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Optimum Support Policy Component for the Development of Agricultural Production: Potato Producer

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Abstract: The present study aimed to determine the optimum policy component in an example of potato cultivation development based on the principle of the efficient use of scarce resources and maximizing the benefit of the producer. Agricultural support policies are commonly implemented by adopting a top-down approach. Regarding benefit maximization at the target group level, policies for agricultural products should be determined with a bottom-up approach. In this manner, in the present study, potato producers were determined to be the target group. Therefore, this study investigated the policy component that provides the highest benefit in line with the demands, expectations, and tendencies of the target group. The micro-data obtained from the potato-growing enterprises operating in provinces where potato cultivation was intensively carried out within the scope of Turkey constituted the research data. A face-to-face survey technique was used as the method for collecting the producer data. Simple descriptive statistics and one of the multivariate analysis techniques, conjoint analysis, were applied in the analysis and evaluation of the data. The optimum policy component setup was determined to be "Price and Payment Support: Above Market Price and 2 months term, Support Area and Amount: to production, 25.47 USD/da (23.04 EUR/da), time of announcement for the supports: pre-planting, and producer's declaration: I do (I declare)" for the potato product. Accordingly, the necessity of a bottom-up approach in the planning and implementation of an agricultural support policy in Turkey is explained based on the results obtained. Therefore, it is considered necessary and beneficial to measure the level of producer benefits on the focus of applications that encourage potato production.

Keywords: agriculture; potato; producer; support policy; conjoint analysis

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1. Introduction

Adequate and balanced nutrition is one of the most important worldwide issues. Plant-based products are the most used product group in human nutrition. Potato, on the other hand, is in the starch-sugar plants group among industrial plants. Potato has tuberous roots and has an important place in terms of both production and consumption. In terms of nutrition, potatoes meet the basic food needs of individuals as an important energy source, especially in underdeveloped countries. It is an annual crop plant and has advantages in terms of cultivation. It can be grown in almost every part of the world and used in various ways as an important food source thanks to its features, such as obtaining a higher yield per unit area, a high nutritional value, being used in various fields, and being able to quickly adapt to different ecologies. It is one of the most important agricultural

products in terms of demand and supply. These aspects can be processed in various ways and presented to the consumer.

Potato production in the world ranks sixth, following sugarcane, corn, wheat, rice, and oil palm fruit. It is in sixteenth place in terms of agricultural cultivation areas. World potato production areas decreased from 18.8 million hectares in 1980 to 17.34 million hectares in 2019. According to the 2019 data, China ranks first in potato fields in the world, with 4.9 million hectares in cultivation areas. It is followed by India, with approximately 2.2 million hectares. Ukraine ranks third in potato cultivation areas with 1.3 million hectares, Russia ranks fourth with 1.24 million hectares, and Bangladesh ranks fifth in potato cultivation areas with 468.4 thousand hectares. The area allocated to potatoes in Turkey in 1980 was 183 thousand hectares. This value decreased to 140.8 thousand hectares in 2019 and ranked 24th in the world [1].

As in all countries worldwide, the agricultural sector in Turkey is supported by direct and indirect means. In the developing process, increases can be seen in the amount of support given to the agricultural sector. Within the scope of basic products, which are especially important in terms of community nutrition, a support policy is followed for plant and animal products. In terms of resource use efficiency, the implementation of the optimum policy component in the support tools for the agricultural sector is important in terms of revealing its high impact and benefit on the target producer group.

Although there are many studies on potato cultivation, studies on the economic dimension of potato plants and the development of cultivation and agricultural policy are limited.

