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PATHWAYS TO ORGANIC CONVERSION IN KYRGYZSTAN: MOTIVATIONS, BARRIERS, AND IMPLICATIONS

Igor **Taranov**[1*], Yoshiko **Kawabata**[2], Takeshi **Maru**[2]

[1]Tokyo University of Agriculture and Technology. United Graduate School of Agricultural Science. 3-5-8 Saiwai-cho, Tokyo, Japan.
[2]Tokyo University of Agriculture and Technology. Institute of Agriculture. 3-5-8 Saiwai-cho, Tokyo, Japan
* Author for correspondence: taranov451@gmail.com

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ABSTRACT

Kyrgyzstan and the global community consider organic farming as a crucial element of sustainable agricultural growth. Kyrgyzstan is advocating for organic agriculture; nevertheless, due to low conversion rates, more effective measures are required. This study aims to explore the motivations for converting to organic farming and the challenges faced by farmers in the Issyk-Kul province of Kyrgyzstan. A survey of 142 certified organic farmers from four aimaks in the Issyk-Kul province, Kyrgyzstan, was analyzed using descriptive statistics and confirmatory factor analysis to examine motivations for organic farming and post-conversion challenges. The results indicate that farmers' decisions to transition to organic farming were primarily driven by environmental and health concerns, while pro-environmental ideologies and visionary motivations had comparatively less influence. Key challenges faced after conversion included limited access to agricultural inputs and difficulties with market access. Education levels and dependence on organic farming as a primary income source were significant factors influencing the decision to adopt organic practices. This study provides important insights into the drivers and barriers of organic farming in Kyrgyzstan. To promote organic agriculture effectively, policymakers must address challenges related to agricultural inputs and market access while considering the connections between education, livelihoods, and motivations for adopting organic practices.

Keywords: organic farming, organic aimak, sustainable agriculture, economic feasibility.

INTRODUCTION

Organic farming has appeared as a response to the destructive effects of modern industrial production systems and a solution to overcome the growing disbalance between humanity and the surrounding environment. It has demonstrated enormous potential to unite ecological farming techniques and the conceptual core of sustainability while ensuring adequate levels of food production (Ume, 2023). Successful market promotion has made organic farming one of the most dynamic and rapidly expanding sectors of sustainable agriculture (Moyer and Sinclair, 2020; Trusova *et al.*, 2021b).

Despite the substantial growth of the global organic market's turnover, problematic aspects of the organic sector's development can be observed in many regions worldwide, regardless of the economic power of the countries and governmental support. For instance, Siepmann and Nicholas (2018) emphasize that the goals of reaching 20 % organic areas in Germany by 2010 remained unattainable and were postponed. According to Kociszewski *et al*. (2020), only 5–15 % of all farms can convert to organic agriculture in Poland. Dissatisfaction with the pace of organic conversion was expressed by other researchers representing developed countries (Cranfield *et al*., 2009; Han *et al*., 2021). Thus, the organic conversion process is an indispensable part of a global organic agenda with persistent acuteness for the overall success of global and regional organic movements. Against this background, scientists and policymakers have posed the question of organic conversion and its facilitation (Madelrieux and Alavoine-Mornas, 2012; Läpple and Kelley, 2013; Hofmann *et al*., 2022).

The basis of the current study was an analysis of the "Organic aimak" project implemented by the Federation of Organic Development (FOD) "Bio-KG," which was established in 2012 after the First National Organic Forum in Kyrgyzstan (FAO, 2020). FOD "Bio-KG" promotes Participatory Guarantee Systems (PGS) as an alternative to the costlier third-party certification in Kyrgyzstan and supports smallholders by disseminating relevant information, organizing fairs and exhibitions of organic produce, and certifying farmers in organic aimaks (administrative territorial units under district level). The private organic standard developed by FOD "Bio-KG" was recognized by the International Federation of Organic Agriculture Movements (IFOAM). The organic aimak approach is advocated by the Kyrgyz government and is expected to serve as a national model for the promotion of organic principles and practices. Also, PGS certification is recognized by the Kyrgyz organic agriculture legislation (Karabassov *et al*., 2022; Ranjan *et al*., 2019).

Residents of the organic aimaks made collective decisions to farm organically and withdraw from the use of chemicals. The organic aimak model of development of organic farming in Kyrgyzstan is unique in the sense of aligning organic principles with the mindsets of Kyrgyz farmers and the cultural and historical aspects of agriculture. In other words, the overarching goal of the organic aimak model is not to radically modify but rather harmonize local and global advancements in organic agriculture.

Decades of research on organic conversion have allowed the observation of certain commonalities in farmers' motivations to convert. Studies such as those conducted by Aoki (2014) and Han *et al*. (2021) have shown that motivational factors often include financial motives. Similarly, Bui and Nguyen (2020) demonstrated that financial considerations influenced farmers' decisions to convert to organic farming. Market access was described by Liu *et al*. (2019) as a main conversion factor. On the other hand, Siepmann and Nicholas (2018) found that personal ideologies and networking are vital to ensure organic conversion. Kociszewski *et al*. (2020) pointed out that farmers' and their families' health and environmental conservation factors influence farmers' decisions to convert to organic farming. However, it is common that researchers find multiple conversion motivations and their confluence.

