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Agro-sphere determinants of green branding: eco-consumption, loyalty, and price premium

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This research is devoted to the determinants of green branding in the agro-sphere. The existence of competition between regular and green brands in the agricultural sector has necessitated the determination of the degree of influence of green branding on the formation of consumer loyalty in order to understand the effectiveness and feasibility of such practices among agricultural producers. Previous research in the study of green branding has not focused on the factors studied influencing the level of consumption of organic products or the factors influencing the size of the price premium for green brands. In this study, the influence of green branding on the loyalty of consumers of the eco-market was determined on the basis of a comparison of integrated indicators of satisfaction and importance of the regular brand and green brands by an expert survey of 250 respondents in five supermarkets in Kyiv (Ukraine). In the example comparing the coefficients of consumer loyalty of eggs of the eco-brand and the regular brand, it was found that the rate of consumer loyalty to the eco-brand exceeded the rate of consumer loyalty to the regular brand by 3%. It was established that the size of the price premium of a green brand is determined by such factors as consumer loyalty, availability of organic certificates, costs of green advertising, additional cost of organic products, average profitability of the industry, and average income of consumers. Based on cluster and discriminant analysis, green brands were divided into three levels of price premium: "high", "medium", and "low." Discriminant equations for each cluster according to the level of price premium were constructed. Such equations make it possible to assign a new object of analysis (a new brand) to a certain classificational price category. The current study proves the feasibility and economic and statistical validity of the impact of green branding on consumer loyalty in the agricultural sector. The study has significant implications for brand management by providing empirical evidence that can improve brand managers' strategic decisions in determining the level of price premium.

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Introduction

The dynamic development of ecologically oriented agriculture is confirmed by the statistics of the independent international Organisation for Economic Co-operation and Development (OECD, 2020) and data from the Research Institute of Organic Agriculture (FiBL) (The World, 2020). Ukraine is one of the leading countries in terms of organic farmland (OECD, 2020) (Fig. 1). Agriculture in Ukraine has sufficient potential for the development of the organic sector. In fact, from January–September 2019, the turnover of agricultural trade between Ukraine and the EU increased by 23% compared with the previous year and reached a record $7.5 billion with a positive balance of $3.2 billion (Balanovych, 2019). On the other hand, it should be noted that Ukraine lags behind the pace of the world in spreading the experience of organic food production and the culture of its consumption. To overcome such imbalance, it is important for Ukraine to take into account the key principles related to green branding in the agricultural sector.

The first principle is to understand the essence of green branding. Green branding is part of the concept of green marketing (Sarkar, 2012), which has become widespread and has formed a new vision of approaches to eco-market research and management. Based on the definition of organic products, according to which organic products are products of sustainable agriculture and food industry, obtained as a result of certified organic production (Grubor et al., 2018), the eco-market will mean the ratio of demand, supply, price, and cost of organic agricultural products to demand, supply, price, and cost of all other agricultural products in statics and dynamics. Among the main factors that stimulate the development of the concept of green branding, scientists single out the consumption of food without chemicals and free of genetically modified ingredients, thereby reducing the environmental burden of agricultural production (Lockie et al., 2002), corporate social responsibility (Čerkasov et al., 2017), eco-innovation (Sarkar, 2012), green advertising (Čerkasov et al., 2017; Nedumaran and Manida, 2019), eco-labeling standards and eco-packaging (Chen et al., 2017; Darnall et al., 2018). Today, it has become an increasingly common realization that the key to the success of any company is a synergistic combination of branding strategies with social justice and environmental protection.

The development of the green economy (Goswami et al., 2017; Musvoto et al., 2018) and the increasing role of green branding raises the issue of identifying the potential level of consumption of organic products for Ukraine in order to realize the need for a strong green brand that can meet not only consumer needs (Murgado-Armenteros et al., 2020; Ricci et al., 2018), but also the needs of a society focused on sustainability and ethical uplift. Taking into account that the leaders in terms of development of organic food markets and eco-consumption culture are countries with developed economies (the largest markets for organic food are concentrated in countries such as Germany—10.9 billion euros and France—9.1 billion euros, and the highest per capita consumption of organic food is observed in Denmark, Switzerland, and Sweden), and that green branding is a common phenomenon of the last decade for many farmers (Hana et al., 2017; Jaung et al., 2018), it is logical to assume that there is a certain relationship between the level of per capita income and the level of consumption of organic products.

