

Research Article

**Post-modern Religiosity and Consumer Ethics: A Research by K-Means Based
Consumer Segmentation and Random Forest Assisted Classification**

*Post-modern Dindarlık ve Tüketici Etiği: K-Means Tabanlı Tüketici Segmentasyonu ve
Random Forest Destekli Sınıflandırma Araştırması*

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Makale Geliş Tarihi	Makale Kabul Tarihi
23.05.2025	19.08.2025

Abstract

This study examines the relationship between postmodern religiosity and consumer ethics using machine learning techniques, particularly K-Means clustering and Random Forest classification. Participants were categorized into three groups based on their religiosity levels: religious, undecided, and distant from religious beliefs. The findings reveal that higher religious belief, in the postmodern sense, correlates with stronger ethical consumption behaviors. The religious group exhibited both cognitive and behavioral ethical consumption, while the undecided group demonstrated cognitive ethical attitudes without translating them into actions. The secular group, however, showed individualistic and utilitarian consumption patterns, lacking a clear ethical consumption tendency. The Random Forest model, which achieved 92% accuracy, was employed to predict ethical consumption patterns, with key variables identified through SHAP analysis. This study highlights how postmodern religiosity influences consumer ethics, offering valuable insights for marketers aiming to target ethical consumers.

Keywords: Postmodern Religiosity, Consumer Ethics, Ethical Consumption, Machine Learning, Consumer Segmentation

Öz

Bu çalışma, makine öğrenimi teknikleri, özellikle K-Means kümeleme ve Random Forest sınıflandırmasını kullanarak postmodern dindarlık ile tüketici etiği arasındaki ilişkiyi incelemektedir. Katılımcılar, dindarlık seviyelerine göre üç gruba ayrılmıştır: dindar, kararsız ve dindarlıktan uzak. Bulgular, postmodern anlamda yüksek dindarlığın daha güçlü etik tüketim davranışlarıyla ilişkili olduğunu ortaya koymaktadır. Dindar grup hem bilişsel hem de davranışsal düzeyde etik tüketim sergilerken, kararsız grup bilişsel etik tutumlara sahip olup bunları davranışa dönüştürememektedir. Seküler grup ise etik tüketim eğilimi göstermeyen bireyselci ve yararçı tüketim desenleri sergilemiştir. Random Forest modeli, %92 doğruluk oranı ile etik tüketim desenlerini tahmin etmek için kullanılmış ve SHAP analiziyle anahtar değişkenler belirlenmiştir. Bu çalışma, postmodern dindarlığın tüketici etiğini nasıl etkilediğini vurgulamakta ve etik tüketicilere yönelik hedefleme yapmayı amaçlayan pazarlamacılar için değerli bilgiler sunmaktadır.

Anahtar Kelimeler: Postmodern Dindarlık, Tüketici Etiği, Etik Tüketim, Makine Öğrenimi, Tüketici Segmentasyonu

Önerilen Atıf /Suggested Citation

Elgün, M.N., 2025, Post-modern Religiosity and Consumer Ethics: A Research by K-Means Based Consumer Segmentation and Random Forest Assisted Classification, *Üçüncü Sektör Sosyal Ekonomi Dergisi*, 60(3), 2940-2957.

1.Introduction

Although there were not enough studies focused on consumer ethics in the literature until 1990 (Ozgen & Esiyok, 2020; Karabıyık, 2019, s. 40; Hunt & Vitell, 1986, s.5), today one of the most important identifiers of postmodern society is consumption. Because postmodern consumption has gone beyond satisfying needs and has also become a means of social interaction. This has given consumption a social dimension. As with every behavior that has gained a social dimension, consumption ethics has also gained importance in the postmodern period. Because ethical or unethical behaviors in consumption have significant effects on society and businesses (Carrington, Chatzidakis, Goworek & Shaw, 2020). Today, there is a scientific deepening that will require studies examining the effect of personality types on consumption ethics (Karabıyık & Başaran Alagöz, 2020, s. 67).

In this study, which aims to conduct more detailed research on consumption ethics in a postmodern society where consumption itself and the ethics of consumption behaviors are effective not only in terms of marketing but also in the social structure, the relationship between postmodern religious belief and consumption ethics was investigated. In the study, the religiosity levels of the participants who were applied the postmodern religiosity survey were determined and they were divided into three groups as religious, undecided and distant from religious beliefs. Then, the consumer ethics profiles in these three groups were examined and differences were determined. The research findings show that there is a positive cause and effect relationship between religious belief in the postmodern sense and consumer ethics. In postmodern consumers with high religious beliefs, consumer ethics are higher both cognitively and behaviorally. Although there is consumer ethics at the cognitive level in consumers who are undecided about postmodern religious beliefs, these values remain at the cognitive level and do not turn into behavior. Consumers in this group need an external factor for their values to turn into an actionable dimension. In the secular group, which is distant from postmodern religious beliefs, there is no tendency towards consumption ethics. Instead, there is an individualistic utilitarian understanding of consumption decisions and behavior.

More detailed presentations regarding the research are made in the findings, discussion and conclusion sections. However, before the research section, in order to understand the study correctly, the scope of the research should be stated within the framework of ethical consumption and postmodern religiosity.