In addition to motivational factors, numerous studies have explored the obstacles associated with conversion to organic agriculture. Bui and Nguyen (2020) emphasize that the lack of knowledge on organic farming and insufficient financial support are the main impeding factors, whereas Liu *et al*. (2019) argue that lower yields and the educational background can be barriers for organic conversion. In their overview of organic farming in India, Avasthe *et al*. (2019) identified various obstacles to organic conversion, such as the lack of available organic fertilizers and plant protection means, a poorly developed organic market to obtain premiums, insufficient knowledge and skills to engage in organic agriculture, lack of governmental support, and relevant agricultural policies to support the promotion of organic farming. Partap (2010) detailed some of the key constraints emerging during the pre-adoption stage and confronting farmers in Asian countries, such as the deeply ingrained structural problems of the agricultural sector associated with small land plots and lacking alternatives to ensure food security on a farm level. Obviously, the promotion of agroecological approaches, including organic farming, and the introduction of better land-use patterns require a deeper understanding of farmers' motives to adopt one or another agricultural practice (Marr and Howley, 2019; Papanikolaou *et al*., 2024; Salvador *et al*., 2022).

Motivations for conversion to organic farming must be at the center of researchers' efforts to understand farmers' mindsets and inform decision-making processes (Király *et al*., 2022; Shahini *et al.,* 2022). Bolis *et al*. (2017) found that sustainable development was, in many ways, determined by decision-making. In turn, decisions are influenced by socio-economic and environmental factors. As farmers' motivations and conversion barriers influence decisions, changes in attitudes and motives represent acute sustainability issues. These factors may be common to all countries and touch upon similar dimensions, such as economic, political, environmental, social, philosophical, and technical. However, visible commonalities vary in intensity and influence on the resulting farmers' choices. It entails the need for an individual approach to each case of organic promotion, even within a given country (Mendes *et al*., 2022; Manta *et al*., 2023). This aspect of organic conversion prompted the present research in the context of organic farming in the Issyk-Kul province of Kyrgyzstan.

The emergence of organic farming in Kyrgyzstan is difficult to trace back. Lack of available studies, statistical data, and the absence of the term "organic agriculture" in Kyrgyz legislation until recently represent obstacles for researchers. It may be assumed that numerous smallholders experienced significant financial difficulties after the abrupt end of the Soviet era's centralized governmental support and had to farm organically, although unintentionally and unknowingly. A similar pattern of informal non-certified organic farming has been reported by some researchers (Aoki, 2014; Mero *et al*., 2023). After gaining independence in 1991, Kyrgyzstan pursued a market economy paradigm that sharply changed farming patterns. State-led agricultural complexes (known as "kolkhoz" and "sovkhoz") were dismantled, and their lands were distributed (Lerman and Sedik, 2009).

To date, the Kyrgyz government's strategic vision is fully associated with organic principles and organic farming as a framework for current and future agricultural

development. This vision is reflected in the main strategic policy document, namely, the National Development Strategy of the Kyrgyz Republic 2018–2040. The government's adoption of a five-year action plan in 2017 aimed to augment the number of certified and non-certified organic farmers to 20 thousand by the end of 2022. However, the government's commitment was confronted with the evident problem of a low conversion rate. According to the latest statistics from IFOAM, the total number of organic farmers in Kyrgyzstan reached 1144 in 2021, including those in conversion (Willer *et al*., 2023). Moreover, in 2022, there were 1097 PGS organic farmers and 3000 PGS producers involved (Anselmi and Castro, 2023). Available statistical data illustrate that the planned indicators have yet to be developed.

The main purposes of this study are to improve the understanding of organic conversion patterns in Issyk-Kul province, Kyrgyzstan, by investigating the motivation factors and barriers after transition and to examine the relationship between the motivations and demographic variables. To achieve these purposes, a questionnaire-based survey was conducted among organic farmers in four organic aimaks. This study represents the first scientific attempt to investigate the motivational factors for organic conversion and their respective barriers in organic aimaks. The Theory of Planned Behavior (TPB), a framework that examines how attitudes, perceived social pressure, and perceived ability to perform a behavior shape intentions and actions, was applied alongside a confirmatory factor analysis. The findings are expected to shed light on the current processes in the Kyrgyz organic sector and inform decisions taken by stakeholders.