Looking at the direct or indirect studies on the subject, Lami (2019) the economic aspect of agricultural enterprises where potato cultivation is carried out in the city of Elbasan, Albania was investigated. As a result of cost analysis, it was determined that the cost of potatoes was below the selling price. In this study, the cost of 1 kg of potatoes was calculated at LEK 2.07 (USD 1.92). In this research, a more planned production was advised in accordance with the technique so that producers can continue to produce high-quality and profitable potatoes in the region [2]. Tok and Davran (2010) investigated the socioeconomic structure and problems of agricultural enterprises producing early potatoes in the Adana Province. The average number of parcels in the research area, the average parcel width, the ownership status of existing cultivated lands, average labor in the enterprises, capital distribution, farm capital ratio within active capital, the ratio of working capital, the ratio of foreign capital used, the average gross product in enterprises, the gross product per decare, the average agricultural income, and family income were calculated. Producers have experienced important problems in early potato production, focusing on four issues: price, marketing, product, and production techniques [3]. Karsan and Gül (2017) in Niğde province is an intensive-potato production area in Turkey. The present study aimed to examine the changes in potato production costs and income in the province of Niğde from 2000 to 2014. The absolute profit from potato production in Niğde province was calculated at 355.6 TL/da (162.63 USD/da) for 2014. The year with the highest absolute profit (450.8 TL/da/ USD 206.17) was 2005, whereas the lowest year (−329.7 TL/da/USD −150.79) was 2012. Except for 2012, this gross production value covered production costs in all of the years examined. However, with the increase in production costs, absolute and relative profits tended to decrease [4].

Kadakoğlu and Karlı (2021), focused on the current situation of potato production in the world and in Turkey, the foreign trade structure, how the potato support policy is in Turkey, and ways and suggestions to be followed to increase potato production in Turkey's future. A model was created to determine the factors affecting potato production in Turkey, and it was determined that potato producers planted potatoes depending on the potato price they received the previous year, the fertilizer price the previous year, and the potato demand. When the price of potatoes and potato consumption increased by the farmer in the previous year, farmers produced more potatoes. Additionally, the increase in fertilizer prices caused farmers to stay away from potato production [5]. Lazarus and White (1984)

stated that potatoes are grown in most parts of the state of New York and that environmentally adverse effects negatively affect potato production. A linear programming model was used to determine the crop rotations that caused a reduction in potato production areas. The researchers suggested a potato-cauliflower rotation for the sustainability of potato production [6]. Kızıloğlu (1994) examined the production costs of wheat, barley, potato, sunflower, sugar beet, and vetch, which are important field crops in the Erzurum province in eastern Turkey. Kızıloğlu also revealed the econometric analysis of the supply functions of these products and identified the factors that restrict or encourage cultivation areas. As a result of the economic analysis of the potato supply functions produced in the research region, it was determined that factors other than economic factors were more effective at determining potato cultivation areas [7]. Loader (1997) sought a detailed diagnosis of individual relationships within the fresh potato marketing system from Egypt to the United Kingdom. Based on transaction cost economics in their study, the researcher revealed the effects of relationships on the marketing network of channel structure and integration [8]. Dağdemir and Birinci (1999) estimated models relating to supply and demand functions by using the data from the 1963 to 1997 period in their studies. The researchers revealed the factors affecting the amount of potato production and consumption in Turkey. In the supply function, it was determined that there was a direct relationship between potato production and real prices and the technology received by the farmer. In the demand function, it was determined that there were direct relationships between potato consumption and the real prices paid by the consumer for potatoes, the population, and an inverse relationship between income [9]. Moazzem and Fujita (2004) analyzed the potato marketing system in Bangladesh, especially the economic relations between farmers, traders, and cold-storage owners. The researchers stated that investment in the potato market was capital-intensive, risky, and mostly vertically linked. They reported that traders were investing in risky potato storage businesses and that their incomes had declined as cold storage owners provided "cheap" loans [10]. Şahin (2003a) examined the structural features and problems of agricultural enterprises producing potatoes in the province of Van. The researcher found that, as the enterprises became smaller, the supply of potatoes decreased [11]. Şahin (2003b), in their study, examined the marketing structure of potato-producing enterprises in the province of Van. The researcher stated that 52.50% of the potato was marketed through merchants and 32.20% through brokers, 5.10% was delivered directly to the consumer without intermediaries, and 10.20% was sold to local buyers [12].