The second principle is that environmentally friendly and socially responsible brands have become important drivers in the formation of consumer loyalty in the eco-market. Analyzing the research (Murphy, 1992), we can see a positive relationship between brand ethics and loyalty. Although the green brand is not a clear competitive advantage, the studies (Doszhanov and Ahmad, 2015) have confirmed the close links between green brand awareness, trust in the green brand, perceived value of the green brand, and the intention of consumers to choose eco-friendly products. A good example is community supported agriculture (CSA). This type of agriculture (Haney et al., 2015; Morgan et al., 2018) works with a much greater involvement of consumers and other stakeholders, which leads to the strengthening of consumer–producer relations. If we analyze the experience of countries whose economies are similar to that of Ukraine, it is worth noting that Romania, which not only uses environmentally sustainable technology but also is in compliance with EU marketing standards, requires farmers to provide consumers with clear information about the composition of the product and its origin (Aceleanu, 2016).

Research shows that the perceived value of a green brand and its perceived quality have a direct impact on the intention to purchase eco-products. Trust in the green brand also mediates the relationship between the perceived value of the green brand and the intention to make a purchase, which, in turn, makes it possible to predict consumer behavior in purchasing green products. When studying the peculiarities of consumer behavior in terms of the formation of loyalty, it is necessary to take into account the

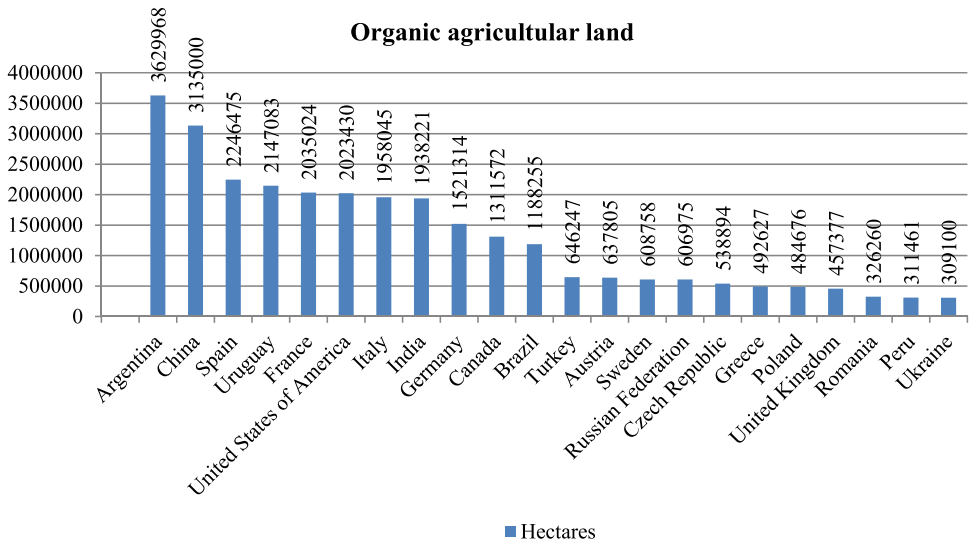

Fig. 1 OECD agriculture statistics: environmental performance of agriculture—indicators: Organic farmland area (in hectares)/Country.

possible negative factors that can have an undesirable effect on the formation of loyalty. Consumer confidence plays a special role in this context. According to scientists, the lack of consumer confidence is a barrier to the development of the organic food market. Distrust of the control system and the authenticity of products sold as organic have a significant negative impact on customer behavior (Muposhi et al., 2015; Nuttavuthisit and Thøgersen, 2017).

Research (Azad et al., 2013; Marakanon and Panjakajornsak, 2017) indicates that, of the elements of the marketing complex, the greatest influence involves the ratio between green price and customer loyalty, which creates the preconditions for the formation of the third principle—the size of the green brand price premium.

Based on this, factors, such as taking into account price competition among eco-producers and producers of regular agricultural products and geographical competition, need to be taken into account (Fujita and Hamaguchi, 2019; Quark, 2015). Thus, the first factor includes the average profitability of the industry and the average level of consumer income, as the decision to purchase organic products is associated with the cost of their acquisition. The increase in the cross-selling of organic products is aimed at expanding the segment of the eco-market, which reflects the behavior of buyers capable of consistent purchases (Juhl et al., 2017). This suggests that the second factor in the formation of the price premium is consumer loyalty. Firms and companies can use green brands to increase sales of eco-products and improve consumer knowledge about green brands. The study (Norwood and Lusk, 2008) noted that many groups of agribusiness producers are interested in creating added value by differentiating their products and developing alternative products using new technologies. Successful positioning of a green brand is seen as an advantage that can be used to distinguish eco-products from the products of potential competitors in the minds of consumers, giving the impression that these products are different (Suki, 2016). Therefore, the presence of additional costs of organic products is the third factor. The cost of green advertising also has an impact on the formation of a higher price for organic products compared with conventional products (Marian et al., 2014; Wanninayake and Shantha, 2014). The cost of green advertising should be considered as a fourth factor. Finally, some research (Asioli et al., 2017; Zhang et al., 2018) has indicated that consumer willingness to pay a premium price is justified by the presence of an organic certificate—the fifth factor. Ukraine is at the initial stage of expanding the practice of certified organic production. It was only in 2018 that the law "On basic principles and requirements for organic production, circulation and labeling of organic products" was adopted (Law of Ukraine of 10.07.2018 № 2496-VIII). In addition, certification of organic products is carried out in Ukraine primarily according to international standards, which significantly complicates the procedure for organic market participants.