MATERIALS AND METHODS

The study concerns organic farmers of the Issyk-Kul region of Kyrgyzstan, bordering Kazakhstan and China. The region covers 43 100 km^2 and has a population of more than 500 000 people, mostly rural residents (NSCKR, 2021). Issyk-Kul province grows various organic crops: potatoes, apples, garlic, carrots, apricots, berries, and medicinal plants. Lake Issyk-Kul has the status of a protected ecological and economic zone. This status was granted under the Law of the Kyrgyz Republic No. 115 "On sustainable development of the ecologic-economic system of Lake Issyk-Kul". The Issyk-Kul province of Kyrgyzstan was chosen for this study due to its considerable popularity among tourists, economic potential, favorable climate, and the need to protect the environment. The study covered four organic aimaks: Aral, Kun-Chigysh, Aksuu, and Tosor (Figure 1), using information from certified organic farmers from these aimaks. According to the Bio-KG, in 2022 there were 398 certified organic farms, including 171 in Aral, 153 in Aksuu, 58 in Kun-Chigysh, and 16 in Tosor (FAO, 2020). All participants had a PGS certificate.

A questionnaire was developed based on a literature review, interviews with organic farmers, discussions with experts in organic agriculture, and the TPB—a framework widely used to understand decision-making, including farmers' choices to adopt organic farming (Maleksaeidi and Keshavarz, 2019). The TPB posits that behavioral

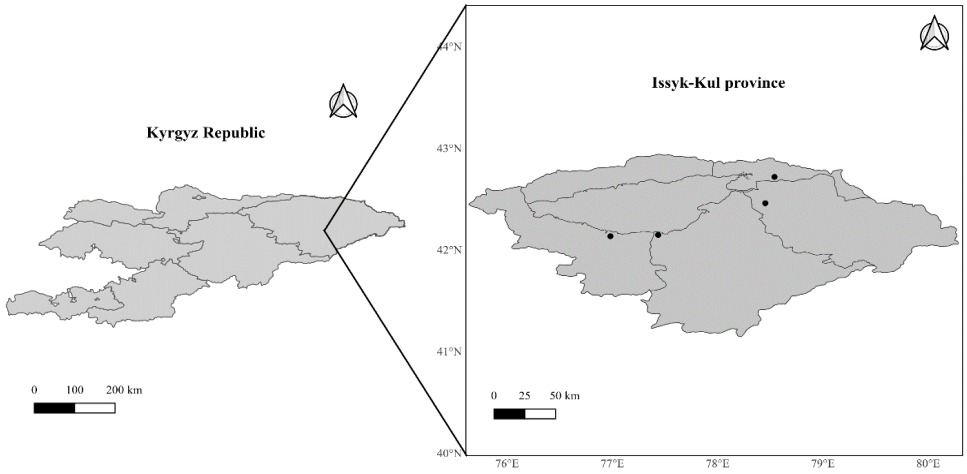

Figure 1. Map of the study area. Black dots show the locations of the organic aimaks (Aral, Aksuu, Tosor, and Kun-Chigysh – clockwise).

intentions are influenced by attitude, subjective norm, and perceived behavioral control. Attitude reflects the individual's perception of the benefits of a behavior, subjective norm refers to social pressure, and perceived behavioral control captures the perceived ease or difficulty of performing the behavior. These factors jointly determine intention, which predicts behavior. The flexibility of the TPB allows for the inclusion of context-specific variables, making it suitable for analyzing the motivations and barriers faced by Kyrgyz farmers in transitioning to organic farming (Tama *et al*., 2021; Yang *et al*., 2022; Khazieva, 2022). Its validity in studying farmers' behavioral patterns has been demonstrated in multiple studies, confirming its relevance to this research (Han *et al*., 2021; Yang *et al*., 2022; Zhang *et al*., 2020; Senger *et al*., 2017).

The questionnaire survey was conducted in December 2022 among about 40 % of organic farmers from the four selected organic aimaks in the Issyk-Kul province. The criteria for the selection of respondents were: organic certification, membership in the "Organic aimak" project, and cultivation of plants. Questionnaires were distributed to 160 randomly selected PGS-certified organic farmers, of whom 158 completed the questionnaires (98.75 % response rate). All respondents signed an informed consent form. After removing 16 duplicate questionnaires, the sample size was settled at 142 respondents.

The collected data was analyzed using descriptive statistics to summarize the demographic and farm characteristics. Data analysis was performed using R and the lavaan package (Rosseel, 2012). Variables with Kaiser-Meyer-Olkin (KMO) value <0.7 and factor loadings <0.5 were excluded (Shrestha, 2021). Confirmatory factor analysis (CFA) was conducted to evaluate 12 conversion motivation variables and 7 post-conversion barrier variables. Internal consistency was assessed using Cronbach's alpha and Raykov's rho, while model fit was evaluated with fit indices, including Root

Mean Squared Error of Approximation (RMSEA), Standardized Root Mean Square Residual (SRMR), Comparative Fit Index (CFI), and Tucker-Lewis Index (TLI).

RESULTS AND DISCUSSION

The sample included a diverse group of respondents (Table 1), predominantly male (88.7 %) and aged between 56–65 years (42.9 %). Most respondents were from the Aral (43.7 %) and Aksuu (37.3 %) aimaks, reflecting the uneven distribution of organic farmers across the region. Educational backgrounds varied among the participants, with 64.1 % having completed higher education and 35.2 % holding vocational qualifications. However, only 7 % of the respondents had professional agricultural education, indicating a potential gap in specialized knowledge related to organic farming.