Birinci and Küçük (2006) aimed to determine the amount and cost of the production inputs used for potato production activities by potato-producing enterprises in Erzurum. The researchers determined that there was a demand for 78.20 h of labor and 4.40 h of tractor drawbar power in potato production in the examined enterprises [13]. Engiz (2007) interviewed farmers producing certified seed potatoes and companies that had contracted production in the Nevşehir province. According to the Cobb–Douglas production function created in this research, it was determined that an economic optimum would be achieved when the workforce, draft power, and fertilizer use were increased in both the seed and edible industrial potato production [14]. Tunçtürk et al. (2007) interviewed 28 potato-producing enterprises in the Erciş district of the Van province using the stratified sampling method and stated that the producers stored potatoes in bulk after the harvest and sold them to the nearby settlements and neighbors, especially to traders [15]. Engindeniz and Karakuş (2008) stated that Turkey has a significant advantage in terms of early potato exports to EU countries, that the number of potatoes in the Turkish and European markets decreases during the harvest period of early potatoes, and that exports are advantageous in this case [16]. Bonabana-Wabbi et al. (2013) investigated the profitability of potato and pineapple farms and technical efficiency and productivity factors in potato farms in southwestern Uganda and found that seasonality had an effect on gross profits in pineapple and potato businesses [17]. Kaya (2015) examined the Cobweb theorem for potato crops in the context of different models. In the mentioned study, the relationship between the amount of potato production and its prices were examined using Koyck and Almon models

in the context of the Cobweb theorem, which states that production amount follows prices with a period lag. As a result, it has been stated that the Cobweb theorem could not be explained with the help of the Almon model [18]. Rana et al. (2017) reported that India aims to produce 125 million tons of potatoes in 2050 to ensure food security and that the country needs to explore non-traditional areas to achieve this great goal. The researchers identified a number of strengths and opportunities associated with potato cultivation in the region and reported that known weaknesses and threats could be mitigated through the use of technology and a focused rural development process [19]. Rana and Anwer (2018) reported that India is the second largest potato producer in the world after China and has shown tremendous growth in potato production over the last fifteen to twenty years, but this growth has been due to area expansion rather than yield increase [20].

In the present study, the question, "what should be the optimum marketing policy component for the development of potato cultivation?" in a definition that is also important in terms of practice, which is seen as an important deficiency in the literature and was examined from a producer-oriented perspective. This study adopted to develop a policy construct based on microdata as a new model. The international literature provides no research in which conjoint analysis can be utilized at the level of the agricultural sector or agricultural products. Therefore, it is important to contribute to the literature with this study in which conjoint analysis is applied to the agricultural sector.

2. Materials and Methods

The main material of the study consisted of the data obtained by the survey method from farmers. The research was carried out in eight provinces (Adana, Afyonkarahisar, Aksaray, İzmir, Kayseri, Konya, Nevşehir, and Niğde) where the potato cultivation areas are large in Turkey (Figure 1). Secondary data related to the study were obtained from The Food and Agriculture Organization (FAO), the Turkish Statistical Institute (TSI), and the Provincial Directorates of the Ministry of Agriculture and Forestry. Additionally, national and international studies on the subject were also utilized.

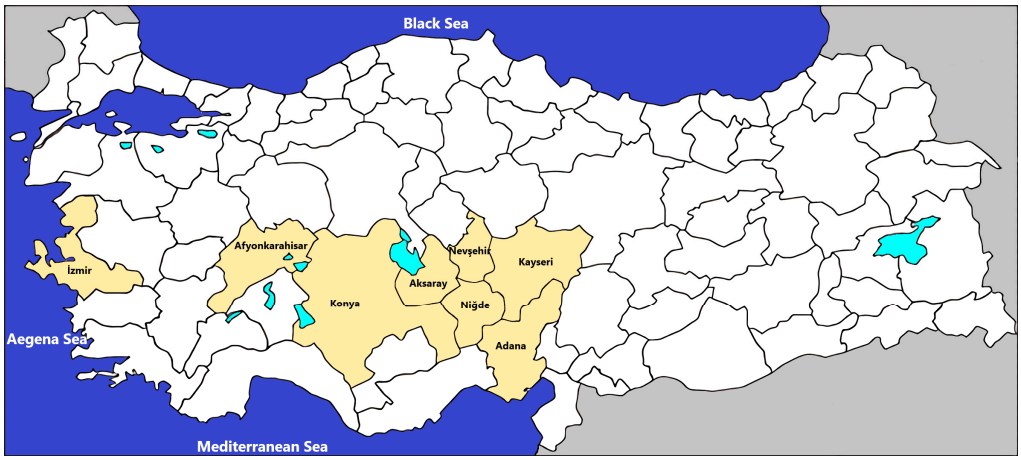

Figure 1. Provinces in the research area.

