



**ENVIRONMENTAL SUSTAINABILITY AND CLIMATE SCIENCE
DEPARTMENT**

Within the framework of the Presidential Research and Education Fund

Research title:

**Problems, progress and prospects of organic farming as a means
of sustainable agriculture in Kyrgyzstan.**

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Bishkek 2021

Abstract

Since the organic farming system has been encouraged to reduce environmental impacts, many studies have been conducted. Kyrgyzstan is located in Central Asia, and its main industry relies on agriculture, with a huge area of farm lands. To reduce the environmental impacts in Kyrgyzstan, the current farm land use should be converted to the organic farming system. In addition, to conserve endangered species inhabit in Kyrgyzstan, the soil condition should be considered. However, despite the necessity of an organic farming system, the organic products in Kyrgyzstan lack international standards, such as International Organization for Standardization (ISO) certificate. In this research, the factor which made the absence of international standards, was assumed to be lack of proper process to get the standard. As the organic farming system was not seriously considered and focused in the other research works, the first factor to be checked was the difference of the current soil condition in Kyrgyzstan. To measure the difference, soil analysis was conducted with soil samples gathered from 14 farm lands. The next factor to be checked was how consumers and producers in Kyrgyzstan discern what is the organic farming system, to measure the socio-economic value. For that, a questionnaire was provided, and as many answers as possible were gathered for the facility of analysis. From the soil analysis, the difference between organic and non-organic farming was not observed, and concluded that Kyrgyz farms are already taking an organic farming system, whether the farm has organic standards or not. From the questionnaire analysis, even though the fixed hypotheses were dismissed, the preference for organic products and the same opinion which is organic farming system in Kyrgyzstan is not actively considered, and it causes the lack of proper process for international standard. The result defined in this research can be applied to the future work about the necessity of organic products in Kyrgyzstan and has significance that this research considered the overall condition of organic farming in Kyrgyzstan.

Key words: Organic farming, standards, certification, policy, soil sampling, organic products.

Introduction

General background

Kyrgyzstan is one of the Central Asian countries, located next to China, Kazakhstan, Uzbekistan and Tajikistan, and a mountainous country with 93% of territory covered with mountains of over 3000m above sea level. According to the National Statistical Committee of the Kyrgyz Republic [1], despite its mountainous geographical feature, the total areas for agriculture, especially plowed areas, and employees in the agricultural industry have gradually increased from 1992 to 2019. This statistic represents not only that Kyrgyz people in all other regions eke out the living condition with the agricultural industry, but also that Kyrgyzstan must be considered as an agriculture-focusing and developing country. However, currently available resources and research on organic farming in Kyrgyzstan are considerably limited. As Kyrgyz government announced the plan which focuses on building 100% of the organic farming system [2], it shows volition to improve and encourage organic farming system, but the current situation is still inactive with the absence of certification and standardization.

Kyrgyzstan has the endangered botanical species [3], which should be definitely conserved for biodiversity. The government sets conservation plans for chemical use and plant protection in agricultural lands also, not only for wild animals, but its plan conduction is still not specific as to which wild animals and plants will be observed with which plans [4]. As organic farming begins with reduction of chemical use, it should contribute to the inactive organic farming system in Kyrgyzstan with its onlooking attitude. At least, the government should strictly observe farms in the protected areas for wild animals as an example to the other farms. Furthermore, it should continue keeping watch on the farms for its nation as well, with promoting the purchase of organic products and the need for them to protect the nation's health.

Organic products easily drive consumer's motivation to purchase, with comparison between 'natural' and 'chemical,' even though the advantage of organic product for human health is scientifically unclear [5], in other words, there is possibility of consumers' intention increases to buy the product, relying on the non-certified marks. Furthermore, with the conducted survey, it was deduced that most consumers in Kyrgyzstan do not have sufficient information about organic products through advertisement, and prefer to buy organic products for certain reasons.

Also, contrary to Kyrgyz Republic's gradually growing population, its poverty is still located at lower condition [6]. As the organic products win popularity compared with other products even among the people under poverty, the transparent and proper certification should be issued to ensure the nation's wholesome consumption to contribute to the healthy socio-economic environment. For that reason, not only the proper process, also approachable advertisement activation, which consumers should not find the themselves in to get information, are essential. There are some local

and international organizations that provide intermediary services for obtaining foreign organic certification in Kyrgyzstan. There are organizations such as Helvetas (Switzerland), GIZ (Germany) and Sun Planet (Kyrgyzstan), which help Kyrgyz organic farms to obtain foreign organic certifications with some training for organic farms. The certification cost about 7000-8000\$ and the process to get certification takes a time up to 3 years. However, the certificate is valid for 1 year, then it is needed to update. In addition, since Kyrgyzstan does not have its own organic standard which is currently under development, if a farmer wants to get a certificate for promotion of the farm and its product, he should waste a lot of money and time.

Objectives

The first objective is to understand what is the advantage of organic farming system in Kyrgyzstan, compared with non-organic farming system, and how it has been considered by both consumers and producers, and encouraged by the government, in terms of impacts on ecological environment, with the premise that organic farming system should be advantageous to reduce the environmental impacts and hypothesis that organic farming area has less chemical component. To encourage organic farming, the first step must be complete understanding of its benefit and harmful impacts of agrochemicals in the agricultural field. Chemical pesticides impact on the following three groups of environment: on soil condition, biodiversity and air ecosystem, as even with little amount of spill by not only killing earthworm which makes the soil to be fertility, but non-target animals as well [7], and furthermore, to human organisms which consumed the farm crops from the polluted area [8]. In this point, this research set the hypothesis that soil in organic farming areas contains less harmful components such as heavy metals, compared with it in non-organic farming areas.

The second objective is to investigate the socio-economic value by ascertaining the awareness and cognition of consumers to organic products which have been circulated in Kyrgyzstan, with the premise that the organic product market is not activated in Kyrgyzstan. In addition, if consumers and producers already perceive the danger of chemicals in agriculture, it should be ascertained which factor sustains the chemical use. The most possible hypothesis coincided with the matter of price, absence of policy and ignorance about advantages of organic farming and danger of chemicals, with another assumption that producers are aware but likely to accept cheaper ways and consumers are more likely to purchase the cheaper products. In addition, the absence of proper process for organic certification and how it affects consumers' purchase tendency should be verified with practical data, as Jannsen and Hamm clarified that logos on organic products considerably affect consumers' tendency [10]. Currently, the most active farming system in Kyrgyzstan is for cotton production, encouraged by Helvetas [9]. At the same time, since cotton production is the main agricultural industry [9,18], its acceptance of the organic farming system has considerable influence on the other

agricultural industries which exclude organic farming. However, it is essential to establish a certain system which is encouraged by national organizations, not by international organizations. The third objective is to verify the absence of proper policy and predict the future movement for furtherance of the organic farming system. If consumers and producers are already aware of the benefits from organic farming, the non-activated organic agriculture must be improved only with policies by the government. In actuality, policies are directly connected with economic growth which is welcoming tidings for the government, looking into European countries' previous instances [11]. Thus, the third objective also coincides with consideration to improve the current policies by introducing benefits from the organic farming system, and to encourage the policies for proper certification process which does not regard establishment of the national certificate in Kyrgyzstan, but strict observation on product to get international certificates.