Table 1. Respondents' profile and farm characteristics (n=142) evaluated in four organic aimaks in the Issyk-Kul province, Kyrgyzstan.

Variables	Description	Frequency	%
Sex	1 = Male	126	88.7
	0 = Female	16	11.3
Age (full years)	≤35	13	9.2
	36–45	16	11.3
	46–55	49	34.5
	56–65	61	42.9
	>65	3	2.1
Location of the interviewed organic farmers (by organic aimak)	Aksuu	53	37.3
	Aral	62	43.7
	Kun-Chigysh	21	14.8
	Tosor	6	4.2
Education background level	Secondary school	1	0.7
	Vocational education	50	35.2
	Higher education	91	64.1
Professional agricultural education	1 = Yes	10	7
	0 = No	132	93
Size of organic farmland (ha)	≤1.1–2.0	28	19.7
	2.1–3.0	69	48.6
	3.1–4.0	31	21.8
	>4.0	14	9.9
Experience of organic agriculture	≤5 years	26	18.3
	6–10 years	114	80.3
	>10 years	2	1.4
Organic farming as a main income source	1 = Yes	109	76.7
	0 = No	33	23.3

The size of organic farmlands ranged from small holdings of 1.1–2.0 ha (19.7 %) to larger plots exceeding 4.0 ha (9.9 %), with 48.6 % of farmers cultivating land within the 2.1–3.0 ha range. The majority of the farmers (80.3 %) had 6–10 years of experience in organic farming, while 18.3 % had less than 5 years of experience. Organic farming was reported as the primary income source for 76.7 % of the participants, while 23.3 % relied on additional income sources, including school teaching, municipal service, animal husbandry, beekeeping, and small-scale businesses.

Confirmatory factor analysis of motivations for organic conversion

To understand what motivates farmers to switch to organic farming, respondents were asked to select one appropriate option from a five-point Likert scale (from 1 "strongly disagree" to 5 "strongly agree") to share their attitudes (Table 2). There are three motivational factors, namely the environmental and human health, motivation of pro-environmental ideology, and vision-supportive motivations.

Standardized factor loadings of 0.5 or higher were considered acceptable for inclusion in the model, with values above 0.7 indicating stronger contributions. Consequently, three indicators loaded significantly on Factor 1, two indicators loaded significantly on Factor 2, and one indicator of Factor 3 had significant loading. One indicator in Factor 3 demonstrated close significance (0.681). Two other indicators had acceptable loadings (>0.5). Among the five indicators of Factor 1, three indicators loaded the highest. The indicator "I wanted to improve soil fertility and its health on my farm" has the highest factor loading, followed by "I thought organic farming would increase my longevity" and "I wanted to care about Issyk-Kul Lake." Factor 2 consists of three indicators, of which "I considered my farm as a part of nature" loaded significantly, followed by "Organic farming fits my ethical views." The indicator "I wanted to follow my religious traditions based on environmental stewardship" was of lesser significance but with the acceptable factor loading. The indicator "I had a vision of my farm as a prosperous organic enterprise" has the highest loading for Factor 3. Closely related to it is the indicator "I wanted to provide the local community and potential consumers with healthy produce," followed by "I wanted to reduce the overall costs by excluding chemicals from the production process."

The explored factors have good internal consistency and acceptable construct reliability (Cronbach's alpha >0.7; Raykov's rho >0.7). The robust fit indices of the CFA model (Table 3) for farmers' organic conversion motivations demonstrated acceptable fit indices.

Confirmatory factor analysis of barriers after conversion

To identify barriers after organic conversion, the surveyed organic farmers were asked to assess the challenges they faced after the conversion period by choosing one option from a five-point Likert scale (from 1 "not at all" to 5 "extremely serious"). CFA resulted in a two-factor model covering the factors of agri-input deficiency and market access challenges. All indicators of Factor 1 and one indicator of Factor 2 had

Table 2. Factors, factor loadings, measurements, and coefficients of observed variables for the confirmatory factor analysis (CFA) model of motivations for organic conversion in four organic aimaks in the Issyk-Kul province, Kyrgyzstan.

Factors and their indicators	Factor loadings	Mean	SD	Cronbach's alpha	Raykov's rho (omega)	*p*-value
Factor 1: Environmental and human health						
I wanted to care about future generations	0.635	4.65	0.57			
Organic farming would positively contribute to the environment	0.672	4.63	0.58			
I wanted to improve soil fertility and its health on my farm	0.775	4.51	0.70	0.84	0.82	0*
I wanted to care about Issyk-Kul Lake	0.709	4.43	0.67			
I thought organic farming would increase my longevity	0.742	4.39	0.70			
Factor 2: Motivation of pro-environmental ideology						
I considered my farm as a part of nature	0.833	3.39	0.72			
Organic farming fit my ethical views	0.704	3.27	0.71	0.74	0.74	0*
I wanted to follow my religious traditions based on environmental stewardship	0.578	2.42	0.80			
Factor 3: Vision-supportive motivations						
My farm design and operations were suitable for easier conversion	0.53	3.70	0.64			
I wanted to provide the local community and potential consumers with healthy produce	0.681	3.59	0.75			
I wanted to reduce the overall costs by excluding chemicals from the production process	0.665	3.51	0.78	0.71	0.77	0*
I had a vision of my farm as a prosperous organic enterprise	0.70	3.17	0.53			