The data obtained from potato-growing enterprises reflect the 2019 production season. Since it would not be possible to conduct a survey with all businesses in the population in terms of time and economy, the businesses to be surveyed were selected by the sampling method. To determine the sample in the study, the Farmer Registration System was used, which obliged the collection of farmer information in a central database to monitor, audit, report, and query the agricultural supports implemented in Turkey. A Stratified Sampling Method was used to determine the number of samples surveyed. The farmers involved in potato production were divided into strata according to their frequency distribution, considering the size of the potato planted area. The Neyman Method formula was used in

the distribution of the sample number to the strata [21]. The following formulas were used to determine the number of sample producers.

$$n = \frac{(\Sigma N_h S_h)^2}{N^2 D^2 + \Sigma N_h {S_h}^2}$$

In the formula, n: sample volume, N: total number of units, N_h: number of units per stratum, S_h: standard deviation per stratum, D = d/z where d: predicted deviation, z: standard normal distribution value, and ${S_h}^2$: stratum variance.

$$N_h = \frac{N_h S_h}{\Sigma N_h S_h} * n$$

The above-mentioned stratified sampling was carried out using the Neyman method, and the number of enterprises to be surveyed was determined. Accordingly, the number of sample farms for each province was calculated with a 95% confidence level and a 5% deviation from the average for the framework list, which was obtained by performing a full enumeration of the agricultural enterprises producing potatoes in the determined settlement (Table 1).

Table 1. Number of potato producers interviewed in the research area.

Provinces	Potato Field (da) Groups			Total
	≤50.00	50.01–100.00	100.01≥	
Adana	16	7	39	62
Afyonkarahisar	41	18	19	78
İzmir	48	11	9	68
Kayseri	34	12	26	72
Nevşehir	36	11	22	69
Niğde	25	17	14	56
Aksaray	27	6	25	58
Konya	21	9	40	70
Region Total	248	91	194	533

In accordance with the rules of the stratified sampling method used in the determination of the enterprises to be surveyed in this study, the average cultivation area of the enterprises in the provinces where potato cultivation is intense in Turkey was divided into three strata. Equal distribution, variance, and standard deviations between the strata were taken into account while determining the strata according to the cultivation areas.

Producers were divided into three layers according to potato planting area widths. Accordingly, enterprises with a potato cultivation area of fewer than 50 decares were in Group I, enterprises with a potato cultivation area between 50–100 decares were in Group II, and groups and enterprises with a potato cultivation area of 100 decares or more were in group III (Table 1).

Conjoint analysis was utilized to determine the policy components that could contribute to the improvement of potato production volume, quality, and marketing in the Adana, Afyonkarahisar, Aksaray, İzmir, Kayseri, Konya, Nevşehir, and Niğde provinces in Turkey. Conjoint analysis is a multivariate analysis technique that is used to analyze individuals' preferences for different combinations of measured and unmeasured traits. The purpose of conjoint analysis is to determine the priorities and options that affect an outcome at the decision stage [22]. Joel (2002) defines conjoint analysis as a method of systematically evaluating and estimating a decision maker's limited number of alternative choices [23]. This analysis attempted to reveal what features a newly developed or already existing product or service should have, the preference behavior of individuals who benefit from this product or service, and to reveal the most desired features of the service [24–26]. Analysis was widely used in a wide variety of fields. It is a method that can be used in

planning the new service and in efforts to upgrade existing achievements to determine the effects that innovations make.

The starting point of the conjoint analysis is based on the "Total Utility Theory". In the partial benefit contribution model, the partial benefits of each feature level related to the product are independent of each other, and the sum of the partial benefits of these feature levels creates the total benefit.

The first step in the analysis is the selection of the preference function, which determines the effect of the factor characteristics that have an effect on the preferences of the people participating in the analysis on the decision. This function is the basis for determining partial values of the factor characteristics that can affect the preferences of the people participating in the analysis [24,26].