Thus, the existence of a number of conflicting beliefs and practices, which are the result of competition between regular and green brands, necessitates determining the degree of influence of green branding in the agro-sphere on consumer loyalty in order to understand the effectiveness and expediency of such practices among agricultural producers in Ukraine. The purpose of this study is to test the following three hypotheses: H1—on the existence of a correlation between the level of per capita income in the country and the level of consumption of organic products; H2—on the impact of green branding on consumer loyalty to the eco-market; and H3—the size of the price premium of the green brand is determined by a set of certain factors (consumer loyalty, the presence of an organic certificate, the cost of green advertising, additional costs of organic products, average profitability, and average consumer income). The findings contribute to the substantiation of economic and statistical validity of the influence of green branding on the loyalty of consumers of agricultural products.

Methods

Based on the analysis of previous research, we formulated a system of basic hypotheses that would prove or disprove the impact of green branding on the loyalty of consumers of agricultural products. The system of basic research hypotheses is presented in Fig. 2.

To conduct a study to establish the correlation between the level of per capita income in the country and the level of consumption of organic products, the following data were collected: (1) indicator of gross national income per capita (OECD, 2020) and (2) level of consumption of organic products per capita (The World, 2020).

The study was based on 37 members of the international OECD, most of which are high-income countries. The choice of these countries is explained by the fact that they have developed markets for organic food and a corresponding culture of eco-consumption. Accordingly, such a sample can be considered homogeneous and representative. It should be noted that all collected data were recorded in the dynamics; that is, this study covered the period from 2017 to 2019. Consideration of the collected data in the dynamics is explained by the need to increase the reliability of the obtained results, which, in our opinion, significantly affects the detection of the above relationship.

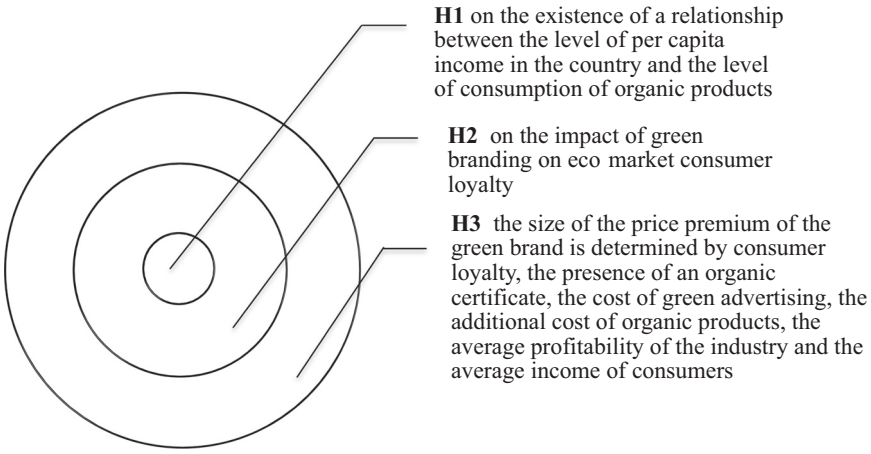

Fig. 2 System of basic research hypotheses.

Correlation analysis of two variables (per capita consumption of organic products and per capita income level) was conducted in three stages (Lipsey and Wilson, 2001):

Stage 1—construction of the scattering diagram and determination of the Pearson correlation coefficient;

Stage 2—verification of data that form variables for normal distribution;

Stage 3—determination of the Spearman correlation coefficient.

The next hypothesis, H2, involved the assumption about the impact of green branding on eco-market consumer loyalty. Clarifying hypothesis H2 on the impact of green branding on consumer loyalty to the eco-market, the following should be noted:

1. Consumer loyalty depends on two parameters: satisfaction and importance
   Accordingly, two egg brands were selected as the object of the study: regular production (regular brand) and organic production (green brand) in order to compare the level of consumer loyalty to the regular and green brands. The survey was conducted in five supermarkets in Kyiv (Ukraine) through an expert survey of 250 respondents, who were asked to rate the degree of satisfaction and importance on a 5-point scale on eight attributes of brands. The following attributes of the brand were chosen as evaluation parameters: product quality, environmental friendliness, organicity, price, brand image, social responsibility of the brand, advertising support, and accessibility. Evaluation of the reliability of the obtained survey results was carried out on the basis of the calculation of the concordance coefficient according to formula 1 (Hair et al., 1998) as follows:

$$W = \frac{1_2}{m^2(n^3 - n)}\left[\sum_{j=1}^{m}\left(\sum_{i=1}^{n} a_{ij} - \frac{\sum_{j=1}^{m}\sum_{i=1}^{n} a_{ij}}{n}\right)^2\right], \quad (1)$$

   where a_{ij} is the rank of ith parameter of jth respondent, m is the number of respondents, and n is number of parameters. The concordance coefficient shows the degree of agreement of the respondents' opinions on the importance of each of the evaluated attributes. The value of the concordance coefficient is in the range of 0 to 1. Consistency is considered satisfactory if $W \geq 0.5$. If $W \geq 0.7$, consistency is considered good. In the case when the respondents' conclusions about the influence of the factors of the studied attribute completely coincide, $W = 1$. Otherwise, the concordance coefficient is equal to 0.
   It should be noted that the total number of respondents was justified using formulas 2,3:

$$N = \frac{t_a^2}{E_1^2} \quad (2)$$

$$E_1 = \frac{E}{\sigma} \quad (3)$$

   where N — is the total number of respondents, which characterizes the representativeness of the sample; t_a — the number of standard deviations required to ensure that the probability of hitting a certain interval is 95%; E_1 — the relative error determined before the beginning of the questionnaire; E — absolute error; σ — is the standard deviation of the estimate.
   Given the maximum permissible error set at 0.05 and the reliability of the confidence interval of the expert assessment, defined at 0.95, the tabular value of N is 250. Therefore, the number of respondents should be taken at 250 people. The reliability of the survey results was assessed on the basis of the concordance coefficient (formula 2). Its value is equal to 0.81, which testifies that there is a consent among the respondents.
2. In the next stage of the study, an integral indicator of the degree of satisfaction was calculated by formula 4:

$$I = \frac{\sum \bar{x}}{\sum \bar{y}} \times 100\%, \quad (4)$$

   where $\bar{x}$ is the average score on average ratings of satisfaction with the evaluation parameters and $\bar{y}$ is the average estimate of the average values of the importance of the evaluation parameters.
   It should be noted that, for our study, of interest was the coefficient of loyalty at a certain level of satisfaction because, in our opinion, it characterizes commitment to the green brand. Therefore, the next step in the methodology of our study was to identify the relationship between satisfaction and loyalty.
3. The relationship between satisfaction and loyalty is non-linear (Goderis, 1998). The graph of this dependence corresponds to the hyperbola function, formula 5:

$$l = a + \frac{b}{x - c}. \quad (5)$$

where l—consumer loyalty, which depends on the score of consumer satisfaction; x—score of consumer satisfaction; a, b—hyperbole asymptoms; c—distance to the beginning of the coordinate system.

With complete customer satisfaction (maximum score on a 5-point scale), loyalty was 1, average satisfaction (score 4) significantly reduced the level of loyalty and corresponds to a value of 0.3, and with complete dissatisfaction (score 1) the loyalty ratio was 0. Thus, we obtained a system of equations, shown in formula 6:

$$\begin{cases} 0 = a + \frac{b}{1-c} \\ 0.3 = a + \frac{b}{4-c} \\ 1 = a + \frac{b}{5-c} \end{cases} \quad (6)$$

according to the solution: $a = -\frac{1}{6}$, $b = -\frac{7}{9}$, and $c = \frac{34}{6}$.

Thus, the function of the dependence of loyalty on satisfaction had the following form (formula 7):

$$l\left(x_j\right) = -\frac{1}{6} - \frac{7}{9\overline{x}_j - 5_1} \quad (7)$$

Next, according to the average value of the answers of 250 respondents, loyalty coefficients for satisfaction and importance were calculated.

The obtained integrated indicator for eight attributes of two brands (regular and green) provided an opportunity to understand whether the green brand had a higher level of loyalty than the regular.

Confirmation or refutation of H2 was proposed on the basis of a comparison of integrated indicators of satisfaction and importance, taking into account the coefficients of loyalty to the brands of producers of organic and conventional eggs.

The following, H3, was formulated as follows: the size of the price premium of the green brand was determined by consumer loyalty, the presence of an organic certificate, the cost of green advertising, additional costs of organic products, average profitability, and average income. The following steps were taken to confirm or refute this hypothesis:

1. The maximum and minimum size of the price premium were determined. A study of prices for nine green brands of

agricultural products in five supermarkets in Kyiv (Ukraine) showed that the price premium was in the range from 1 to 45%, that is; the minimum price premium was 1%, and the maximum was 45%.