*Significant at $p < 0.001$; n = 142, $\chi^2 = 55.626$, degrees of freedom = 47, *p*-value (chi-square) = 0.182. SD: standard deviation.

highly significant factor loadings (≥0.7) (Table 4). The other two indicators of Factor 2 had acceptable factor loadings higher than 0.5. One indicator of Factor 1, "Lack of organic fertilizers," showed the highest factor loading, followed by "Lack of extension services for organic farmers," "Spread of pests," and "Spread of weeds." Factor 2 was comprised of three indicators, of which "Large distance to the local markets" loaded the highest, whereas two other indicators had acceptable factor loadings.

Table 3. Robust fit indices of confirmatory factor analysis (CFA) model on organic conversion motivations in four organic aimaks in the Issyk-Kul province, Kyrgyzstan.

Fit indices	Acceptable value*	Extracted value	Result
Root Mean Square Error of Approximation (RMSEA)	Close to 0.06 or less	0.042	Accepted
Comparative Fit Index (CFI)	Close to 0.95 or greater	0.980	Accepted
Tucker Lewis Index (TLI)	Close to 0.95 or greater	0.971	Accepted
Standardized Root Mean Square Residual (SRMR)	Close to 0.08 or less	0.066	Accepted

*Acceptable values adopted from Brown (2015).

Table 4. Factors, factor loadings, measurements, and coefficients of observed variables of the confirmatory factor analysis (CFA) model of the barriers after conversion period in four organic aimaks in the Issyk-Kul province, Kyrgyzstan.

Factors and their indicators	Factor loadings	Mean	SD	Cronbach's alpha	Raykov's rho (omega)	*p*-value
Factor 1: Agri-input deficiency						
Lack of extension services for organic farmers	0.84	2.35	0.76			
Lack of organic fertilizers	0.951	2.11	1.12	0.9	0.85	0*
Spread of weeds	0.72	3.3	1.02			
Spread of pests	0.78	2.73	1.22			
Factor 2: Market access challenges						
Poor cooperation with other organic farmers in my organic aimak	0.629	2.3	0.87			
Large distance to the local markets	0.845	2.18	1.12	0.74	0.78	0*
Low demand for my organic produce	0.666	1.58	0.68			

*Significant at $p < 0.001$; n = 142, $\chi^2 = 12.93$, df = 11, *p*-value (chi-square) = 0.298. SD: standard deviation.

All latent variables had sufficient internal consistency (Cronbach's alpha >0.7) and construct reliability (Raykov's rho >0.7). The robust fit indices of CFA model for the barriers after conversion period (Table 5) showed acceptable values.

Table 5. Robust fit indices of the confirmatory factor analysis (CFA) model for the barriers after conversion period in four organic aimaks in the Issyk-Kul province, Kyrgyzstan, based on Brown (2015).

Fit indices	Acceptable value	Extracted value	Result
Root Mean Square Error of Approximation (RMSEA)	Close to 0.06 or less	0.039	Accepted
Comparative Fit Index (CFI)	Close to 0.95 or greater	0.997	Accepted
Tucker Lewis Index (TLI)	Close to 0.95 or greater	0.993	Accepted
Standardized Root Mean Square Residual (SRMR)	Close to 0.08 or less	0.035	Accepted

Regression analysis of organic conversion motivations

To identify potential links between factors for organic conversion and demographic variables, three multiple regression analyses were conducted by the number of revealed conversion factors. First, it was tested whether the residuals of the regression models followed a normal distribution. The results of the Kolmogorov-Smirnov test suggest that the residuals do not significantly deviate from the normal distribution ($p > 0.05$). Second, some multicollinearity was found in regression model 1 for two predictors, namely the motivation of pro-environmental ideology (VIF = 5.23) and vision-supportive motivations (VIF = 5.35). According to James *et al*. (2021), VIF values >5 can be considered problematic. Following the researchers' recommendation, one composite variable was created to replace the two aforementioned predictors in regression model 1. VIF reassessment revealed that all predictors in regression models had acceptable VIF values <2. Next, authors conducted the Breusch-Pagan test for heteroscedasticity. The results of the test showed that there was no strong evidence of heteroscedasticity in authors' models ($p > 0.05$) (Table 6).

For regression model 1, the environmental and human health model was statistically significant ($R^2 = 0.31$, F (8.133) = 7.53, $p < 0.001$). It was found that the following independent variables significantly predicted motivation of the environmental and human health: composite variable ($p < 0.001$, $\beta = 0.485$): for every unit increase in the composite variable, the response variable is expected to increase by 0.485 units; organic farming as a main income source ($p < 0.01$, $\beta = 0.231$): for every unit increase in organic farming as a main income source, the response variable is projected to increase by 0.231 units.