Literature Review

Currently, many researches about organic farming systems have been conducted for reducing environmental impacts, especially in European countries, India and China, due to its expectation to shift to conventional farming. According to Lee, Choe & Park [12], the organic farming system has been recognized as one of the most reasonable alternatives to conventional farming, and as a valuable economic source in the market. Studies of organic farming systems in Kyrgyzstan, however, rely on research from European countries and are more likely to focus on certain categories of product. However, we aimed to combine the organic farming system in both fields to calculate current and future progress. Livestock farming takes great importance for the sustainability of the rural economy, but it also has a high environmental impact [13]. As the demand for livestock products of Kyrgyzstan is growing [13], the loss of biodiversity is concerned with the decreasing numbers of the consumed livestock animals. However, according to Rahman [14], agriculture can also protect and enhance biodiversity with replacement as organic agriculture. Looking into replacing conventional livestock farming with organic system, the methods and benefits must be considered. The followings are standards for organic livestock farming [15]:

- Maintaining closed herds and flocks; i.e. breeding replacements on the farm, so as to minimize the risk of importing diseases from elsewhere and in order to develop stock that are adapted to the specific farm conditions;
- Use of organically-produced livestock feed;
- Avoiding the unnecessary use of veterinary medicines and pesticides in order to reduce possible adverse health impacts;
- Providing animals with the conditions and opportunities of life that accord with their physiological needs, natural behavior and general well-being;

- Allowing animals to adapt to local conditions;
- Maintaining/cultivating genetic diversity.

Since the standards of organic livestock farming are considerably concerned about animals' welfare and health, not only support and propulsion from animals by the Society for the Prevention of Cruelty to Animals (S.P.C.A), but also economic benefit for farmers can be addressed. For example, looking into a case from South Korea, the economic efficiency is guaranteed from an organic farming system with decreased possibility of animals' mortality and disease rate [15]. However, concerning greenhouse effect, emission in organic farming system may be higher than those in the conventional one, due to lower production per unit of input [13], but yet, if the farming land is shifted to large spontaneous area where feed plants naturally grow and soil become fertile from animals' manure [16], with feed quality management [13], the carbon emission matter must be reduced. Since 86.2% of agricultural land in Kyrgyzstan is occupied for pasture [17], GDP from agriculture and conservation of biodiversity should be considerably increased with a shift to an organic farming system.

Benefit for plants from the organic farming system has been prominently discussed among many scholars with abatement of chemical fertilizers. Concern for organic farming can be caused from weakness to damage from disease and harmful insects and deterioration of growth. However, once the organic farming area adapts to status without synthetic fertilizer, the area can naturally control pest and disease [19]. Furthermore, this circumstance must bring benefit with reduced expenses for fertilizer and the increased yield [9]. Thus, to encourage an organic farming system in crop agriculture, provision for adapting period must be devised. In the case of Kyrgyzstan, the sort of dominant products are different by region, for instance, Issyk-Kul region is famous for apples and pears, Chuy region takes sugar beet and Osh and Jalal-Abad regions take cotton production [9,18]. Cotton production takes the largest part in crop agriculture in Kyrgyzstan [9], and it is a field where the organic farming system is most highly activated [2,9]. This condition is considerably prospective, as the largest agricultural industry applies to the organic farming system, and it can lead to being precedent and example for other agriculture productions.

In addition, according to Bachmann, F. & Amanbaev, A [9], not only improvement of organic cotton farms' soil condition, compared with conventional cotton farms, regarding environmental impacts, but also increased economic benefits for farmers were observed with increased yield and reduced expenses for inputs.

The benefit for farmers is the key factor of the socio-economic values of the organic farming system, and a foundation for rural development. One of the factors which improve the rural economy from organic farms is the increased number of employees [20]. As the agricultural industry in Kyrgyzstan is the most activated industry in most regions [1], development of the industry is

expected with the increased number of employees. Furthermore, by providing people, who are not in the agro-industry field, with the experience of organic farming, the knowledge and skill can be spread to the community [20,21], and the transmission creates an effect of advertisement for farmers. However, as improvement of vista is important for social value of organic farming [21], the agreeableness during the experience should be guaranteed by creating pleasure vista in the organic farming area to fully absorb the effect with more variegated biodiversity, prepared with absence of chemicals. The cultural variety is also one of the socio-economic values of the organic farming system [21]. Excluding farmers, most consumers, especially the young that do not have efficient experience, are not aware of how agricultural commodities are produced. In this point, by providing experience, consumers can watch how the products they eat are cultivated in different ways from conventional farming systems which they are already acquainted with. The systems, organic farmers accept, must provide consumers with agricultural variety by introducing different harvest ways and confidence in consumers' expenditure practice to prefer organic products. After the improvement of the rural economy through the expansion of employment and the effect of advertisement with the open-door system to consumers, the next socio-economic effect concerns the national range.

Kyrgyzstan is not a well-developed country, concerning its economy [6], and since Kyrgyz economy relies on agricultural industry [1], the impact of rural economic development to the national finance status can be considerably conspicuous. Additionally, with the geographical benefit of Kyrgyz territory, which is surrounded by different countries, international trade is expected as well through establishment of international standard and guaranteed products' quality, and drawing attention of consumers in the other countries. In actual, according to S. Meredith & H. Willer [11], the increasing retail market sales of organic product in European Union (EU) was observed with the consumers' interest. Regarding the cotton production, which takes the largest part in Kyrgyz agricultural industry and is more likely to be exported to the other countries, is supported by Swiss organization, Helvetas [9], and this factor disproves the absence of the national observation for organic production by government. Since the non-chemical mark can effect on the consumers' interest [5], unless the effort to establish the international organic standard for farmers by the government is not fulfilled, the reach to the upper level of market development cannot be achieved only with farmers' concern. Thus, once the organic farming system is accepted to Kyrgyz agricultural industry, whether the acceptance is voluntarily performed by farmers or encouraged by the government with policy, the establishment of a process to get standard is essential to be capable of carrying the growing rural economy and national market.