In the partial benefit contribution model of the conjoint analysis, the partial benefits of each feature level related to the product are independent of each other, and the sum of the partial benefits of these feature levels creates a total benefit at the target audience level. The theoretical explanation of the partial benefit contribution model, which is widely used in conjoint analysis, can be defined as follows [27]:

$$\text{Prefijk1} = \text{ai} + \text{bj} + \text{ck} + \text{d1}$$

In the formula,

Prefijk1 = the producer's preference for support or total benefit
ai = the partial benefit of supporting feature A at level i
bj = the partial benefit of boosting feature B at level j
ck = the k-level partial benefit of the C feature of bracing
d1 = the partial benefit of the D feature at the reinforcement of level l

The purpose of the conjoint analysis was to determine the priorities and options that affect an outcome at the decision stage. The first step in this analysis was the selection of the preference function, which can determine the effect of the factor characteristics that have an effect on the preferences of the people participating in the analysis and on the decision. This function is the basis for determining the partial values of the factor characteristics that affect the preferences of people participating in the analysis [26]. The most used models are the ideal vector model, the ideal point model, and the partial benefit model [28]. As in all statistical studies, the first step of the conjoint analysis was to determine which decision mechanism and purpose the research problem was aimed at. The point to be noted at this stage is that the research problem should be able to be solved by defining the preferences between variable and variable levels. Two different data collection techniques are used in conjoint analysis. These are the full profile method and the paired comparison method. Because the full concept method is more advantageous, it can be widely used in practice [27].

In the present study, the full profile method was preferred to compile the data evaluated in the combined analysis. Accordingly, question cards containing the determined features of the services and each feature level were prepared and presented to the producers. The selection of factors and factor levels to be included in these question cards was a critical step. It should be noted that these factors and factor levels are not the same as the current support policies; they are realistic and practical and should not affect the producer's choice numerically.

In the present study, conjoint analysis was used to determine the optimum policy component for the sustainability of potato production. Thus, the degree of influence of the policy set that maximizes the producer's utility and the characteristics of the producer in this policy preference was determined. In the conjoint analysis for the producer, determining the relationship between the factor and factor levels and the order of preference was the most important stage of the analysis. At this stage, a pilot prequestionnaire was applied to the individuals in terms of the scope of support given for the product in the previous

periods, how support for the region in the future should be, and for the determination of factor and factor levels (Table 2).

Table 2. Factors and factors level used in conjoint analysis.

Factors	Factor Level
Price and Payment Support (Market Support) (PPS)	Above Market Price and 2 Month Term (PPS1) Market Price and 1 Month Term (PPS2) Below Market Price and advance payment (PPS3) None (PPS4)
Support Area and Amount (SAA)	To production, 25.47 USD/da (23.04 EUR/da) (SAA1) To quality, 25.47 USD/da (23.04 EUR/da) (SAA2) To production 8.49 USD/da (7.68 EUR/da) and to quality, 12.73 USD/da (11.52 EUR/da) (SAA3) To input, 16.98 USD/da (15.36 EUR/da) (SAA4)
Time of Announcement for the Support (TAS)	Pre-planting (TAS1) Production Process (TAS2) End-harvest (TAS3)
Producer's Declaration (PD)	I do (I declare) (PD1) I do not (I do not declare) (PD2)

Within the scope of the conjoint analysis study, the selection of the factors and their levels on the cards to be shown to the interviewee was a critical step. In analysis, the factors should be decisive in such a way that influences the choice of individuals; the factors should provide complete and meaningful information about the service and be realistic, as well as practical and representative of a single concept. The use of factors involving more than one dimension, such as quality, should be avoided. Factors should be easily communicated by the interviewee so that a realistic assessment can be made. The number of factors included in the analysis directly affects the reliability and statistical validity of the results. Additionally, when the number of factors and the factor levels are increased, the increasing number of parameters either brings more card presentations or leads to a decrease in the validity of the parameters [27].

In conjoint analysis, determining the relationship between the factors and factor levels and preference order is one of the most important parts of the analysis. At this stage, primarily, the factors and factor levels required for the policy should be determined. In this study, the factors and factor levels were examined and determined as a result of the evaluation, a preliminary questionnaire form was prepared for the producers, and the factors and factor levels valid for the analysis were determined as follows (Table 2).

The determined factor and factor levels were entered into the SPSS package program, and an orthogonal design was created to explain the combinations of product/service profiles, combining each factor with others and forming a vertical series in the form of subsets. The combinations to be used in the analysis according to the factor and factor levels were determined as 16-question cards in the SPSS 13 package program.

Within the scope of the conjoint analysis, 16 different support component scenarios in the Orthogonal Design consisting of factor and factor levels and the support preference of the producer for potato production were presented. Producers were asked to score from 10 to 0 points, giving 10 points to the policy component they preferred the most and 0 points to the policy component they preferred the least.

