondents and other regions of Kazakhstan. Studying farmers' behavioral patterns from additional perspectives in the event of refusal also deserves scholarly attention. This paper only writes about the alternative financing sources that farmers turn to, and

further research is needed to explore deeply how farmers respond to subsidy denial.

6.4 Policy Implications

The study findings highlight the need to improve farmers' access to finance, technology, and efficient input delivery mechanisms, as well as the need to create stronger incentives for innovation and investment. By following the recommendations outlined in this paper, policymakers can overcome existing shortcomings in the implementation phase of the subsidy program. The system improvements proposed in this study reflect the needs of farmers, the perspectives of people who should benefit from subsidy policies. However, as long as existing shortcomings persist, subsidies may continue to fail to achieve their objectives. Policymakers should, therefore, prioritize ensuring that subsidies reach their intended targets in an affordable manner and allow farmers to enjoy the full value of government support.

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Appendices

Appendix 1. Objectives and Expenditures of the National Project for the Development of the AIC of the Republic of Kazakhstan for 2021-2025 (in billion tenge). Source: Authors' interpretation of the Ministry of Agriculture.

Objectives	Subsidies	Credit (loans)	Leasing	Insurance	Infrastructure investment	Science investment	Total
1. Increase the labor productivity	1,308.5	77.3	79.4		17.4	101.4	1,583.9
2. Increase the availability of basic food products of domestic production	127.8				913.4		1,041.2
3. Increase the export of agricultural products and the share of processed products	87.7				867.0	57.2	1,011.9
4. Increase the incomes of rural residents	797.7	503.5		3.8	2.4	16.8	1,324.1
Total	2,321.7	580.8	79.4	3.8	1,800.2	175.4	4,961.1
Share of total	46.8%	11.7%	1.6%	0.1%	36.3%	3.5%	100%

Appendix 2. Objectives and Expenditures of the State Program for the Development of the Agro-Industrial Complex for 2017-2021 (in billion tenge). Source: Petrick et al. (2018).

Objectives	Subsidies	Credit (loans)	Infrastructure investment	General services	Total
1. Involvement of small and medium-sized farms in agricultural cooperation				2.0	2.0
2. Saturation of the domestic market and development of the export potential of domestic products	876.4	300.0		120.3	1,296.7
3. Effective use of financial measures of state support	383.7				383.7
4. Effective use of water resources			355.9	3.7	359.6

5. Creation of conditions for efficient use of land resources			295.3	32.8	328.1
6. Increase of agricultural producers' sufficiency with machinery and chemicals					
7. Development of trade and logistics infrastructure					
8. Scientific and technological, personnel, and information-marketing support of the agro-industrial complex				4.1	4.1
Total	1,260.1	300.0	651.2	162.8	2,374.2
Share of total	53.1%	12.6%	27.4%	6.9%	100%

Appendix 3. Descriptive summary of interview results with farmers.

Name	Region	Crop	Type of Subsidy	Years of Farming
Farmer 1	Kyzylorda region, Zhanakorgan district	Cotton, cabbage, tomato, melon, watermelon	Subsidy for fertilizers, Subsidy for seed production	5 years
Farmer 2	North Kazakhstan region	Sunflower, flax, wheat, barley, oats	Subsidy for fertilizers, Subsidy for investment, Subsidy for seed production	14 years
Farmer 3	Turkistan region, Zhetisai district	Cotton	Subsidy for fertilizers	8 years
Farmer 4	Turkistan region, Zhetisai district	Cotton	Subsidy for fertilizers	10 years
Farmer 5	Turkistan region, Shardara district	Corn, sunflower	Subsidy for fertilizers	5 years
Farmer 6	Turkistan region, Ordabasy district	Tomato, cucumber, strawberry, lemon, cabbage	No subsidy (rejected)	15 years

Farmer 7	East Kazakhstan, Zaisan district	Spring wheat	No subsidy (rejected)	7 years
Farmer 8	Zhambyl region, Shu district	Cabbage, alfalfa	No subsidy (terminated)	9 years
Farmer 9 (Agronomist)	Almaty region	Apple, raspberry, strawberry	No subsidy (not applied)	2 years