2. Scope of Study

The relationship between economics and ethics has been seen in the literature since the existence of economics within the framework of modern science. For example, the term "moral economy" has been used since the 18th century (Götz, 2015). The fact that Adam Smith, who is considered the founder of modern economics, was a moral philosopher before confirms this idea. But, as mentioned in the introduction, there were not enough studies in the literature on consumer ethics until 1990. While ethical production discussions were seen until this period, ethical consumption discussions emerged after this period (Ransome, 2005, s. 159; Karabıyık & Elgün, 2023). According to Bagozzi (1995, s. 276), although the concept of ethics in marketing has always been a studied subject, until 1990 the concept of ethics was a research topic from the seller's perspective. After 1990, especially with the emergence of relationship marketing, ethical values have become a topic of discussion and research in terms of consumer behavior. One of the important concepts in Bagozzi's determination is the concept of relationship marketing. Because it is striking that with the beginning of the discussion of ethics in consumer behavior, marketing practices began to be seen as a relationship development process. The fact that marketing practices began to be seen as a relationship process developed between consumers and brands, instead of selling a product, caused the ethical behaviors of both parties in this relationship to gain importance. With this change in the understanding of consumption and marketing, the reason why some consumers behave unethically has begun to be questioned and researched.

In early definitions, consumption ethics is defined as "the moral principles and standards that guide the behaviour of individuals as they obtain, use, and dispose of goods and services (Muncy & Vitell, 1992, s. 298)". In a different study, Hassan, Rahman, and Paul (2022, s. 113) define consumer ethics as "examining and interpreting consumer beliefs and behaviour from an ethical lens".

There are at least three comprehensive theoretical models on consumer ethics in the marketing literature. The model developed by Hunt and Vitell is the most suitable for practical application and is also

systematic enough to be a subject of research (Vittel, 2003, s. 34). According to this model, consumer ethics begins with the consumer having more than one alternative method to solve the problem consumer is in. In this process, ethical behavior can be mentioned in cases where deontological and teleological factors are taken into consideration and a choice is made among alternatives. Most of the time, a hybrid decision and behavior emerges in which deontological and teleological factors are taken into consideration at the same time (Mayo & Marks, 1990). Deontological and teleological distinctions are actually fundamental distinctions for consumer ethics. From a practical perspective, the consumer who has to make a decision that includes consumption ethics has to make a decision under many situational and internal normative and purposeful factors. One of these factors is the factors related to religious belief, which should be seen as both an internal and external factor. This study investigated how factors that develop depending on religious belief affect consumer ethical decisions.

The phenomenon of postmodernism has emerged in social life as a factor that has radically changed the social structure. For this reason, postmodernism has also affected the religious beliefs of individuals. Postmodern factors have transformed religious beliefs into a more secular and deconstructive structure by taking them under the influence of late capitalist logic (Vliegthart, 2025). The explanation of religion with the late capitalist structure in these studies also shows that the economic structure is a dominant factor in postmodern society. It should not be ignored that the late capitalist structure is a structure explained by consumerism. Religious beliefs have become more secular and pragmatist with postmodernism. In this study, the concept of religious belief has been accepted with a postmodernist perspective in accordance with the understanding of age. Although the form of religious belief has changed with postmodernism, 80% of people have a religious belief (Singh et.al., 2023). Therefore, research on the effects of religious belief on consumer behavior and especially consumption ethics is important.

3. Method and Research Process

First, it's important to mention the internal consistency levels of the scales used in the study. This was assessed using Cronbach's alpha. This coefficient is a reliability indicator that measures the homogeneity of correlation between items in multi-item scales.

In the calculation made for the 12 items (Q1–Q12) within the Postmodern Religiosity Scale, Cronbach's Alpha coefficient was found to be 0.761. This value indicates an acceptable level of internal consistency among the items of the relevant scale ($\alpha \geq 0.70$ threshold was taken into account).

In the analysis conducted on the 31 items of the ethical consumption scale (variables YOAF, YOPE, DSYA, ZKOE, TTSA, GDCF, and DOIY), Cronbach's Alpha coefficient was calculated as 0.892. This value reveals that the scale is highly reliable and has strong internal consistency.

Cronbach's alpha coefficients above 0.70 for both scales indicate that the items used in the study exhibit a homogeneous structure and are consistent in measuring the same conceptual structure. Therefore, the findings are considered an important criterion supporting the validity of the scales.

This study presents a multidimensional segmentation and classification process based on ethical sensitivities and socio-demographic characteristics of consumers. In the first stage, clustering was performed using the K-Means algorithm on a data set consisting of 49 variables collected through a survey. Then, the obtained clusters were classified using Random Forest, K-Nearest Neighbor (KNN) and Decision Tree algorithms.

The models were compared according to accuracy, recall, precision and F1 score metrics, and the Random Forest model was selected as the most successful model with 92% accuracy. The decision-making processes of the model were explained with SHAP value and feature importance score analyses. In addition, the ethical and demographic profile features of each cluster were interpreted with visual support.

Each methodological process related to the analysis is explained separately in the research process section. Only methodological processes and decisions are stated in this section. The results of the research are evaluated in the findings section.

The surveys used in the research are basically two-dimensional. The first of these is ethical consumption, and the second is religiosity in the post-modern era.

In ethical consumption, the Consumer Ethics Scale, which was updated by re-validation testing by Kurtuldu (2023), was used. The applied survey consists of 31 questions and seven dimensions. These dimensions are: Actively Benefiting from an Illegal Action (YOAKT), Passively Benefiting from an Illegal Action (YOPAS), Actively Benefiting from a Legal Practice of Questionable/Questionable Accuracy (DSAKT), Actions That Are Harmless and Evil (ZARKO), Downloading Copyrighted Materials from the Internet/Buying Imitation Products (TETAK), Recycling/Environmental Awareness (GERCE) and Doing the Right/Good Thing (DOIYI). The survey was used as a five-point Likert Scale.

The Religiosity in the Postmodern Era scale was developed by Yakut (2022). The survey consists of 12 questions and is applied as a five-point Likert scale.

Before the research process, the importance and originality of the research should be stated.