Methodological Approach

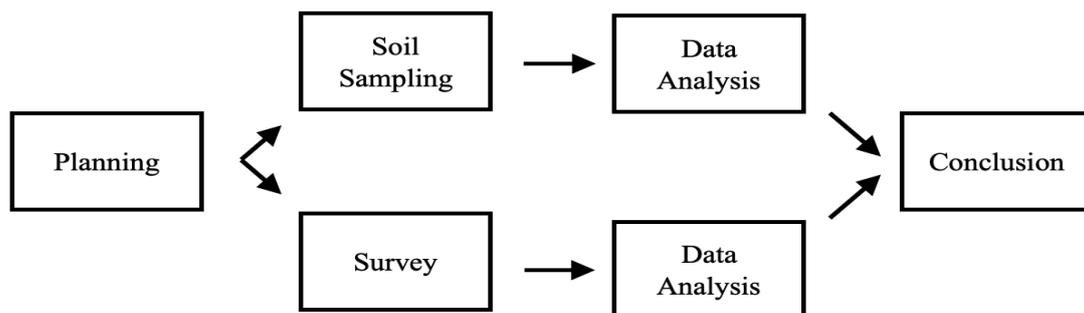
Hypotheses

The main hypothesis of this paper is that “Due to the absence of the proper standard for organic products in Kyrgyzstan, producers are not taking advantage of the organic farming system, despite its advantages, compared with non-organic farming systems.” Based on the main hypothesis, sub-hypotheses were suggested with bisectional aspects, which are 1) Producers in farming industry are already aware of the advantage of organic farming system, and 2) Consumers are less likely to be aware of the advantage of organic farming system, compared with producer group, on the account of absence of active advertisement or promotion for organic products. The first hypothesis focuses on the ecological effect with the premise that the benefit of the organic farming system is also applied to Kyrgyz farming industry, while the second one focuses on the current socio-economic status of the organic products. **In addition, each hypothesis has following questions, for the first sub-hypothesis:**

- Do producers in Kyrgyzstan fully understand what organic farming is?
- How producers in Kyrgyzstan apply the organic farming system to their agriculture?
- Do producers in Kyrgyzstan prefer the organic farming system?
- Which factor affects the producers’ preference for applying the organic farming system to their farms?
- Do producers consider that the current producing system for organic products is proper?

for the second sub-hypothesis, following questions were suggested, which are:

- Which factor affects the Kyrgyz consumer’s preference for purchase?
- Are consumers in Kyrgyzstan more likely to buy organic products?
- How is the current system of advertisement for organic products in Kyrgyzstan being conducted?
- Do consumers consider that the current circulating system for organic products is proper?



Process of research work

Research Design

Since all the hypotheses and research questions are based on the premise that ascertains the benefit of the organic farming system, the first assignment should be to identify how organic farming in Kyrgyzstan affects its soil condition. Due to lack of certified mark for eco-friendly farms, the identifying process was not smoothly conducted. Therefore, farms were chosen from each region, Issyk-Kul, Osh, Jalal-Abat, Batken, Naryn, Talas and Chui. In addition, since Chui region where the capital city Bishkek, the most polluted city in Kyrgyzstan, is located, for the significant difference between organic and non-organic farms, much detailed examination was considered. Compared with Bishkek, the other regions were expected to be less polluted, therefore, the fundamental soil condition was mainly considered. All processes for soil sampling were planned to be conducted, based on the capacity of laboratories in Kyrgyzstan. During the soil sampling process, the survey with questionnaire was planned to examine both hypotheses. The number of gathered answers was planned to be over 250 cases, and divided into two versions: For producers and for consumers.

Since this research is the first work which explores the organic farming of Kyrgyzstan in detail, and examines all aspects of the organic farming system, the ecological and socio-economic aspects, extra process was not considered.

Soil Sampling

To ascertain the ecological benefit of organic farming, basically the comparative method was used for analysis of soil samples from both organic farming and non-organic farming areas. In total, 14 Samples were gathered from 7 organic and non-organic farming areas of 7 regions in Kyrgyzstan.



Figure 1.1. Kyrgyzstan Map (Red dots for indicating soil sample area), available at: <https://www.worldatlas.com/maps/kyrgyzstan>

For the capital city Bishkek, it was expected to be more polluted than other regions, on account its focus on the industries with factories [1], thereby more components were analyzed. Based on the ISO 11466 [22], possible components to be detected were selected with consideration of the capacity of laboratories in Kyrgyzstan. However, for the other regions, the basic soil condition, such as pH consistency and Humus, was measured to examine the difference between organic and non-organic farming area's soil condition, since those regions were expected to be less polluted. In addition, Russian standard, which was also suggested by laboratories, was considered for the maximum permissible detection [23], however, for the accurate comparison of heavy metal content in soil samples, the guideline, presented in research about food safety of agriculture in European Union [24], was used to measure whether Kyrgyzstan's soil contains over-standard heavy metal or not, since the Russian standard doesn't show the clear guideline. After the soil sampling process, the data analysis was conducted with the method that the heavy metal detection limits [24] operate as the mean, and based on the variance, t-test was carried out. At first, starting from identifying that organic farming area in Kyrgyzstan is less polluted than the non-organic farming area, H_1 was set to represent. \bar{X}_1 and \bar{X}_2 were calculated with means of two groups: 1) Group with all components are considered and 2) Only components which appear on the EU detection limits [24].

To check whether the H_1 is materialized or not, each group's p-value was examined. For the first group, the standard deviations of organic farming area's heavy metal detection, and it of the non-organic farming area, were calculated to represent S_1 and S_2 and the means of each population were calculated for the μ_1 and μ_2 value. For the second group, the calculation process is almost identical with the formula for the first group, but the components (Zn, Pb and Co) were applied since mercury and nickel detection amounts were excessively low, and all mean values, including standard deviation values, were calculated with difference value from the detection limits [24].

$$t = \frac{(\bar{X}_1 - \bar{X}_2) - \delta_0}{s} \quad s = \sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$$

$$H_1: \mu_1 - \mu_2 < \delta_0$$

$$P(t_{DF} \leq t \mid \delta = \delta_0)$$

Surveying Consumers and Producers

Before providing questionnaires, we set two groups which are consumer and producer to consider each group's cognition on organic farming in Kyrgyzstan. The factors, which should be considered, are designed to examine the factors, to satisfy the hypotheses presented above, as following:

- 1. Consumers with younger age are more likely to be exposed to advertisements for organic products;**
- 2. Consumers with younger age are more likely to buy organic products;**
- 3. Consumers with higher income are more likely to buy organic products;**
- 4. Consumers with higher education are more likely to buy organic products;**
- 5. Consumers are more likely to consider organic products as expensive products.**

to be examined in questionnaire for consumers, and factors which are expected to be examined in the questionnaire for producers are:

- 1. Producers with younger age are more likely to be aware of the organic farming system;**
- 2. Producers with younger age are more likely to have confidence in their organic products;**
- 3. Producers with higher education are more likely to be aware of the organic farming system;**
- 4. Producers with more understanding of organic farming are more likely to prefer organic farming.**

Since the survey process takes the greatest part to explore socio-economic value of Kyrgyz organic farming, we decided to gather all possible answers from citizens and producers of farmers. For the selection of producers, extra standards were not considered, but all possible farmers, irrespective of the farming system, were selected to get answers. For both groups, consumers and producers, we set the number of gathered answers to 200 answers, but at the same time, we endeavor to get more answers, even if the number was reached to 200. Except independent answers, such as "What is the most important thing in consuming?", each answer, which represents the respondents' perception, such as "Price is one of the important motivations to produce.", was gradually given points from 1 to 5 to calculate the result, e.g. 1 - Strongly Disagree to 5 - Strongly Agree, following Likert scale. Based on the calculated points, we drew results with interrelations of each factor. In addition, to clarify the purpose of the survey, sensitive information was not applied to the questionnaire, and paper was supplied in Russian version, since Kyrgyz people are fluent in Russian.