For regression model 2, the motivation of the pro-environmental ideology model was statistically significant ($R^2 = 0.91$, F (9.132) = 156, $p < 0.001$). It was found that the following independent variables significantly predicted motivation of pro-environmental ideology: environmental and human health ($p < 0.001$, $\beta = 0.365$): for every unit increase in motivation of environmental and human health, the response variable will increase by 0.365 units; vision-supportive motivations ($p < 0.001$, $\beta =$

Table 6. Regression models for organic conversion motivations evaluated in four organic aimaks in the Issyk-Kul province, Kyrgyzstan.

Predictors	Environmental and human health			Motivation of pro-environmental ideology (MPEI)			Vision-supportive motivations (VSM)		
	B	SE B	β	B	SE B	β	B	SE B	β
EHH	-	-	-	0.446	0.035	0.365**	-0.469	0.055	-0.347**
MPEI	0.386^{cv}	0.059^{cv}	0.485^{cv}**				1.21	0.044	1.091**
VSM				0.704	0.026	0.781**	-	-	-
Sex	-0.125	0.085	-0.111	0.007	0.037	0.05	-0.074	0.049	-0.049
Age	-0.001	0.003	-0.017	0	0.001	-0.002	0	0.002	-0.008
Edu	-0.013	0.059	-0.018	-0.05	0.026	-0.052	0.009	0.033	0.090*
Prof_edu	0.093	0.119	0.067	-0.045	0.052	-0.027	0.035	0.068	0.019
Size_OF	0.007	0.015	0.037	0.003	0.007	0.014	-0.003	0.009	-0.013
Exp_OA	-0.012	0.013	-0.076	-0.003	0.006	-0.017	0.007	0.008	0.034
MIS	0.194	0.066	0.231*	-0.112	0.03	-0.11**	0.141	0.039	0.124**

CV denotes values for the composite variable (MPEI+VSM) in the regression model 1; n=142. EHH: environmental and human health; Edu: education background level; Prof_edu: professional agricultural education; Size_OF: size of organic farmland; Exp_OA: experience of organic agriculture; MIS: organic farming as a main income source; B: unstandardized coefficient; SE B: standard error of the unstandardized coefficient (B); β: standardized regression coefficient; *$p < 0.01$; **$p < 0.001$.

0.781): for every unit increase in vision-supportive motivations, the response variable will increase by 0.781 units; organic farming as a main income source variable ($p < 0.001$, $\beta = -0.11$): for every unit increase in organic farming as a main income source variable, the response variable is projected to decrease by 0.11 units.

Finally, for regression model 3, the vision-supportive motivations model was statistically significant ($R^2 = 0.88$, $F(9.132) = 107.5$, $p < 0.001$). It was identified that the following independent variables significantly predicted vision-supportive motivations: environmental and human health ($p < 0.001$, $\beta = -0.347$): for every unit increase in motivation of environmental and human health, the response variable will decrease by 0.347 units; motivation of pro-environmental ideology ($p < 0.001$, $\beta = 1.091$): for every unit increase in motivation of pro-environmental ideology, the response variable will increase by 1.091 units; education background level ($p < 0.01$, $\beta = 0.09$): for every unit increase in education level, the response variable will increase by 0.09 units; organic farming as a main income source ($p < 0.001$, $\beta = 0.124$): for every unit increase in organic farming as a main income source, the response variable will increase by 0.124 units.

Standardized β of the motivation of pro-environmental ideology exceeded one. In some cases, it can indicate multicollinearity, but the VIF value of this variable assumes low multicollinearity (VIF=1.72). It might imply very high influence of ideological considerations on farmers' vision-supportive motivations.

Motivations for organic conversion

As the study revealed, there were multiple motivations for organic conversion and barriers organic farmers in organic aimaks faced. Based on the results, farmers' conversion motivations were three-fold and related to environmental and human health, pro-environmental ideology, and vision-supportive aspects. It was identified that environmental and human health was a dominant conversion factor. Soil fertility and soil health were highly important conversion motivations for farmers. Organic farming is seen as an appropriate technique to improve soil health and, thereby, contribute to better personal health and future generations' welfare (Vinyukov *et al.*, 2022; 2023). Soil fertility, as one of the driving forces of organic conversion with relation to Kyrgyz farmers in Jalal-Abad province, was reported by Kaegi *et al*. (2017). Motivations of environmental and personal health are commonly cited by the researchers with regards to organic conversion. Initial motivation of caring for future generations was aligned with the farm vision of providing consumers with wholesome produce.