3.1. Purpose, Originality and Importance of the Research

Traditional descriptive statistics often fail to provide sufficient depth in modeling consumer behavior. Modern data science approaches significantly strengthen the processes of pattern discovery and classification in high-dimensional and multivariate data sets. In this context, machine learning techniques – especially clustering and classification algorithms – offer innovative solutions in understanding consumer behavior. In this study, the aim is to structurally model ethical sensitivities in the context of postmodern consumption perception, and segment and classify consumers according to their ethical profiles in the light of multidimensional data.

Modern consumer behavior is not only a reflection of economic preferences, but also of the relationships that individuals establish with ethical, cultural and spiritual values. In the postmodern era, forms of religiosity have become individualized and shaped through personal meaning production rather than traditional rules. In this context, ethical consumption is not only an environmentalist or animal-friendly behavior, but also an expression of belief-based decision-making mechanisms. Today, these structures, where religious values and consumption preferences are intertwined, have an important place in both the material and spiritual worlds of the individual. For this reason, the relationship between ethical consumption and religiosity is addressed in a multidimensional manner in the study.

In other words, the aim of the research is to explain the relationship between the phenomenon defined as postmodern religiosity and consumer ethics in terms of sub-dimensions. Its originality is based on the application of the machine learning method as a methodological process. Thanks to machine learning, multi-dimensional and cross-dimensional analyses can be made in much more detail than traditional quantitative methods.

3.2. Data Set and Pre-Analysis

The data set used consists of psychosocial variables such as ethical consumption habits, religious values, perception of social responsibility, individual benefit orientation, and demographic indicators. There are 49 numerical variables answered by 121 participants in total. Since the variations that will arise from the sample are important in studies conducted with the machine learning method, studies with smaller sample sizes can be seen. For example, in the study conducted by Koç and Karabiber (2021: 162) with the machine learning method, the sample size was five, while 465 variations occurred. In the study conducted by Işık and Çamurcu (2007) in which they measured the performance of the K-Means, K-Medoids and Fuzzy C Means algorithms, the sample size was 150.

Categorical variables in the data were converted to numerical form using the Label Encoder method, and then all data were normalized using the Standard Scaler. Considering the sensitivity of K-Means and distance-based algorithms in particular, data standardization was deemed mandatory.

The study was conducted in Konya, Türkiye, with 121 participants between the ages of 18-35. These participants were 63 female and 58 males. There was a balanced sample in terms of gender distribution. 76 of the participants were not employed and were living off passive income. 45 participants were employed regularly and were earning wages.

3.3. K-Means Clustering

The K-means algorithm is an unsupervised learning technique that divides observations into clusters based on their similarity. In this study, its value was determined by Elbow and Silhouette analyses.

When the total error (inertia) values are examined according to the Elbow Method in Figure 1, it is seen that an elbow occurs at. This finding shows that three clusters are the most appropriate separation.

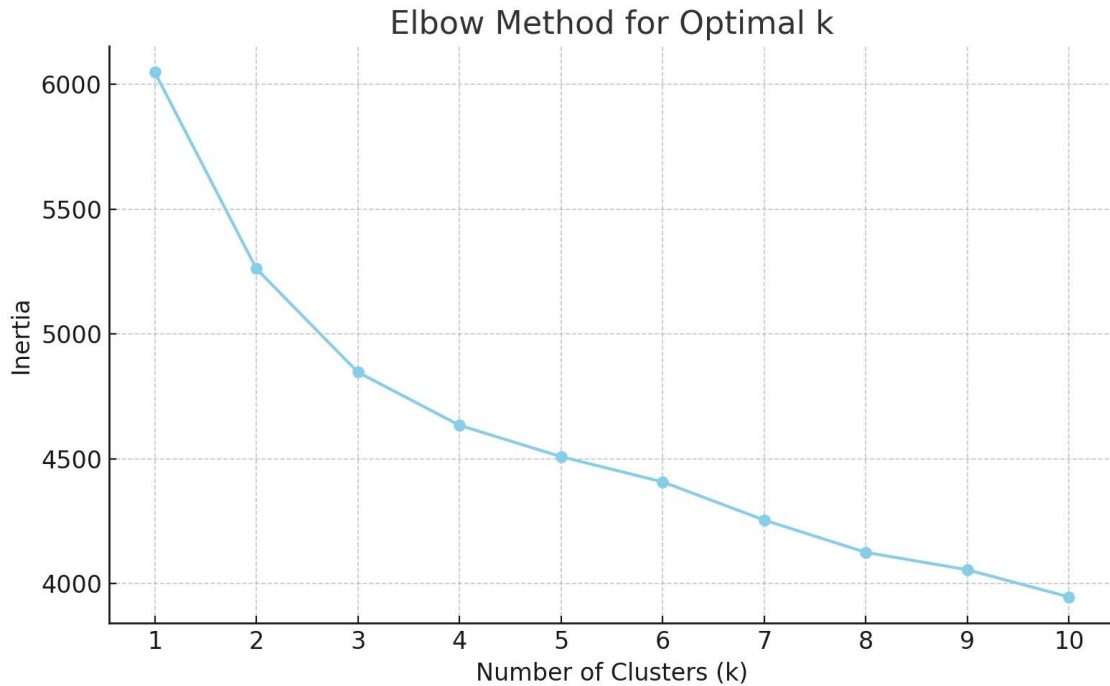


Figure 1: Elbow Clustering Numbers

In order to control the randomness of the algorithm in the modeling process, random state was fixed as 42 and convergence was achieved in 300 iterations. Intra-cluster variance (inertia) minimization was taken as basis and distinguishability between clusters was found to be high.