2. The interval values of the price premium were calculated in order to distinguish three groups: (1) low level of price premium, (2) average level of the price premium, and (3) high level of price premium. The step of the interval was determined by the maximum and minimum values, taking into account the number of degrees of gradation of points according to formulas 8 and 9:

$$H = \frac{\max - \min}{k} \tag{8}$$

$$H = \frac{45 - 1}{3} \approx 14.6. \tag{9}$$

3. Next, nine green brands were classified into three groups (clusters) using cluster analysis. The essence of the iterative method of cluster analysis of k-means is that the classification process begins with determining the initial conditions—the number of clusters. In our research, the number of clusters was three: Cluster 1: low level of price premium, Cluster 2: average level of price premium, and Cluster 3: high level of price premium.
The clustering procedure was as follows: each standard was assigned a serial number, which was also a cluster number. From $(n - k)$ objects, point X_i with coordinates $(x_{i1}, x_{i2},\ldots, x_{im})$ was selected and checked with the help of Euclidean distance to determine to which of the standards it was as close as possible, that is, had the minimum distance. In the next stage of the analysis, we chose the point X_{i+1} and repeated all procedures for it. Thus, after performing $(n - k)$ iterations, all objects in the set were assigned to one of the k clusters.
4. Discriminant equations were constructed for each cluster. Such equations made it possible to assign a new object of analysis (a new brand) to a certain classification price category.

Discriminant analysis allowed us to study the differences between two or more groups of objects simultaneously for several variables. The main purpose of discrimination was to find such a linear combination of variables that would optimally distribute the groups under consideration.

The canonical discriminant function with unknown coefficients was as follows:

$$d_{km} = \beta_0 + \beta_1 x_{1km} + \cdots + \beta_p x_{pkm}, \tag{10}$$

where d_{km} is the value of the discriminant function for the mth object in group k and x_{pkm} is the value of the discriminant variable for the mth object in group k.

Thus, to identify the relationship between the level of per capita income in the country and the level of consumption of organic products, we used the pairwise linear regression model. Determining the impact of green branding on consumer loyalty to the eco-market was based on a comparison of integrated indicators of satisfaction and importance. We carried out identification of the most influential indicators on the size of the price premium as well as the distribution of nine green brands by three levels of the price premium using cluster and discriminant analysis.

Results

Results of confirmation/refutation of H1. In the first stage of testing H1, a scattering diagram for two variables (level of consumption of organic products per capita and gross national income per capita was constructed (Fig. 3)). Thus, based on the results of the analysis, preliminary conclusions were made about the existence of relation between the phenomena. In Fig. 3. we see that the Pearson correlation coefficient is equal to 0.794 and has a positive value, which confirms the existence of a positive correlation between the studied variables. However, the Pearson correlation coefficient is a reliable indicator provided that there is a normal distribution of variables (Hair et al., 1998). For this reason, we checked the variables "level of consumption of organic products per capita" and "gross national income per capita" for normal distribution. According to the results of this inspection, it was found that the variable "level of consumption of organic products per capita" is not normally distributed. Thus, we calculated the Spearman correlation coefficient, which is used to determine the correlation in the absence of a normal distribution of at least one variable (Hair et al., 1998).

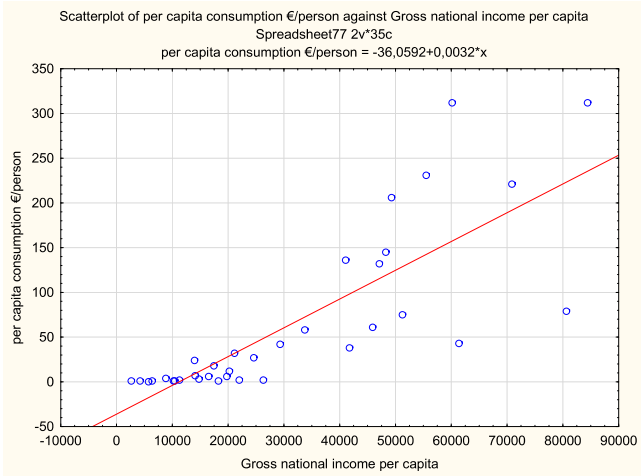

Fig. 3 Scattering diagram for two variables (level of consumption of organic products per capita and gross national income per capita).

The results of the calculated value of the Spearman correlation coefficient, which was carried out in the program Statistica are presented in Table 1.

Thus, performing a correlation analysis, we saw the existence of a high level of positive correlation between the variables "level of consumption of organic products per capita" and "gross national income per capita", which is confirmed by the value of Spearman's correlation coefficient at 0.879. Thus, hypothesis H1 was confirmed: there is a correlation between the level of per capita income in the country and the level of consumption of organic products.

The results of confirmation/refutation of H2. H2, concerning the impact of green branding on eco-market consumer loyalty, was tested by comparing integrated satisfaction and importance indicators, taking into account the loyalty coefficients to the brands of organic and conventional egg producers. To this end, 250 consumers were asked to rate on a 5-point scale the degree of satisfaction and importance of the following attributes of brands: product quality, environmental friendliness, organicity, price, brand image, brand social responsibility, advertising support, and accessibility. The research area covered and the profile of the respondents are presented in Fig. 4.