Each region has its own pattern of organic conversion with a unique combination of factors (Chen *et al.*, 2024a; 2024b). As expected, organic farmers of Issyk-Kul province were highly concerned with environmental protection due to close proximity to Lake Issyk-Kul. It may be one of the reasons for the absence of clearly expressed motivation of profitability among the indicators. Another aspect touches upon the domestic organic market, which is at an embryonic stage (Babajani *et al*., 2023). Prices for local organic and conventionally grown products do not significantly vary in the domestic market. It might raise the question of the economic sustainability of the converted organic farms. Financial considerations are typical driving forces of organic conversion (Bui and Nguyen, 2020; Han *et al*., 2021). However, it is not uncommon when organic farmers grow organic crops for their own consumption. As the interviewed farmers reported, farm productivity largely remained on the pre-conversion level. Thus, organic conversion did not negatively affect the economic viability of the organic farms. It implies that agricultural zones with traditional farming can convert with fewer financial risks.

Further, in accordance with the vision-supportive motivations, farmers who opted for organic farming in organic aimaks had reasonable expectations of future financial benefits. These results are not fully consistent with the findings of the study by Kaegi *et al*. (2017) on organic farmers from Jalal-Abad province of Kyrgyzstan supported by the "Bio-Cotton" project, which identified soil fertility and financial motivations as the main factors. Unlike the "Bio-Cotton" project, organic aimaks do not target export markets and have a goal of developing the domestic market first and familiarizing Kyrgyz small farmers with organic principles. However, farmers of Issyk-Kul province noted that they wanted to reduce the use of chemicals and, thereby, cut the costs and reach farm prosperity as a part of their vision. It could be viewed as a subtle indication of an intention for enhanced financial stability in the long run.

It is important to highlight that the motivation of pro-environmental ideology was quite influential in farmers' decisions to convert. An idea of a farm as an

indispensable component of nature is derived from the philosophy of holism and typical to committed organic farmers who have strong beliefs in organic farming as a part of their personal ideologies (Zymaroieva *et al.,* 2021; Yermakov *et al.,* 2021). It is worth to mentioning that both religious beliefs and the philosophy of holism coexist within one factor of motivation of pro-environmental ideology. It may be the case of mutual enrichment between emerging religious traditions and new values brought by the organic movement. The authors could find strong positive attitudes toward organic farming supported by suitable farm design to facilitate transition. Thus, two of the three main components of TPB (attitudes toward the behavior and PBC) were significant in explaining organic conversion in organic aimaks. In contrast to several studies (Sapbamrer and Thammachai, 2021), subjective norms did not seemingly influence farmers' intentions to convert. Therefore, results underline the prevalence of the internal motivations.

Barriers to organic conversion

The second CFA model on barriers after conversion revealed two major areas of organic farmers' concerns, namely agri-input deficiency and market access challenges. Lack of agri-inputs, as a major barrier, was characterized by poor access to extension services and organic fertilizers. Spread of weeds and pests was described by the surveyed farmers as serious to some extent. In modern agricultural paradigms, knowledge has become an input that ensures optimal use of physical inputs (fertilizers, pesticides, machinery) (Shahini *et al.,* 2023; İsmayilov *et al.,* 2022). As described earlier, merely 7 % of the survey respondents had professional agricultural backgrounds. It explains high dependence on additional agricultural extension support for farmers in conversion. Organic farmers in organic aimaks reported that they were confronted with the lack of extension services after the transition period. Lack of customized extension services to meet the needs of organic farmers presented a significant challenge. Findings by Karki *et al*. (2011) and Läpple (2010) show that training and access to the necessary information are vital for the adoption of organic farming and prevention of reversion. In general, the transfer of knowledge by extension officers is critical for organic conversion. Lacking extension support appears to be a root cause of declined farm performance (Mukambaeva *et al.,* 2024). Thus, further studies are needed to investigate the role of agricultural extension in the promotion of organic farming in organic aimaks.

Interestingly, subjective norms were not influential conversion motivations. Some other researchers identified social norms as the main barriers to organic conversion. What is interesting to observe here is the role of organic aimak as an association of organic farmers. In their research on spatial distribution of organic farming in the United States, Kuo and Peters (2017) found that close proximity to organic farming areas stimulated organic conversion in neighboring areas. However, as statistical data show, the number of organic aimaks and organic farmers does not grow substantially in surrounding areas. Collective attitudes and actions can play a crucial role in individual decision-making. According to Sapbamrer and Thammachai (2021), membership in

associations and active participation in the life of the local community have a positive effect on the organic conversion process. The authors' findings illustrate that the synergetic potential of the membership of organic aimak appears to be underutilized as a motivational factor.

The next impeding factor reported by organic farmers was the marketing of organic produce. An overwhelming majority of the organic farmers were small-scaled and needed collective actions to facilitate access to agricultural markets. However, it was found that poor interactions among organic farmers represent a barrier to better marketing. In other words, the lack of collaborative actions may be disadvantageous for all members of organic aimaks. Geographical locations of the large, profitable markets create additional barriers for organic farmers in Issyk-Kul province to sell their produce. Mostly, organic farmers tended to access markets in the capital city of Bishkek, which was mentioned by farmers as the primary target outside of Issyk-Kul province. Noteworthy, almost the same number of organic farmers sold their produce in other districts of Issyk-Kul province and other provinces of Kyrgyzstan. Low demand for organic produce was reported by the farmers as a minor difficulty and may be seen as a temporary obstacle (Kociszewski *et al*., 2020).