To assess the suitability of the number of clusters determined by the K-Means algorithm, silhouette scores and within-cluster total variance (inertia) values were calculated. Such numerical metrics reveal whether the clusters are robust not only visually but also in terms of statistical validity.

For the number of clusters determined as $k = 3$ using the Elbow method:

- Overall Silhouette Score: 0.091
- Total Within-Cluster Variance (Inertia): 4173.01
- Cluster-Based Average Silhouette Scores:

Cluster 0: 0.132

Cluster 1: 0.064

Cluster 2: 0.062

The silhouette score measures the degree to which individuals are cohesive within their clusters and how distinct they are from other clusters. The overall silhouette score is low at 0.091, indicating weak separation between clusters. In particular, the average silhouette scores for Cluster 1 and Cluster 2 remain at around 0.06, indicating that the boundaries of these clusters may be close or overlapping.

On the other hand, the low total within-cluster variance (inertia = 4173.01) indicates that the data are sufficiently compacted into clusters and that the clusters have internal similarity. This suggests that there is natural segmentation in the data, but these segments are transitive.

3.4. Classification Algorithms

In model selection, Random Forest algorithm was preferred due to its high accuracy rates and the advantage of interpreting variable importance levels. K-Nearest Neighbor (KNN) algorithm was used to understand example-based heuristic classifications and to provide reference for the clarity of class boundaries. Decision Tree model was included because it is an effective tool in visually explaining the rules. Thus, the ability of different classifiers to distinguish ethical consumer clusters was evaluated comparatively.

Therefore, a clarification regarding Random Forest analysis is necessary. The Random Forest classification model used in this study was configured with default hyperparameter settings commonly used in the literature. Specifically, the number of trees (n_estimators) in the model was set to 100, and the maximum depth (max_depth) was unconstrained (defaulted to None). Techniques such as GridSearchCV or RandomizedSearchCV, which are processes for systematically optimizing hyperparameters, were not evaluated within the scope of this study.

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The obtained cluster labels were defined as target variables and transferred to supervised learning models.

The data was separated with the train test split function as 80% training and 20% test, and the outputs of all models were evaluated with accuracy score, precision score, recall score, f1 score functions.

Table 1: Model Values

Model	Accuracy (%)	Precision	Recall	F1 Score
Random Forest	92	0.93	0.92	0.92
KNN	76	0.81	0.76	0.75
Decision Tree	72	0.74	0.72	0.71

3.5. Feature Importance and SHAP Analysis

With SHAP analyses, it was understood which variables the model considered in which direction and to what extent when making decisions. This explainability model allows the interpretation of the effect of ethical and religious variables on classification not only at the correlation level but also in the context of the decision.

It is not enough for machine learning models to provide high accuracy; the decision mechanisms of the models must also be understandable. In this context, the contributions of variables to the classification were analyzed in detail through the Random Forest model, which showed the highest success in the classification process. The two basic methods used are:

- **Feature Importance:** The contribution rate of each independent variable to the model was calculated with the feature importances metric, which is an internal feature of the Random Forest algorithm. This method is based on metrics such as the number of branches and Gini gain in decision trees.

- **SHAP (SHapley Additive exPlanations):** SHAP is a method that explains the “decision-making logic” of the model on an example-by-example basis by calculating the contribution of each variable to the model separately for each observation. If the SHAP value is positive, it increases the variable class estimate; if negative, it decreases it.

3.6. Segment Profiling: Cluster-Based Average Scores

Figure 2 Cluster Visualization with PCA — This visual, obtained by reducing high-dimensional data to two dimensions with PCA (Principal Component Analysis), clearly presents the visual separation of the three clusters obtained with K-Means. It is observed that the cluster boundaries are well defined and separated from each other. This supports that the segmentation is structurally meaningful.