Results and Discussion

Soil Sampling

Considering heavy metal components in Bishkek farming area, a conspicuous difference, which shows organic farming area considerably has less heavy metals, was not observed [see *Figure 1.2.*

<i>Indicator</i>	<i>Unit</i>	<i>Bishkek (O)</i>	<i>Bishkek (N)</i>
<i>Zinc</i>	mg/kg	0.164	0.324
<i>Copper</i>	mg/kg	0,6	0,29
<i>Lead</i>	mg/kg	2,54	6,0
<i>Iron</i>	mg/kg	2,36	3,6
<i>Ammonia Nitrogen (NH3-N)</i>	mg/kg	4,08	1,81
<i>Nitrate Nitrogen (NO3-N)</i>	mg/kg	734,8	1434,5
<i>Chloride</i>	mg/kg	60,35	10,65
<i>Sulfate</i>	mg/kg	220,8	95,54
<i>Phosphate</i>	mg/kg	10,3	9,16

Figure 1.2. Contents of components from soil analysis of Bishkek's farming area (Non-organic farming and Organic farming area)

and 1.3.] In addition, the premise, which was expected to be proved with the detection of heavy metal, that “Soil in organic farming area is less polluted than the non-organic farming area” was not

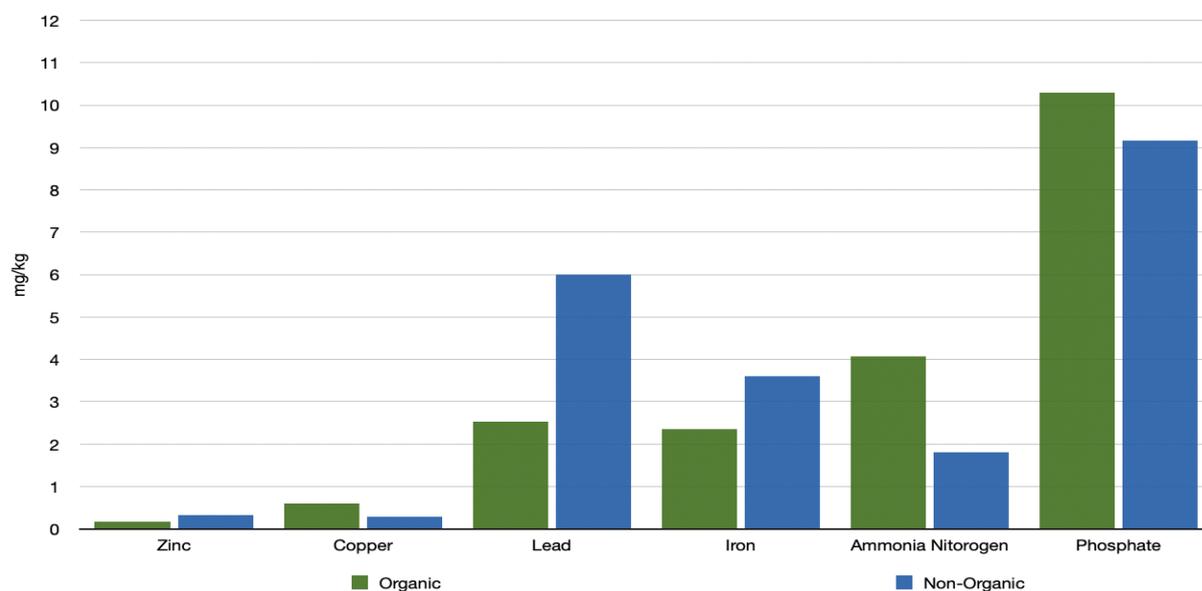


Figure.1.3. Chart of Components in Bishkek Area

proved with p-value of 0.748 in the first group test ($t = -0.3288$, $df = 11.941$) and 0.6307 in the second group test ($t = -0.5426$ and $df = 2.58$). Therefore, for the other regions, we decided to examine the soil condition with the inorganic components' detection, such as pH, Humus, Nitrogen and etc.,

except heavy metal detection, to observe the difference between organic and non-organic farming areas. However, the result for the six regions' soil conditions, with the data presented in the *Figure 1.4*, also showed results without difference between organic and non-organic farming area, and dismissed hypothesis as the test for the Bishkek, with p-value of 0.8557 ($t = 0.19164$, $df = 4.9144$).

	<i>Humus</i>	<i>pH</i>	<i>Nitrogen</i>	<i>Phosphorus (P2O5)</i>	<i>Potassium (K2O)</i>
<i>Issyk-Kul (O)</i>	5,20	7,80	280	114,0	680,0
<i>Issyk-Kul (N)</i>	3,12	7,60	160	92,0	400,0
<i>Osh (O)</i>	1,92	8,00	105	70,0	264,0
<i>Osh (N)</i>	1,81	8,10	95	24,0	200,0
<i>Jalalabat (O)</i>	2,23	8,35	110	36,0	300,0
<i>Jalalabat (N)</i>	1,98	8,30	100	28,0	264,0
<i>Batken (O)</i>	1,66	8,55	85	17,0	376,0
<i>Batken (N)</i>	1,46	8,40	75	11,0	352,0
<i>Naryn (O)</i>	2,96	8,15	150	55,0	240,0
<i>Naryn (N)</i>	2,18	8,05	110	18,0	120,0
<i>Talas (O)</i>	4,73	8,0	240	15,5	240,0
<i>Talas (N)</i>	2,50	7,95	130	32,5	165,0

Figure 1.4. Contents of components from soil analysis with gathered samples from 6 different regions. (Unit: mg/kg)

Since all collected data did not show the significant difference and further work will not meaningful, we should have finished soil sampling with the conclusion which is “Almost all Kyrgyzstan’s farms are taking organic farming system, however, due to lack of the proper standard process, the farms are considered as non-organic farms.” In other words, the result itself was disappointing, but for Kyrgyzstan's agriculture and soil quality, the result can be considered as a positive perspective that represents the possibility of organic farming system’s growth, if the proper certificate process is created.

Surveying Consumers and Producers

In total, 356 answers sheets were gathered (176 of Consumers and 180 of Producers) from different regions in Kyrgyzstan with a variety of age groups (See Figure 2.1.). Since the age group of both surveys showed penetrated features, the factors to be considered, which are related to age, were expected to be deduced in much significant form. First, questions in consumer groups with age groups were considered to satisfy factors which are: 1) *Consumers with younger age are more likely to be exposed to advertisements for organic products*, and 2) *Consumers with younger age are more likely to buy organic products*.