Policy and practical implications

Overall, conversion obstacles were not rated high and were described by the organic farmers on average as minor ones. It may be explained with reference to one of the conducive indicators identified in the CFA model on motivations for organic conversion. Surveyed organic farmers emphasized that their farm design and field operations were suitable for easier conversion. These results are in accordance with Aoki (2014), who found that farmers engaged in traditional chemical-free agriculture (so-called informal organic) were capable of easier conversion to certified organic farming. Concerns over personal and environmental health, the growing global market of organic products, and changing dietary habits are likely to contribute to faster expansion of organic farming (O'g'li and Karshiboevna, 2024; Yeraliyeva *et al.*, 2016). For Kyrgyzstan, the design and implementation of agricultural policies based on scientifically proven results could significantly contribute to the promotion of organic farming.

To identify potential relationships between organic conversion factors and demographic variables, three multiple regression models were run. The results of multiple regression analysis indicated that age, gender, size of organic farmland, experience of organic farming, and professional agricultural education did not affect motivations for organic conversion. On the other hand, a strong relationship was found among the three factors described in the CFA model of motivations for organic conversion. All models showed that three conversion factors are closely interlinked. It was found that reliance on organic farming as the main income source significantly influences all three conversion factors. This suggests that a level of farmers' engagement in organic farming as an economic activity significantly affects motivations for organic conversion. Factors of

environmental and human health and vision-supportive motivations demonstrated a significant negative relationship. The reason for that is not clear and indicates the need for further investigation. The authors hypothesize that there may be controversy between personal benefits and public interests. Also, findings indicated that education level positively affected vision-supportive motivations.

The results show that organic conversion is a multidimensional phenomenon. It may indicate that organic promotion policies can be effective only if multiple factors are taken into account. Thus, the practical implication of the findings is that policies aimed at promoting organic agriculture should transcend pure economic stimulation and include the whole array of factors in order to be effective. Next, customized agricultural extension services should be introduced to facilitate the conversion process. As it was found, the lack of the needed information may be the primary cause of the decreased farm performance and one of the components of the inputs' deficiency. Non-agricultural educational backgrounds, insufficient knowledge on organic farm management, coupled with poor access to relevant information and agricultural inputs, may undermine farmers' positive image of successful organic farming and preclude farmers from conversion (Trusova *et al.,* 2021a). Therefore, the establishment of specialized extension systems is of high importance to strengthen the capacities of currently operating organic aimaks and reduce uncertainties common for the promotion of new approaches (Pimentel *et al*., 2005).

As this study showed, social norms do not play a significant role in farmers' decision-making. Thus, the "Organic aimak" initiative should strengthen collaborative ties among members of organic aimaks to untap underutilized potential of social interaction by organizing more joint events and developing positive images of organic farmers and organic aimaks as responsible stewards of natural resources with strong personal beliefs and ethical values. Finally, local organic farm shops offering permitted organic inputs should be established to provide organic farmers with the whole spectrum of the necessary organic fertilizers and bio-pesticides. Successful cases of vermiculture and compost production based on local raw materials should be replicated to ensure a multiplication effect. Therefore, measures to support local production of organic inputs should be considered when designing agricultural policies.

CONCLUSIONS

This research explored the motivations for organic conversion and the barriers encountered post-conversion among Participatory Guarantee Systems (PGS)-certified organic farmers in the Issyk-Kul province of Kyrgyzstan. Analysis revealed that the primary motivation for transitioning to organic farming stemmed from environmental and health concerns, particularly the need to improve soil health, enhance personal well-being, and ensure environmental sustainability. The most significant barriers faced by farmers after conversion were deficiencies in agricultural inputs, including limited access to organic fertilizers and extension services, as well as challenges related

to market access. Farmers reported difficulties in building cooperative networks and accessing distant markets, compounded by low local demand for organic produce. Interestingly, social pressure and norms did not emerge as significant factors influencing the decision to convert or challenges faced thereafter.

Regression analysis underscored strong interconnections between the three motivational factors and highlighted the importance of organic farming as a primary income source in shaping farmers' decisions. Education level positively influenced vision-supportive motivations, emphasizing the role of knowledge in fostering sustainable farming practices. These findings underscore the need for policymakers to develop targeted interventions that address key challenges, such as improving access to agricultural inputs, enhancing market integration, and expanding extension services tailored to the unique needs of organic farmers. Additionally, fostering educational programs and collaborative initiatives within organic aimaks can amplify motivation and reduce barriers.

By offering insights into the organic conversion patterns of farmers in Issyk-Kul, this study provides a foundation for shaping policy and educational efforts to promote organic agriculture. Future research should involve larger and more diverse samples across various regions and stakeholders, including consumers and policymakers, to deepen the understanding of the dynamics underlying organic farming transitions in Kyrgyzstan.

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