The results of the calculation of the integrated indicators of satisfaction and loyalty of consumers of the conventional egg brand and the eco-brand are presented in Tables 2 and 3.

The integrated indicator of consumer satisfaction with the products of a conventional brand, taking loyalty into account, was 41% compared with 78%, calculated on the average value of assessments of satisfaction and importance of brand attributes.

Table 1 The results of the calculated value of the Spearman correlation coefficient (MSStatistica 12, listing).

Variable	Spearman rank order correlations MD pairwise deleted Marked correlations are significant at $p < 0.05000$	
	Per capita consumption €/person	Gross national income per capita
Per capita consumption €/person	1000	0879
Gross national income per capita	0879	1000

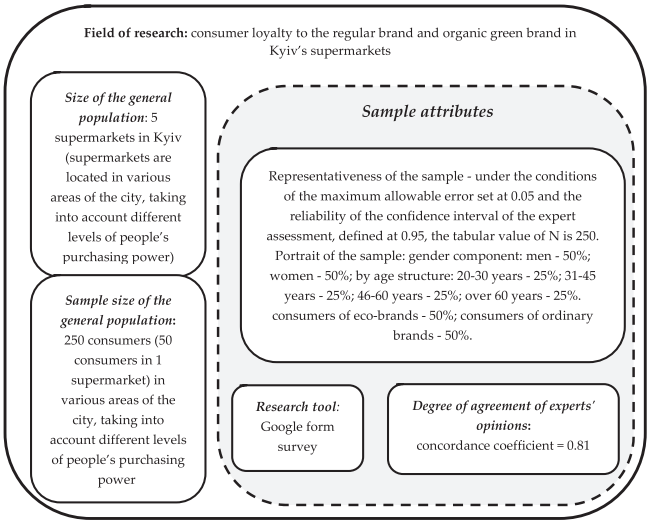

Fig. 4 The research area covered and the profile of the respondents.

This meant that the low level of consumer satisfaction with the most important attributes for them, such as organicity, product quality, and environmental friendliness, would allow a conventional brand to rely on only 41% of secondary purchases.

The results of the calculation of integrated indicators of satisfaction and loyalty of consumers of eco-brand eggs showed that the level of consumer satisfaction with the most important attributes for them, such as organicity, product quality, and environmental friendliness, would allow the eco-brand to count on 44% of secondary purchases.

Thus, guided by statistical results, we obtained confirmation of H2 on the impact of green branding on eco-market consumer loyalty. In absolute terms, consumer loyalty to the eco-brand exceeded consumer loyalty to the conventional brand by 3%.

Results of confirmation/refutation of H3. In the next stage of the study, H3, concerning the impact of factors (consumer loyalty, availability of organic certification, costs of green advertising (Zhang et al., 2018), additional cost of organic products, average profitability of the industry, and average consumer income) on the size of the green brand price premium was tested.

All of these factors were tested by evaluating Student's *t*-criterion values and p-level significance (Hair et al., 1998). According to the results of the tests, all factors were included for further clustering.

The clustering was carried out in two stages: (1) using a hierarchical algorithm to determine the optimal group of classification groups and 2) based on the iterative method of analysis of k-means. The results of cluster analysis using a hierarchical algorithm in the form of a horizontal dendrogram are presented in Fig. 5.

The results of clustering of eco-brands using a hierarchical algorithm confirmed the existence of three classification groups that correspond to three levels of the price premium: "high," "medium," and "low." This made it possible to use the method of k-means for further clustering, as it became possible to pre-select the number of clusters. In our case, the number of clusters was three. Conducting analysis of variance (ANOVA) allowed us to check the adequacy of the results of cluster analysis and the possibility of their practical application in the classification of eco-brands by price premium level (Table 4).

The values of the intergroup variance exceeded the values of the variances within the clusters for all factors analyzed. The calculated values of the *F-criterion* were higher than the tabular value of this criterion at the appropriate level of significance and the corresponding degrees of freedom. The value of the confidence level (*p-level*) led us to conclude that the relationship among the factors found in the clusters was determined randomly on the basis of this sample with a probability of 1% (Hair et al., 1998). The distribution of eco-brands by the level of the price premium based on the results of clustering is presented in Table 5.

Further, in order to determine the differences between clusters simultaneously on several variables, a discriminant analysis was performed. The main purpose of discrimination was to find such a linear combination of variables that would optimally distribute the groups under consideration.

According to Wilks' lambda, which was equal to 0.001793 and the value of the *F*-criterion, which exceeded the tabular value (Ftable = 5.96), it can be concluded that this classification is correct. In addition, it should be noted that the non-informative variable "average profitability of the industry (x6)" was excluded from the discriminant model as the value of its tolerance was less than 0.01.