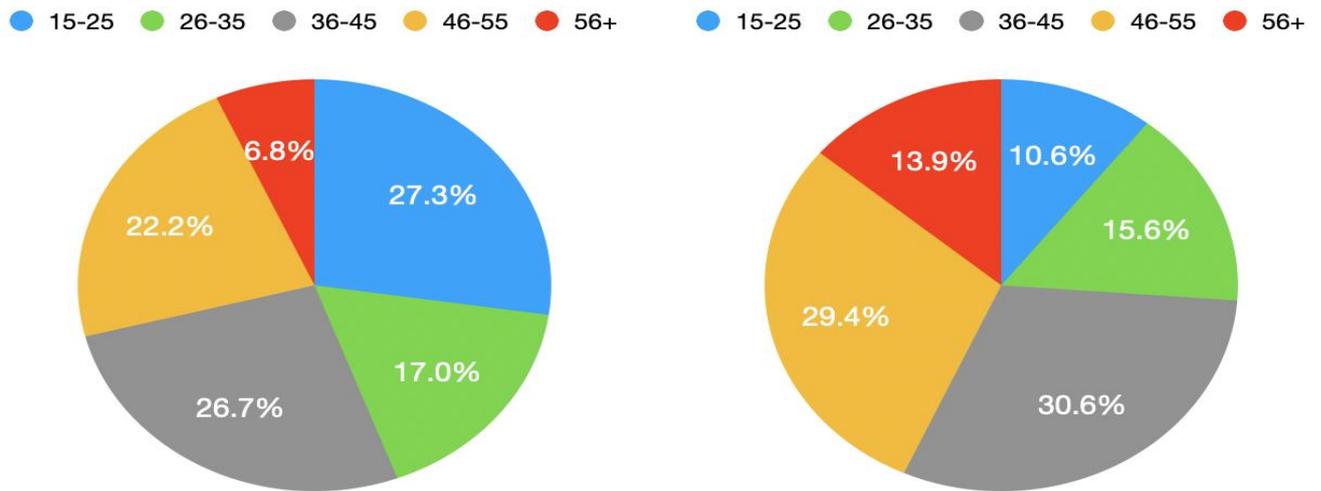


Figure.2.1. Distribution of age groups. Consumers (Left) and Producers (Right)

The distribution of the answers for exposure to advertisement of organic products is shown as following (Also see the *Figure 2.2.*): in the first group (15-25), Always: 2.1% (1 respondent out of 48), Often: 35.4% (17 respondents out of 48), Sometimes: 54.2% (26 respondents out of 48) and Never: 8.3% (4 respondents out of 48). With the *factor 1*), the result should have shown a correlation at a minimum, however, since the result shows that age group does not affect the frequency of exposure to the organic products' advertisement, the *factor 1*) was dismissed. For the *factor 2*), the questions, which are related to the preference to purchase organic products, 1) Farm products without any chemical are more reliable, 2) If organic product's price is equal to non-organic, choice will be

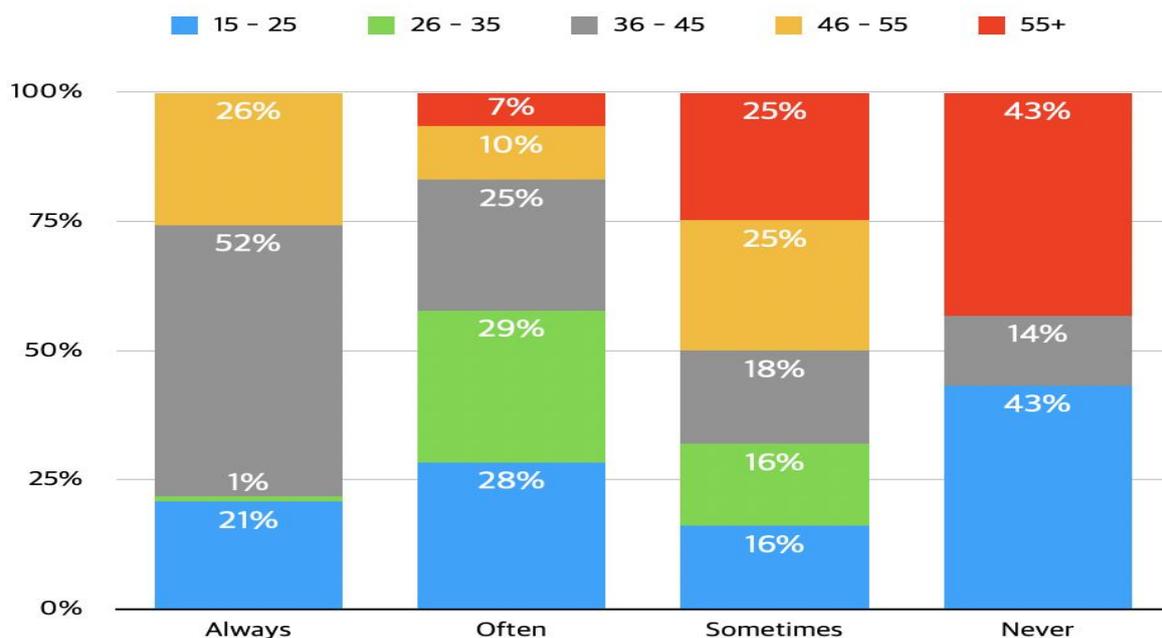


Figure.2.2. Percentage of each answer for exposure to organic products' promotion

organic product and 3) Considering family, the price is not matter, if the product's security is guaranteed, were applied.

Based on answers, which spread from Strongly Disagree (which is scored with 1 point) to Strongly Agree (Which was scored with 5 point), each age groups' answer percentage was calculated (See the *Figure 2.3.*) The means of each group's total score percentage are 84.3%, 85.2%, 86.1%, 86.4% and 80.2% for 55+, 46-55, 36-45, 26-35 and 15-25 respectively. The result showed the approximation among the groups, 55+, 46-55, 36-45, 26-35, however, since the 15 - 25 age group takes the lowest percentage, compared with the other groups, the *factor 2*) was dismissed.