Since the conjoint analysis is an analysis that prioritizes the preferences of individuals, due to the fact that the practitioners take the preferences of their existing applications as a priority, the opinions of the individuals about the applications were revealed. To improve the quantity and quality of potato production in Turkey, a support policy is needed as in other countries. Knowing the optimum support policy component for the target group is important in terms of resource utilization efficiency. Reflecting on the thoughts of the producers who are in practice for the development of potato cultivation provides important information for the development and dissemination of activity.

3. Results

The effect degree of the policy set that maximizes the benefit of the producers and characteristics of the producers in this policy preference was determined (Table 3). Evaluating the results, it was revealed that the most important factor in the support preference of the producers was "price and payment support (market support)". The effect of price and payment support (market support) on the decision of producers to benefit from support was calculated to be 42.52%. It was determined that price and payment support was the first preferred factor in the support given by the producers for the increase in potato cultivation. After the price and payment support, the second-degree important factor in the decision of the producers to benefit from the support was the "support area and amount" support. The effect of this support on the decision of producers to benefit from the support was calculated to be 25.08%. The third-degree important factor in the decision of producers to benefit from support was the "time of announcement for the support". The degree of influence of marketing support producers in terms of the decision to benefit from the support was calculated to be 18.62%. Finally, the fourth most important factor in the decision of producers to benefit from support was the "producer's declaration". The degree of influence of the producer's declaration on the decision for producers to benefit from support was calculated to be 13.78% (Table 3).

Table 3. Results of producer conjoint analysis.

Factors	Factor Level	Partial Benefit	Materiality Level (%)
Price and Payment Support (Market Support) (PPS)	Above Market Price and 2 Month Term (PPS1)	0.67	42.52
	Market Price and 1 Month Term (PPS2)	0.92	
	Below Market Price and advance payment (PPS3)	−0.28	
	None (PPS4)	−1.32	
Support Area and Amount (SAA)	To production, 25.47 USD/da (23.04 EUR/da) (SAA1)	0.68	25.08
	To quality, 25.47 USD/da (23.04 EUR/da) (SAA2)	−0.34	
	To production 8.49 USD/da (7.68 EUR/da) and to quality, 12.73 USD/da (11.52 EUR/da) (SAA3)	−0.24	
	To input, 16.98 USD/da (15.36 EUR/da) (SAA4)	−0.10	
Time of Announcement for the Support (TAS)	Pre-planting (TAS1)	0.43	18.62
	Production Process (TAS2)	−0.04	
	End-harvest (TAS3)	−0.39	
Producer's Declaration (PD)	I do (I declare) (PD1)	0.76	13.78
	I do not (I do not declare) (PD2)	−0.76	
Total	100.00		
Correlations			
	Value	Sig.	
Pearson's R	0.97	0.000	
Kendall's tau	0.83	0.000	

Partial utility values of each factor level show the effect of those levels on the preference of the farmer or farmers. Accordingly, the factor level with the highest partial benefit value was the most preferred option by the producers. Accordingly, the factor level with the highest partial benefit score in the "price and payment support (Market support)" factor was the support to be given with "market price and 1 month term" at 0.92. The factor level with the highest partial benefit score in the factor of "support area and amount" was 0.68, and the amount of support requested to be given was "to production, 25.47 USD/da (23.04 EUR/da)". The factor with the highest partial benefit score in the "time to announcement for the supports" factor was the "pre-planting", with a factor level of 0.43. The factor with the highest partial benefit score in the "producer declaration" factor was support requested according to the product with the "I do (I declare)" factor level at 0.76 (Table 3).

The present research sought an answer to the question of how the support of potato cultivation, which is applied throughout Turkey for the development of potato cultivation,

and is the main subject of this research, should be applied in the eyes of the producers throughout Turkey using conjoint analysis. The average and total utility values of the combinations (question cards) offered to the producers within the scope of the conjoint analysis; the priority order of the producers in the policy preference is given in Table 4.

Table 4. Total producer benefit of cards.