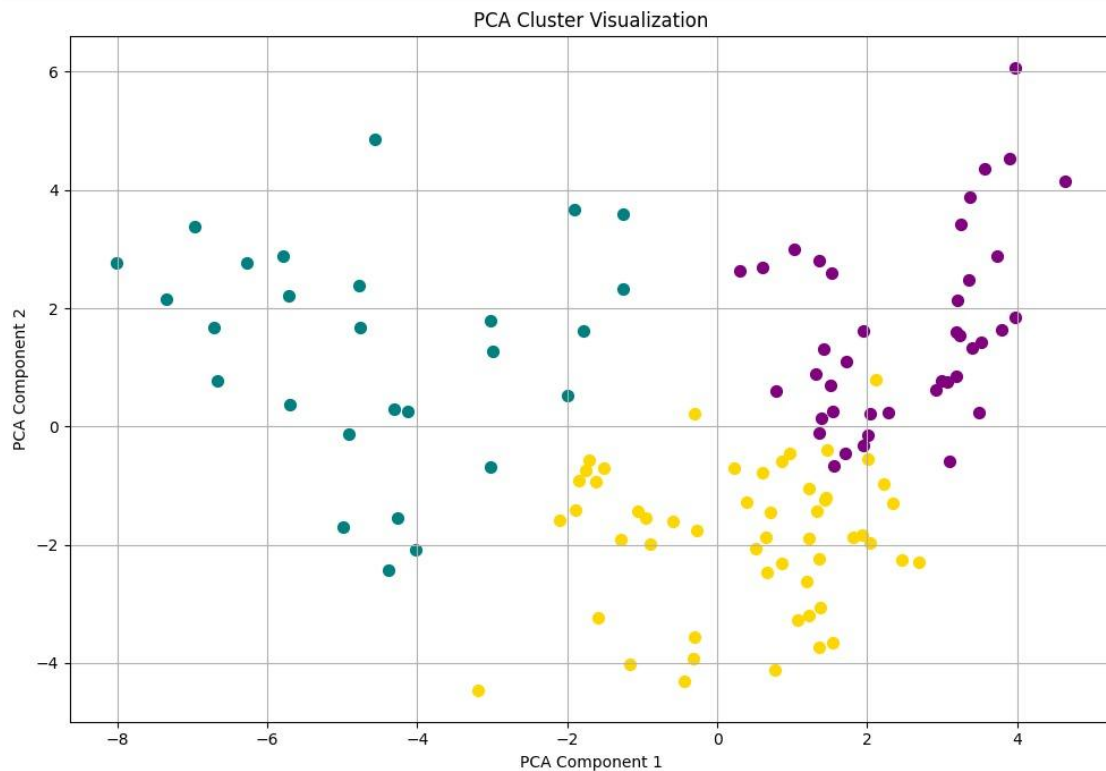


Figure 2: PCA 2D Cluster Representation

4. Findings

In order to present the research findings in a more comprehensive, understandable and comparable manner, the findings are processed separately under the headings of consumer ethics and postmodern religiosity after the introductory explanations in the findings section.

In terms of postmodern religiosity, the findings were addressed in a holistic manner without making any direct distinction in terms of the analysis process or the sub-dimensions of the surveys. Each dimension or specialized differentiation was specified within the meaning integrity and process of the subject. However, since the main context of the study is ethical consumption, the sub-dimensions related to ethical consumption were presented under separate headings, especially in terms of cluster analysis results.

Firstly, methodological outputs supporting the findings were presented in order to establish a link between the method and findings. Then, the section containing the findings was conducted directly.

It presents the ranking of variables according to the average SHAP value. The variables at the top are the factors that contribute most to the overall decision process of the model. In this study, the following were particularly highlighted:

- ZKOE4 and ZKOE5: Questions regarding the ethical attitudes of the participants have the highest SHAP values. This shows that young individuals are a strong determinant of ethical consumption segmentation.
- TTSA1 and YOPF4: Status motivation and utilitarianism contributed moderately to consumption choice and played an important role in separating the transitional groups (Cluster 1).
- DOIY4 (Ethical Score): It was effective in the classification but it is not directly determinative. This finding reveals that the ethical score is not only an output but also a variable element within the system.

The SHAP beeswarm graph presented in Figure 3 visualizes the effects of variables on individual samples in terms of intensity and direction (positive/negative). In this way, the effect of the same variable on different individuals could also be analyzed.

Thanks to these two explainability methods, the internal workings of the model have been made transparent, and the discriminatory power of the variables in segmentation has been revealed not only statistically but also in a causal context. This is an important contribution that makes machine learning open to critical interpretations, especially in social sciences.

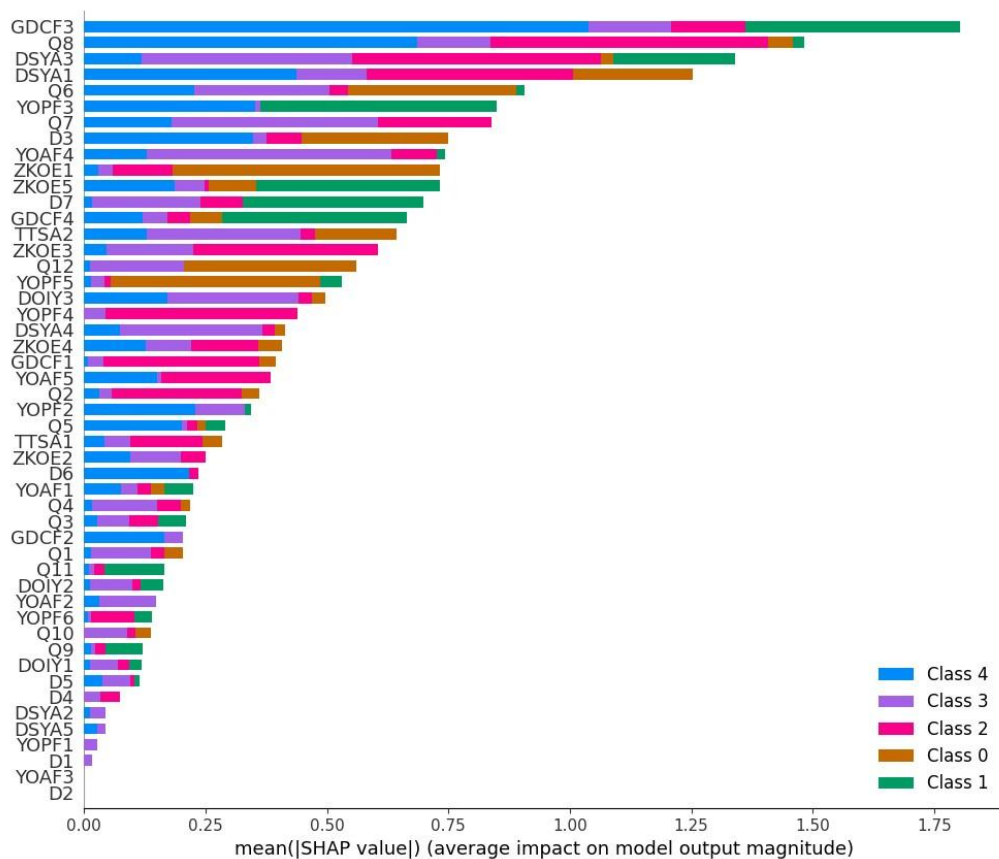


Figure 3: SHAP Beeswarm

After this point, the presentation containing the findings is given directly. First of all, the groups that the participants formed meaningfully in terms of postmodern religiosity were determined by cluster analysis. These groups were formed as follows:

The first 12 variables (Q1–Q12) measure individuals' perceptions of religiosity and their views of the belief system.