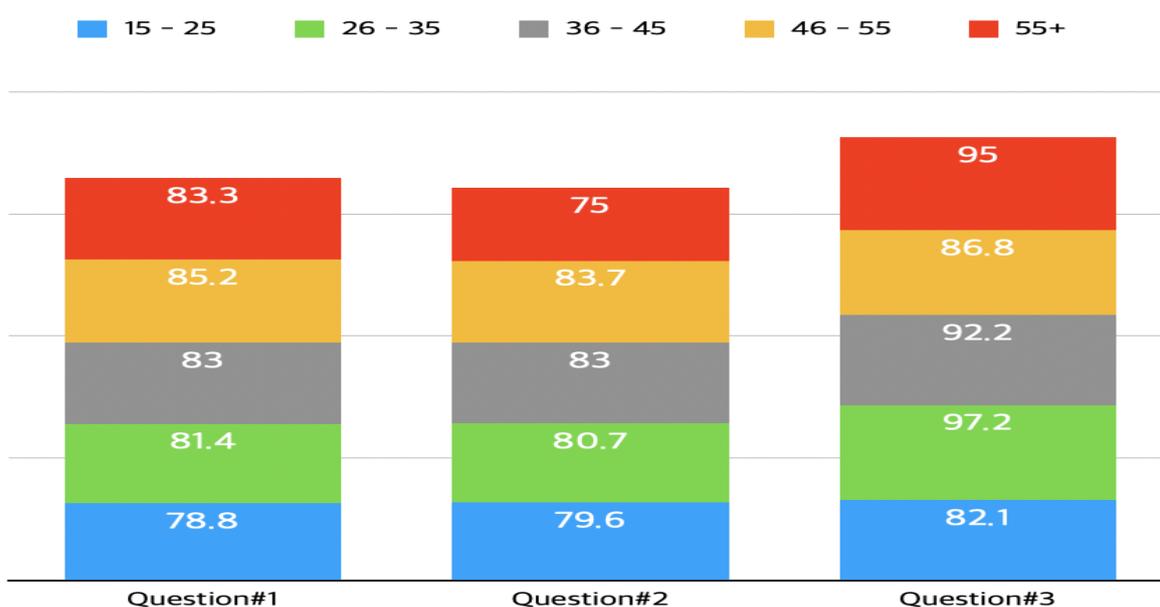


Figure.2.3. Percentage of each age group's total score for question#1,2 and 3

The answers by producers for the *factor 1 and 2* of aspect on producer were also conducted with the identical method with the consumers' answer analysis. For the *factor 1*), *Producers with younger age are more likely to be aware of the organic farming system*, the answers for the question, are you aware of what is organic farming? (From 1 point to 5 point), were applied with total score 95 for 15-25 age group (19 respondents), 140 for 26-35 age group (28 respondents), 275 for 36-45 age group (55 respondents), 265 for 46-55 age group (53 respondents) and 125 for 55+ age group (25 respondents). The result shows that all age groups have similar awareness of organic farming systems (65.6%, 69.1%, 67.6%, 70.7% and 68.4% from 55+ to 15 - 25 group respectively, also see *Figure.2.4.*). For the *factor 2*), *Producers with younger age are more likely to have confidence in their organic products*, the answers for the questions, 1) An expensive product must be of good quality, 2) Farm products without any chemical are more reliable and 3) Farm products without any chemical are usually more expensive, were calculated with a method which was used for *factor 2*) of consumers.

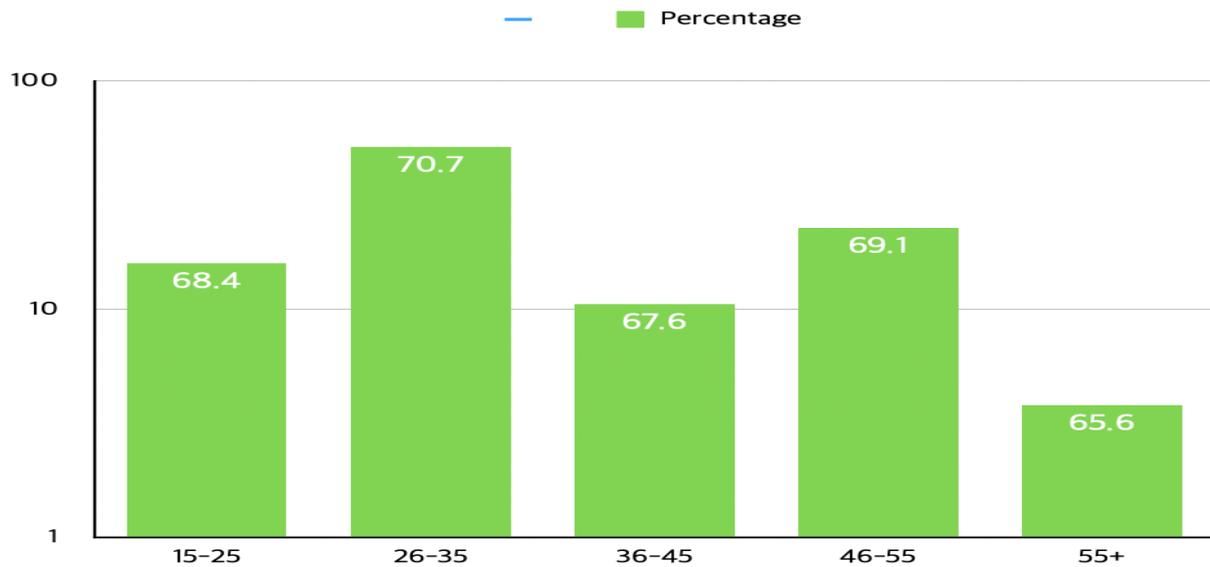


Figure.2.4. Each group's aware of organic farming system (% out of each total score)

The result did not indicate a relation between age and confidence, since the mean percentage values of each age group are 79.7%, 88,2%, 89.5%, 86.2% and 86.6% for each age group from 55+ to 15-25 respectively (See the *Figure 2.5.*)