Card No	Producer's Declaration	Partial Benefit	Time of Announcement of Support	Partial Benefit	Support Area and Amount	Partial Benefit	Price and Payment Support (Market Support)	Partial Benefit	Total Benefit
12	PD1	0.76	TAS1	0.43	SAA1	0.68	PPS1	0.67	2.55
1	PD1	0.76	TAS2	−0.04	SAA1	0.68	PPS2	0.922	2.33
5	PD1	0.76	TAS1	0.43	SAA2	−0.34	PPS2	0.92	1.77
10	PD1	0.76	TAS1	0.43	SAA4	−0.10	PPS3	−0.28	0.80
8	PD1	0.76	TAS3	−0.39	SAA2	−0.34	PPS1	0.67	0.71
14	PD2	−0.76	TAS1	0.43	SAA4	−0.10	PPS2	0.92	0.48
9	PD1	0.76	TAS2	−0.04	SAA3	−0.24	PPS3	−0.28	0.20
11	PD2	−0.76	TAS1	0.43	SAA3	−0.24	PPS1	0.67	0.09
6	PD2	−0.76	TAS2	−0.04	SAA4	−0.10	PPS1	0.67	−0.23
4	PD1	0.76	TAS1	0.43	SAA3	−0.24	PPS4	−1.32	−0.37
13	PD2	−0.76	TAS3	−0.39	SAA3	−0.24	PPS2	0.92	−0.47
3	PD2	−0.76	TAS3	−0.39	SAA1	0.68	PPS3	−0.28	−0.74
16	PD2	−0.76	TAS1	0.43	SAA2	−0.39	PPS3	−0.28	−0.96
2	PD2	−0.76	TAS1	0.43	SAA1	0.68	PPS4	−1.32	−0.97
7	PD1	0.76	TAS3	−0.39	SAA4	−0.10	PPS4	−1.32	−1.04
15	PD2	−0.76	TAS2	−0.04	SAA2	−0.39	PPS4	−1.32	−2.45

Price and Payment Support (Market Support) (PPS), Above Market Price and 2 Month Term (PPS1), Market Price and 1 Month Term (PPS2), Below Market Price and advance payment (PPS3), None (PPS4), Support Area and Amount (SAA), To Production, 25.47 USD/da (23.04 EUR/da) (SAA1), To quality, 25.47 USD/da (23.04 EUR/da) (SAA2), To production 8.49 USD/da (7.68 EUR/da) and to quality, 12.73 USD/da (11.52 EUR/da) (SAA3), To input, 16.98 USD/da (15.36 EUR/da) (SAA4), Time of Announcement for the Support (TAS), Pre-planting (TAS1), Production Process (TAS2), End-harvest (TAS3), Producer's Declaration (PD), I do (I declare) (PD1), I do not (I do not declare) (PD2).

The total benefit value consisted of the sum of the factor levels scores, and their combination with the highest total benefit value was defined as the policy set that provided the optimum benefit for producers. The combination with the lowest total utility value provided minimum benefit to the producers. The optimum policy pattern that gave the producers maximum benefit was card number 12 or its combination with a total utility value of 2.55. The optimum support policy component for potato production is defined in this study as "Price and Payment Support: Above Market Price and 2 Month Term, Support Area and Amount: to production, 25.47 USD/da (23.04 EUR/da), time of announcement for the supports: pre-planting, and producer's declaration: I do (I declare)". The policy support set that provided the least benefit to potato producers was determined to be the number 15 combination with a total benefit score of −2.454. This result shows that producers prefer not to make a production declaration. Additionally, support is made during the production process, the amount of which is 25.47 USD/da (23.04 EUR/da), and price and the payment support is a policy component that provides the minimum benefit, and producers do not prefer it (Table 4).

4. Discussion

Direct and indirect support for the field plays an important role in the development of potato cultivation. In the process of developing support policies, the determination of producer preferences and tendencies at the micro level must be prioritized in terms of resource utilization efficiency and the realization of economic and social benefits anticipated at the target audience level. In this perspective, Price and Payment Support (Market Support) within the framework of existing supports came to the fore as the option that provided the highest partial benefit for producers. This result can be associated with the high sensitivity of producers to market-oriented support in support for potato growing.