Thus, having analyzed the results of discriminant functions, classification matrix, and case classification results, we obtained coefficients of discriminant functions according to clusters that corresponded to certain levels of the eco-brand price premium —"high," "medium," and "low" (Table 6).

The result of the analysis was the selection of discriminant equations that corresponded to the "high," "medium," and "low" levels of the price premium of eco-brands. The classification of eco-brands and equations of discriminant analysis that corresponded to the formed clusters are presented in Table 7. It should be noted that the value of the discriminant function in our case was an indicator by which the brand manager decided to determine the price level for the eco-brand, taking into account the existing level of consumer loyalty.

Setting a price premium for a new eco-brand was based on the obtained discriminant functions. The price premium for a new eco-brand could be set at the level of the class for which the classification value of the discriminant function will be maximum. So, for example, we could determine at what level to set a price premium for the eco-brand "BioFood." To do this, we added the values of the corresponding partial indicators x5 – x1 to the discriminant equations that corresponded to the clusters at the level of the price premium (d_s, d_m, d_h). According to the results of calculations, we obtained the following values:

$$d_s = -554.86;\ d_m = 206.356;\ d_h = -31.423$$

According to the criterion of the maximum value of the discriminant function, we chose Cluster 2; that is, for the new

Table 2 The results of the calculation of the integrated indicators of satisfaction and loyalty of consumers of the conventional egg brand.

Evaluation parameters (brand attributes)	Satisfaction ($\overline{x_j}$)	Importance ($\overline{y_j}$)	Loyalty ratio I ($\overline{x_j}$)	Loyalty ratio I ($\overline{y_j}$)
Production quality	3.21	4.79	0.15	0.72
Environmental friendliness	3.11	4.27	0.13	0.39
Organicity	2.17	4.87	0.05	0.81
Price	3.20	4.37	0.15	0.43
Brand image	3.15	3.18	0.14	0.14
Social responsibility of the brand	2.87	3.88	0.11	0.27
Advertising support	3.81	3.67	0.25	0.22
Accessibility	4.26	4.19	0.38	0.36
Average values	3.22	4.15	0.17	0.42
Integrated indicator,%		*78*		*41*

Table 3 The results of the calculation of the integrated indicators of satisfaction and loyalty of consumers of the eco-brand.

Evaluation parameters (brand attributes)	Satisfaction ($\overline{x_j}$)	Importance ($\overline{y_j}$)	Loyalty ratio I ($\overline{x_j}$)	Loyalty ratio I ($\overline{y_j}$)
Production quality	3.56	4.79	0.20	0.72
Environmental friendliness	3.76	4.27	0.24	0.39
Organicity	3.58	4.87	0.20	0.81
Price	2.89	4.37	0.11	0.43
Brand image	3.15	3.18	0.14	0.14
Social responsibility of the brand	3.58	3.88	0.20	0.27
Advertising support	3.47	3.67	0.18	0.22
Accessibility	3.51	4.19	0.19	0.36
Average values	3.44	4.15	0.18	0.42
Integrated indicator,%		*83*		*44*

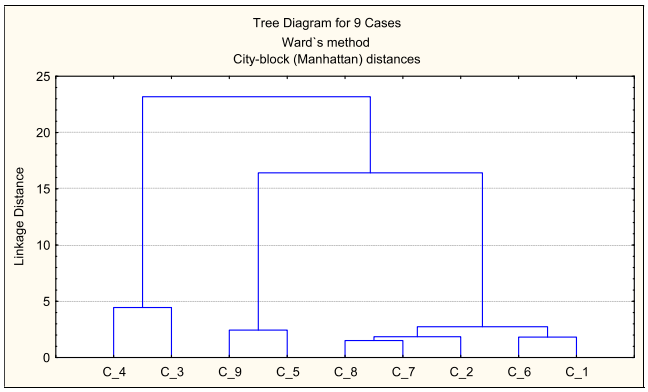

Fig. 5 The results of clustering of eco-brands using a hierarchical algorithm.

eco-brand "BioFood," the size of the price premium had to be set at the medium level, that is, from 15 to 29%.

Discussion

The main goal of the study was to scientifically substantiate and empirically test the following hypotheses: the existence of a relationship between the level of per capita income in the country and the level of consumption of organic products; check the impact of green branding on eco-market consumer loyalty; and check the assumptions about the factors influencing the size of the price premium for the green brand. The study produced both scientific results and ideas for practical applications, and it has implications and directions for future research.