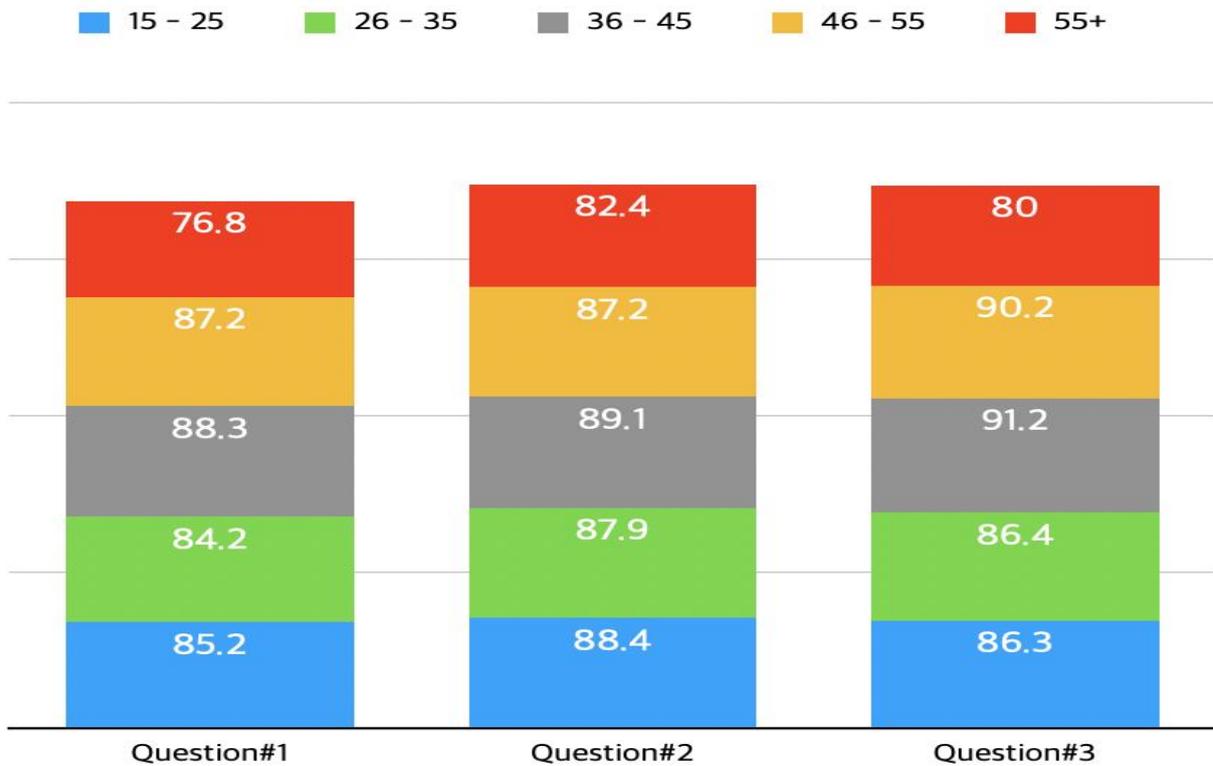


Figure.2.5. Percentage of each age group's total score for question#1,2 and 3 (Producer Version)

For the *factor 3*) Consumers with higher income are more likely to buy organic products, since all respondents avoided answering the question which asked them to define their income and 146 respondents out of 175 (1 blank). For the *factor 4* for consumers, consumers with higher education are more likely to buy organic products, the result showed the upper value in the groups with higher and middle education, compared with the group of lower education, with 86.7% of positive answer percentage by higher education group (Strongly Agree: 64%, 40 out of 63 answers) and 85.7% of positive answer percentage by middle education group (Strongly Agree: 63.4%, 48 out of 75 answers), while the lower education group takes 79.5% of positive answer percentage (Strongly Agree: 25.6%, 10 out of 39 answers). For the last factor of aspect on consumer, consumers are more likely to consider organic products as expensive products, since the ratio of answer is Strongly Agree: 76 (43.2%), Agree: 63 (35.8%), Neutral: 30 (17%), Disagree: 7 (4%) and Strongly Disagree: 0 out of 176.

For the *factor 3*), Producers with higher education are more likely to be aware of the organic farming system, 5 respondents out of 82 answered that they fully understand (6.1%), 41 respondents answered that they understand (50%), 35 respondents answered that they somehow understand (42.7%), and 1 respondent answered that he is not aware of the organic farming system (1.2%). In the group with middle education, 1 respondent out of 72 answered that he fully understands (1.4%), 26 respondents answered that they understand (36.1%), 44 respondents answered that they somehow understand (61.1%), and 1 respondent answered that he is not aware of the organic farming system (1.4%). In the group with low education, 3 respondents answered that they understand (12%), and 22 respondents answered that they somehow understand the organic farming system (88%). As a result, the groups with higher and middle education dominate the positive answer percentage (see the *Figure 2.6*), however, the group sample of lower education was not enough to compare with the other groups (25 out of 180), it is hard to conclude with the deduced result. For the last factor of aspect on producer, *Producers with more understanding of organic farming are more likely to prefer organic farming*, the respondents who answered that they fully understand and who answered that they understand the organic farming system were examined. As a result, 76 respondents were selected, and among them, 60 respondents answered that they considerably prefer (78.9%), 13 respondents answered that they prefer (17.1%), 2 respondents answered that they do not make a distinction between organic and non-organic farming system (2.6%), and 1 respondent answered that he dislikes organic farming system (1.3%), while the other 104 respondents are divided into same sections : 70 respondents answered that they considerably prefer (67.3%), 32 respondents answered that they prefer (30.8%), 2 respondents answered that they do not make a distinction between organic and non-organic farming system (1.9%).

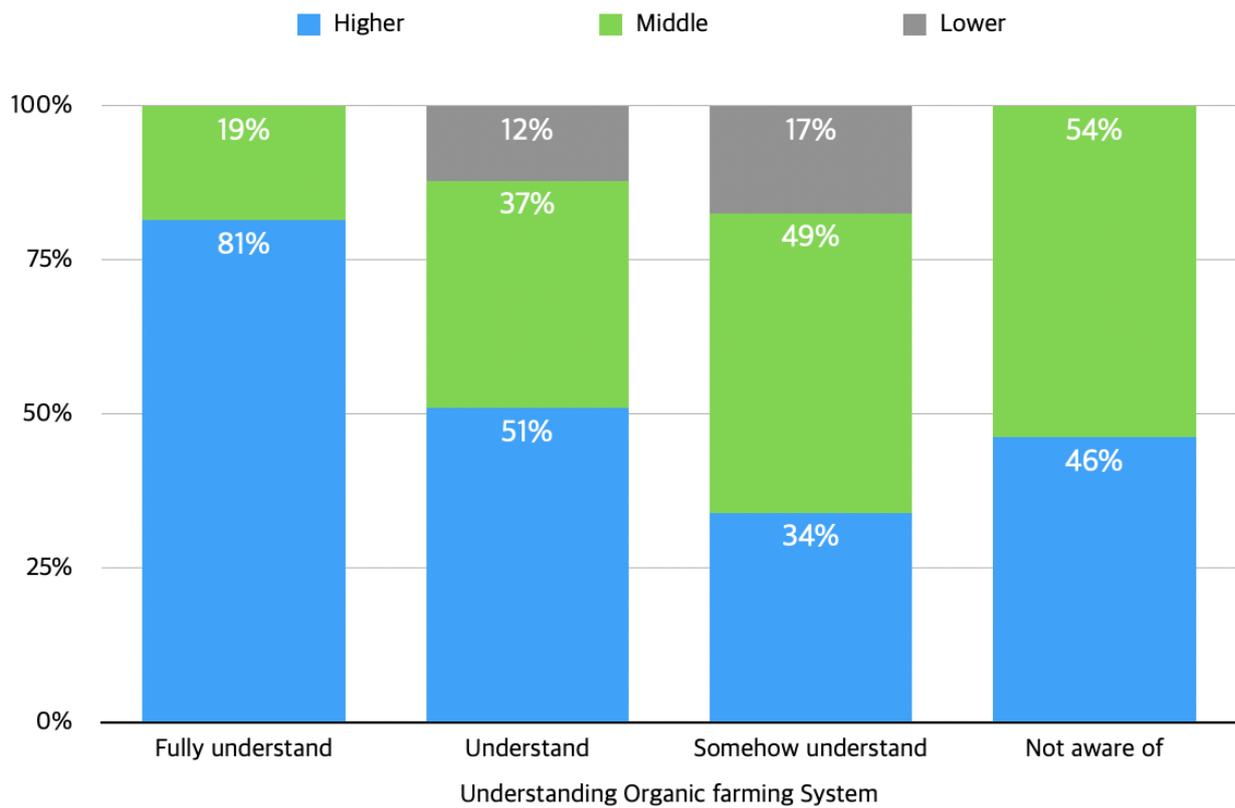


Figure.2.6. Ratio of each group's answer to the question about understanding of organic farming system.