Therefore, this support emerges as the primary support policy tool of market-oriented support for the purpose of improving potato cultivation. Additionally, it is accepted by the producer that market-oriented supports are important for the marketing of a producer's products and that the products are provided with the sustainability of the producer's business activities by evaluating them within the marketing activity. From a producer's point of view, another important support element in terms of support policies is support for the Supported Area and Amount. This factor, on the other hand, emphasizes the importance of support due to factors such as the fact that the product is directly produced by the producer to ensure the continuity of production. For the producer, production is a leading factor. Furthermore, the producer is of the opinion that this contributes to the continuity of their business when they receive the return of their labor and reflects their expectations. Another important factor of support for potato producers is the time to announce the support. In Turkey, producer sensitivity to the timing of the announcement of agricultural subsidies is high. Therefore, there is an important relationship between the timing of support and its effectiveness. In many countries, the level and use of support vehicles are not disclosed before production but during the production process or the harvest period. This does not have an effect on the producer's decision. Because the production decision at the producer level is mostly made in line with the product price and producer earnings in the previous production season. However, uncertainty in the market arising from natural factors, diseases, pests, and production directly affects the producer as well as the amount of production. These uncertainties, which are the general characteristics of the agricultural sector, can negatively affect the decision-making process of the producer. Accordingly, it should be accepted as important data for policymakers that the producers demand support time before the production process. The other factor level is the producer's decisions regarding their declaration status. However, there may be significant changes in the amount of production due to the production or negativities in natural conditions. These negatives in production affect the amount of product offered to the market, whereas good natural conditions cause a high amount of production, a decrease in the price of the product, and, hence, a decrease in the income of the producer. On the other hand, negatives in natural conditions cause a decrease in the amount of production and an increase in prices with a decrease in the number of products offered to the market. In this context, countries place importance on the planning of production areas. Determining the amount of product to be produced with planning studies could prevent the negative effects of the current product in market conditions. Additionally, this will ensure the continuity of production at the producer's level. At the consumer level, the current product can then be consumed at an affordable price.

5. Conclusions

Due to its general characteristics, the agricultural sector needs to be protected and supported by both governments and international organizations. It has been known that countries benefit from these support programs regardless of their economic development. Although the implementation of support policies varies, the aim is to protect all the actors in the sector, from the producer to the consumer, and to ensure the continuity of the sector. These policies are important in terms of the producer dimension, consumer dimension, and commercial dimension. The strategic objectives of agricultural policies are stated as providing adequate and balanced nutrition and developing a globally competitive and environmentally friendly agricultural sector. Countries have determined strategic goals in the agricultural sector and have created policies toward these goals. In this context, Turkey is working to ensure the continuity of this sector by determining agricultural support tools in agricultural support policies.

Considering the global price increases in plant and animal products and the negative effects of these increases, especially on the countries that are net importers of agriculture and food. The world market has witnessed significant real price increases for plant and animal products, especially over the last 20 years.

Since underdeveloped and developing countries are mostly net food importers, the negative impact of price increases in basic agricultural products is high in these countries. This situation has made the level of self-sufficiency in agricultural production important for each country in the world. In this direction, there has been an increase in support for the agricultural sector. Direct and indirect intervention management has been applied to the development of plant production activities, which has an important place in the agricultural sector. Despite the fact that potato production is grown in many geographical areas in the world, the diversity of consumption areas brings with it the necessity of production. Additionally, since potatoes can be used in many different fields, potato production gains importance as an activity that reduces foreign dependency on the product meets domestic demand, and increases exports. This requires the use of resources at a certain scale when viewed on a public scale. In this process, it is important to determine the optimum policy component that can provide the highest benefit to the producer in the development of the said production activity. Is the present study focused on supporting policy components that should be encouraged for potato cultivation?

Effective dynamics in the agricultural products market can be identified as supply, demand, and government. In this regard, support policies for the agricultural sector have been developed and implemented by the government with a bottom-up approach. The present study evaluated a more accurate and useful option and considered such support policies and instruments in a bottom-up approach in terms of creating a high impact on the target audience and efficiency of resource utilization.

The support policy component for the development of potato cultivation should be determined in line with the wishes, needs, and preferences of the target producers. Here, the bottom-up approach becomes important in the process of constructing a support policy. In the present study, instead of seeing the post-implementation effects of a defined and preconstructed policy pattern, finding an ideal component that can maximize the benefit of the producer and, thus, encourage sectoral development has been put forward as a new approach.

As reflected in the results, it was demonstrated by this study that the effect of each support area on producer preference and orientation occurs at different levels. It seems useful and meaningful to implement a similar approach in other crop production models. However, when examined at the potato activity level, determining the profitability of the incentive and support programs at an enterprise level can be seen as an important field of study.

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