- **Cluster 2:** It has the highest means in almost all religious variables. There are particularly strikingly high scores in variables Q2 (“Experiencing religion individually”) and Q10 (“Religion is the spiritual

connection between a person and God”). These individuals have an individual, internalized form of belief and also base their ethical behavior on faith.

- **Cluster 0:** Has more moderate or distant religious values. It remained around neutral (3.0) in some questions and gave higher scores in secular tone statements such as Q11 (“This world instead of the afterlife”). This indicates a secular-pragmatic attitude.

- **Cluster 1:** Generally undecided responses (around 3.0) were given. This cluster consists of individuals whose religious orientation is not yet clear or who mixed up.

After the participants were clustered in terms of postmodern beliefs, the differentiated behavioral patterns of the individuals in each cluster regarding ethical consumption behaviors were examined. At this point, a separate measurement and evaluation was made in the context of the sub-dimensions of the Ethical Consumption Scale. The findings obtained at this stage are as follows:

4.1. Ethical Consumption Findings

Ethical Behaviors (YOAF, YOPF, DSYA, ZKOE, TTSA)

The variables in this category measure the individual's moral attitudes in relation to others and society.

- **Cluster 2:** They gave the highest scores in ethical issues. They are especially prominent in items related to personal honesty such as YOAF3 (“Unauthorized use of passwords”) and YOPF4 (“Not giving away excess remainder of money”). This shows that they exhibit a profile with high ethical sensitivity and adherence to internalized norms.

- **Cluster 1:** Although it is elevated in some questions, the general profile indicates indecision. It can be said that individuals evaluate some situations according to the context.

- **Cluster 0:** Having relatively lower scores may indicate that behavior is not internalized in some ethical dilemmas. There are obvious decreases, especially in items such as DSYA3 and ZKOE1.

Environmental Ethics (GDCF1–GDCF4)

These four variables measure individuals' voluntary behaviors towards environmentally friendly consumption.

- **Cluster 2:** Has the highest scores in the variables of preference for reusable materials (GDCF2) and support for environmentally friendly companies (GDCF3). It is seen that these individuals have high levels of environmental responsibility, not just religious or moral.

- **Clusters 0 and 1:** Show less sensitivity to environmental issues. This may indicate that environmental actions are still less internalized.

Ethical behaviors and environmental ethics clusters show clusters of general behavior patterns in terms of ethical consumption. From this point on, more detailed findings about the ethical consumption behaviors of the clusters are explained.

Cluster 0 – Consumers Adhering to Traditional Norms and Limited Ethical Awareness: Cluster 0 consists of individuals who are mostly undecided (around 3 points) or gave low scores on questions about ethical consumption. Especially in variables such as DOIY4 (ethical behavior score), ZKOE5 (ethical purchasing reflex), the cluster average is low compared to other clusters. This shows that social approval or traditional habits are more dominant in the consumption preferences of these individuals, but their ethical sensitivity remains low.

This cluster also includes individuals with lower income and education levels, and their satisfaction levels with income are also low. In SHAP analyses, it was observed that variables based on traditional values such as ZKOE5 and GDCF2 were decisive for this cluster.

This profile can also be defined as a “price-oriented” or “habit-based” consumer in classical marketing segmentations. Although open to ethical guidance, its conversion potential is limited.

Cluster 1 – Open to Transformation, Ethical and Practical Undecideds: Cluster 1 draws attention with its heterogeneous structure. Ethical scores (DOIY4) are at a medium level but the variance is high.

According to SHAP analysis, among the variables affecting the decision processes in this cluster, there are flexible value expressions such as YOAF5 (utilitarian opportunism), TSAS1 (social status focus) and YOPF4.

Although participants are sometimes inclined to ethical principles, they show inconsistency by scoring low on some questions. This situation indicates that external factors are effective in transforming individuals' ethical orientations into behavior. Factors such as cultural influence, socioeconomic position and environmental pressure explain this permeability.

This cluster is the most open to transformation. When supported by awareness campaigns, social media influence and role model individuals, it is possible to internalize ethical awareness. It requires strategic intervention and communication.

Cluster 2 – Conscious, Determined and Ethical Consumer Activists: Cluster 2 is the group that stands out with its high scores in all factors. The average score in variables directly related to ethical evaluation such as DOIY4, ZKOE4, ZKOE5 is very close to 4. In SHAP analyses, the most decisive variables for this cluster are ZKOE4 (Generation Z ethical sensitivity), TTSA1 (preference for ethical values instead of status) and DOIY4.

As a result of PCA analysis, this cluster is spatially distant from other clusters; this reflects the high consistency and success level of the model.

This group is densely populated with individuals who are more advantageous in terms of income, education and professional diversity. They have the highest averages in monthly earnings and income appreciation variables. Therefore, they have not only ethical awareness but also the economic capacity to implement this awareness.

These individuals can be agents of social change. Roles such as public policy representation, campaign ambassadorship, or community leadership can be successfully undertaken by this group.

4.2. Postmodern Religiosity Findings

In the analyses presented in the previous section, it was seen that consumers were divided into segments according to their ethical and psychological orientations. However, these profiles have not only a behavioral but also a belief-based infrastructure. In this context, religious values come into play as another important factor affecting ethical consumer behavior. Therefore, in the next section, differences based on the religious attitudes of the participants were examined on a cluster basis through the first 12 items of the survey. Thus, possible intersection areas between ethical sensitivity and the level of religiosity were revealed.

In this section, the means given by the participants to the 12-item scale (Q1–Q12) measuring their attitudes towards religious values and the meaning of religiosity were analyzed on a cluster basis. The questions cover both institutional and individual religiosity, secularity, intrinsic spirituality and societal forms of religiosity.