Previous research in the framework of green branding studies (Ahmad et al., 2016; Wanninayake and Shantha, 2014) has not focused on the factors influencing the level of consumption of organic products and the factors influencing the size of the price premium for green brands (Marian et al., 2014; Zhang et al., 2018). In addition, consumer loyalty to the green brand has not been assessed as an integral indicator of the ratio of satisfaction and importance (Cheung et al., 2015). Moreover, consideration of the nonlinear nature of the relationship between satisfaction and loyalty has not been taken into account in previous studies (Azad et al., 2013).

In this study, we analyzed the impact of national income on the level of consumption of organic products, took into account the nonlinearity of the relationship between satisfaction and loyalty, and analyzed the factors influencing the size of the price premium of green brands. Based on cluster analysis, we obtained three groups differentiated by the size of price premium, with constructed discriminant functions for each of them. The empirical results showed existence of a correlation between the level of per capita income in the country and the level of consumption of organic products (H1), and green branding has a positive effect on eco-market consumer loyalty (H2). Also the results indicated that the size of the price premium of the green brand is determined by consumer loyalty, the presence of an organic certificate, the cost of green advertising, the additional cost of organic products, the average profitability of the industry, and the average income of consumers (H3). Based on the statistical analysis of the data of nine green brands, the indicator of the size of the price premium was classified into three groups: high, medium, and low price premiums.

Conclusions

The development of the culture of eco-consumption forms a vector of transformations that will be carried out by agricultural companies as they move toward green branding development. According to forecasts, the level of eco-consumption, consumer

Table 4 Analysis of variance of clustering results of eco-brands by the level of price premium (MSStatistica 12, listing).

Variable	Between SS	df	Within SS	df	*F*	*p*-value
The cost of green advertising (x1)	7.338876	2	0.661124	2	33.3018	0.000564
Loyalty ratio (x2)	7.853209	2	0.146790	2	160.4983	0.000006
Availability of a certificate of organicity (x3)	7.662403	2	0.337597	2	68.0907	0.000075
Additional cost of organic products (x4)	6.973913	2	1.026087	2	20.3898	0.002110
Average level of consumer income (x5)	7.149454	2	0.880546	2	25.2172	0.001202
Average profitability of the industry (x6)	5.711927	2	2.288073	2	7.4892	0.023396

Table 5 Distribution of eco-brands by the level of the price premium based on the results of clustering.

Brand	Cluster	Price premium level	Price premium interval
TM «Organic Milk»	Cluster 1	High	30–45%
TM «EthnoProduct»	Cluster 1	High	30–45%
TM «Staroporytskoe»	Cluster 2	Medium	15–29%
TM «Ekorod»	Cluster 2	Medium	15–29%
TM «Svit Bio»	Cluster 2	Medium	15–29%
TM «LiQberry»	Cluster 2	Medium	15–29%
TM «Organico»	Cluster 2	Medium	15–29%
TM «Liluck»	Cluster 3	Low	1–14%
TM «Mol'far»	Cluster 3	Low	1–14%

Table 6 Coefficients of discriminant functions of clusters that correspond to the levels of the eco-brand price premium.

Variable	Classification Function; grouping: the level of the price premium of eco-brands		
	Medium $p = 55{,}556$	High $p = 22{,}222$	Low $p = 22{,}222$
The cost of green advertising (x1)	- 11.267	12.181	- 61.620
Loyalty ratio (x2)	- 126.276	300.728	- 169.147
Availability of a certificate of organicity (x3)	2.565	- 1.349	9.857
Additional cost of organic products (x4)	- 20.936	19.587	- 124.243
Average level of consumer income (x5)	0.304	0.096	1.113
Constant	- 65.408	- 143.420	- 587.831

Table 7 Classification of eco-brands and equations of discriminant analysis that corresponded to the formed clusters.

Cluster	Number of objects in a cluster	Discriminant function
Cluster 3 (low price premium)	2	d_s - 587.831 + 1.113 × 5 - 124.243 × 4 + 9.857 × 3 - 169.147 × 2 - 61.62 × 1
Cluster 2 (medium price premium)	5	d_m - 65.408 + 0.304 × 5 - 20.936 × 4 + 2.565 × 3 - 126.276 × 2 - 11.267 × 1
Cluster 1 (high price premium)	2	d_h - 143.42 + 0.096 × 5 + 19.587 × 4 - 1.349×3 + 300.728 × 2 + 12.181 × 1

eco-orientation, and the role of the concept of eco-society will grow. Therefore, an approach to agricultural development with a focus on the importance of green branding can be the prerequisite for success for socially responsible producers.

The current study proves the feasibility, economic, and statistical validity of the impact of green branding on the loyalty of consumers of agricultural products. The current study has significant implications for brand management by providing empirical evidence that can improve brand managers' strategic decisions in determining the level of price premium, which is justified by higher loyalty to green brands compared with conventional brands. The obtained results emphasize the need for the further research and development of these provisions.

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YD and ON designed research and collected data, analyzed data, performed research, and wrote the paper.

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