Thus, since both groups positively answered (positive answer percentage of the first group is 96% and it of second group is 98.1%), the last factor was dismissed as well.

Conclusion

Since validation of all hypotheses, including their sub-hypotheses with factors, had failed, the conclusion we deduced is that “Kyrgyzstan’s farming systems are already eco-friendly.” However, 84.3% of respondents (300 out of 356) who gratefully submitted their answers, marked that promotions for organic products aren’t currently activated, and 87.6% of respondents (312 out of 356) answered that they were not educated about the organic farming system in school. Based on this result, if the proper process, to get international certificate to export the Kyrgyz organic products, is established with formation of education about organic farming system in school and incitement for the promotion of organic products through advertisements, future perspective is promising, since Kyrgyz farmers are familiar with farming system without chemicals and possibility of certificate validation is rosy.

As this research premised that Kyrgyzstan’s farming system is not different from other countries where conventional farming systems dominate the agricultural industry because of the environmental contamination, the result is not significant, since Kyrgyzstan has already accommodated to the organic farming system. In other words, this research has definite limitations from the beginning, since it was the first work which focuses on only Kyrgyzstan’s organic farming, and seems to be useless. However, the volition and positive cognition on the organic farming was certified with the survey, furthermore, the result should give path to future research, if there will be another work on Kyrgyz organic farming. Conclusively, for the future researchers, we decided to remain a small recommendation that not to focus on the papers or standards which are published in Russia and actively available in Kyrgyzstan. Since many international organizations such as the UN and ISO, selected Russian as their official language, we recommend using resources from the international organization rather than the Russian resources for contribution to establish proper process for the international certificate.

Recommendation

Current policy by Kyrgyz government for its organic products is insufficient, since it does not support the organic farms. In addition, due to the absence of the national standard for organic products, farmers should rely on the expensive foreign standard, if they want to put a reliable mark. The positive news was that the law on organic agriculture was approved by the Kyrgyz Parliament on February 19, 2019, and the main government agency responsible for organic agriculture is the Department of Organic Agriculture, under the Ministry of Agriculture, Water Resources and Regional Development of the Kyrgyz Republic, which was established on February 19, 2019.

Finally, to draw the maximum effect of the law, the following recommendations, which are activities of government to support the organic farms, can be considered:

- Giving incentives for organic farming;
- Developing organic fertilizers and biological methods to reduce pests and diseases;
- Supporting organic farms with credits, grants, donation and certification;
- Supporting organic farms to sale the organic products and developing logistics centers;
- Informing the nation of the country about the advantages of the organic products, regarding health, nutrition, environment etc.
- Developing laboratories for study on the organic farming;
- Enacting a law which prohibits the import of GMO products.

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Appendices

Appendix A: Provided Questionnaire for Producers

Questionnaire for Organic Product's (Producers / Farmers)

Date _____

Name _____

1. Please define your age group.

1) 15 - 25

2) 26 - 35

3) 36 - 45

4) 46 - 55

5) 56 +

2. Please define your gender.

1) Male

2) Female

3. Please indicate your current place of residence.

- Oblast: _____

- District: _____

- Village: _____

4. Please indicate your latest academic degree.

- 1) High School
- 2) College / Lyceum
- 3) University
- 4) Post University

4.1 Did / Do you get education about Organic Farming at school?

- 1) Yes
- 2) No

5. Please indicate your annual income from farming activities.

KGS: _____

6. What does make you choice at purchase for food?

- 1) Quality
- 2) Price
- 3) Brand / Producer
- 4) Packaging
- 5) Other _____

7 – 13. Please check marks in corresponded boxes.

Content		Answer				
		Strongly Disagree	Disagree	Medium	Agree	Strongly Agree
7	Do you know about organic farming?					

8	Do you feel the effects of chemicals on the human body?					
9	An expensive product must be of good quality.					
10	Farm products without any chemical are more reliable.					
11	Farm products without any chemical are usually more expensive.					
12	If organic product's price is equal to non-organic, choice will be organic product.					
13	Considering family, the price is not matter, if the product's security is guaranteed.					

14. Are you frequently exposed to the advertisements about organic farm products?

- 1) Always
- 2) Often
- 3) Sometimes
- 4) Never

14.1 If you are exposed to the ads, through which media the ads are delivered?

- 1) Television
- 2) Label on products
- 3) Internet
- 4) Social Networks (e.g. Instagram, Facebook etc.)
- 5) Other _____

Appendix B: Provided Questionnaire for Consumers

Questionnaire for Organic Product's (Consumer)

Date_____

Name_____

1. Please define your age group.

- 1) 15 - 25
- 2) 26 - 35
- 3) 36 - 45
- 4) 46 - 55
- 5) 56 +

2. Please define your gender.

- 1) Male
- 2) Female

3. Please indicate your current place of residence.

- Oblast: _____

- City: _____

4. Please indicate your latest academic degree.

- 1) High School
- 2) College / Lyceum
- 3) University
- 4) Post University

4.1 Did / Do you get education about Organic Farming at school?

- 1) Yes
- 2) No

5. Which social group are you involved in?

- 1) Upper Class
- 2) Middle Class
- 3) Low Class
- 4) Other _____

6. What does make you choice at purchase for food?

- 1) Quality
- 2) Price
- 3) Brand / Producer
- 4) Packaging
- 5) Other _____

7 – 13. Please check marks in corresponded boxes.

Content		Answer				
		Strongly Disagree	Disagree	Medium	Agree	Strongly Agree
7	Do you know about organic farming?					
8	Do you feel the effects of chemicals on the human body?					
9	An expensive product must be of good quality.					

10	Farm products without any chemical are more reliable.					
11	Farm products without any chemical are usually more expensive.					
12	If organic product's price is equal to non-organic, choice will be organic product.					
13	Considering family, the price is not matter, if the product's security is guaranteed.					

14. Are you frequently exposed to the advertisements about organic farm products?

- 1) Always
- 2) Often
- 3) Sometimes
- 4) Never

14.1 If you are exposed to the ads, through which media the ads are delivered?

- 1) Television
- 2) Label on products
- 3) Internet
- 4) Social Networks (e.g. Instagram, Facebook etc.)
- 5) Other _____

14.2 Which content do the ads deliver?

- 1) Good effects on Human health