Cluster 0 – Group with Balanced Religious Orientation, Open to Individual Interpretations: This cluster shows a tendency to interpret religious practices individually, with high scores especially in questions such as Q2 (“Individual experience of religion”, 3.63) and Q7 (“Engagement with daily life”, 3.63).

- High scores such as Q9 (“Creating your own belief system” – 3.59) indicate that a pluralist perspective is developing in this group.

- Moderately positive responses were given to items such as Q1 (“Religiosity without formalism” – 3.30) and Q3 (“Acting with reason and logic” – 3.15).

This cluster consists of individuals who question traditional religious patterns and base their beliefs more on individual interpretation, rational evaluation, and moral action. Particularly, the high scores given to statements such as "Religiosity should not be reduced to formalism" and "Religion is more meaningful to live individually" show that this group focuses on the internal meaning of religion rather than its external forms.

However, lower scores on some normative headings (e.g. “Differences in belief are an obstacle to marriage”) indicate that cultural reflexes are still strong despite openness to individual interpretations. This indicates a mental structure that tries to balance modernization with religious traditions.

Cluster 1 – Group with Limited Internal Consistency, Adhering to Traditional Normative Structure: Cluster 1 gives the highest scores to statements such as Q2 (“Individual experience of religion” – 3.66) and Q7 (“Engaging with daily life” – 3.66), and it shows an appearance that supports the individual perception of religion.

- High agreement with secular comments such as Q1 (3.58) and Q12 (“Life can be managed without being sacred” – 3.57) suggests that this group evaluates religiosity more in terms of meaning than form. However, the low values are particularly striking:

- Q10 (“To establish a spiritual connection with God” – 1.81)
- Q4 (“Everyone who is virtuous can be considered religious” – 2.36)

Participants in this group consider religious values together with social norms; they see faith not only as a personal sphere but also as the moral basis of social order. They give high scores on questions such as “It is more meaningful to practice religion individually” and very low scores on inclusive/secular questions such as “Everyone who lives a virtuous life is religious.”

This situation shows that this group evaluates religiosity through strict adherence to the belief system and correct belief-method unity. There is a relatively more distant and limiting stance towards other religions or secular ethical values. Therefore, this cluster represents a structure with high adherence to religious norms but limited tolerance towards religious diversity.

Cluster 2 – Activist Group Whose Religious Beliefs Are Internalized and Reflected in Behavior: Cluster 2 has the highest means in questions such as Q1 (“Anti-Formalism” – 4.05), Q9 (“Synthesis from different beliefs” – 3.90) and Q12 (“Finding direction without the sacred” – 3.90).

- Also, high scores were given in items such as Q5 (“Differences in belief are not an obstacle to marriage” – 3.61) and Q2 (“Living individually is more meaningful” – 3.41).
- More theological questions such as Q10 and Q11 (2.24 and 2.41) have higher values compared to other clusters.

Cluster 2 consists of individuals who have adopted religious values at both cognitive and behavioral levels and prioritize pluralism and ethical sensitivity. In this group, the highest rates of agreement were observed with statements such as “Religiosity should not be reduced to formalism,” “Differences in belief are not an obstacle to marriage,” and “A synthesis can be created from different belief systems.”

Moreover, this cluster consists of individuals who not only develop an individual framework of belief but also put religious values into practice at the level of social responsibility, moral activism and behavioral transformation. This situation reflects the representation of an activist, flexible and pluralistic form of postmodern religiosity.

4.3. General Evaluation of Findings

The heat map below shows the average response scores on multidimensional variables such as religious attitudes, ethical behaviors, environmental concerns, and demographic factors for three clusters determined by the K-Means algorithm (see Figure 4). Each row represents a variable; each column represents a cluster. The color scale shows a transition from blue to red tones from low to high scores.

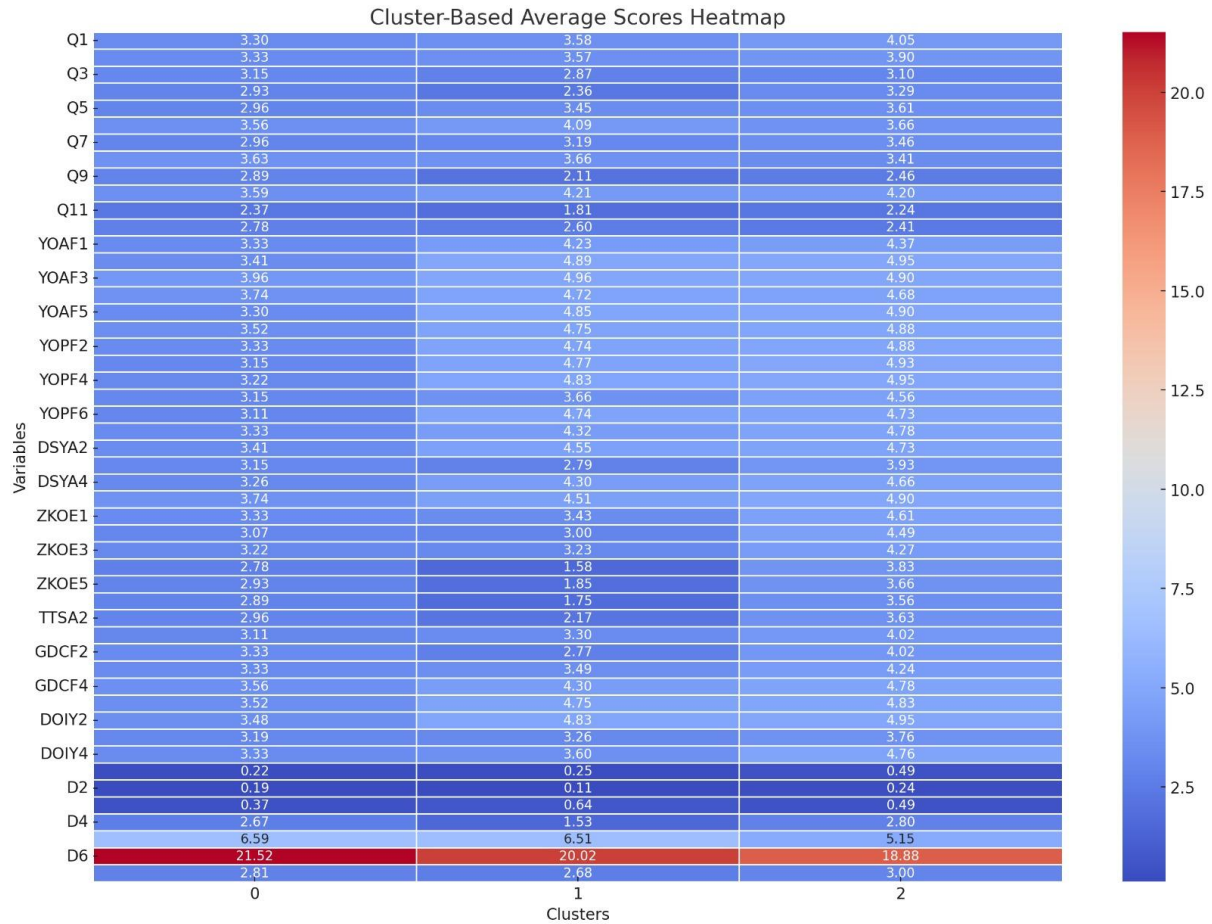


Figure 4: Average Score Heat Map

5. Discussion

Especially the high SHAP values of variables such as ZKOE4 (Z generation ethical sensitivity), DOII4 (ethical score), and YOAF5 show that these expressions are the factors that contribute the most to the learning process of the model. Thus, it has been proven that the obtained segments can be explained not only statistically but also with interpretable artificial intelligence techniques.

According to the research findings, having religious values is also associated with high ethical consumption values. Although postmodern belief individualizes religion, it is still effective in the individual's decisions and behaviors. For example, according to Shah (2025), religious values have a significant effect on responsible consumption behaviors. Under these conditions, it should be expected that religious belief will be effective in ethical consumption as well as in responsible consumption.

In the study, participants were divided into three meaningful groups in terms of religious belief. The first of these is Cluster 0, which prefers to stay more distant from religion. However, it would be more accurate to interpret the structure of staying distant from religion as having a balanced religious orientation that is open to individual interpretation. The second group is Cluster 1, which is attached to the traditional normative structure and has limited internal consistency. Finally, there is Cluster 2, which has internalized its religious beliefs and reflects them in their behaviors.

According to the research findings, participants with high religious values in Cluster 2 are significantly sensitive to ethical consumption. They are particularly sensitive to unauthorized password use and returning the remainder of money. Similarly, according to the meta-analysis study conducted by Ezech and Dube (2025) on journals indexed in Scopus, a strong positive correlation was found between religious belief and environmental sensitivity and green consumption. Although a correlation was found between religious belief and ethical consumption in this study, there is a differentiation between the sub-dimensions of ethical consumption. While the increase in religious belief had a stronger correlation with

ethical values in environmental factors in Ezech and Dube's study, in this study it had a stronger correlation with values such as permission, password use and returning remainder of money. This shows that the participants' sensitivities arising from the personal relationship between two people, such as "theft" or "information privacy", are higher. Although it is not a specific research object of this study, it should be considered natural that there are differences in ethical principles depending on the patterns of beliefs. There are also more significant differences from the studies of Ezech and Dube. For example, it is not possible for religions that purchase animals for sacrifice to have the same ethical understanding on this issue as religions that do not have such a ritual. Similarly, while Hinduism and Buddhism see sustainable consumption as an ethical value, the influence of this approach is decreasing in Christianity and Islam (Minton, Tan, Tambyah et al., 2020). According to the study of Sandikci (2020: 289), the differentiation of ethical approaches of Muslims living in Poland regarding nail polish service also exemplifies this idea. However, in this study, research was conducted with universal values instead of differing values. The differentiation given as an example requires an inter-religious research topic. Examining why religious belief increases ethical values in a general framework, Singh et al. (2023) emphasized that religious values increase self-control and thus support an ethical value that turns into action.

In this study, environmental ethical sensitivity is ranked second, and participants show their environmental concerns by supporting environmentally sensitive brands. Instead of examining environmental concerns one by one, it is a general method for consumers to intellectually value brands and turn to these brands. For example, in the study by Cobano and Minton (2025), it was determined that consumers classify brands in terms of whether they have environmental ethical values or not and made purchase decisions directly based on these brands. This situation can be explained by the postmodern era consumption approach, where brands are perceived as individuals. Because in the postmodern era, both brand managers and consumers attribute a social personality to brands and develop relationships with these brands as individuals. The study by Srivastava, Sama, Rishi, and Rajpurohit (2025) also confirms that individuals develop relationships with brands in this way.

There was also a difference in environmental ethical values between the groups that were distant and undecided about religious beliefs. While there was an individualistic rationalism in Cluster 0, which was distant from religion, in Cluster 1, which was undecided about religious values, although there was an importance given to the environment at the cognitive level, this thought did not turn into action. In addition, in Cluster 1, the consumption motivation was status motivation and utilitarianism.

It is not possible to say that there are no consumption ethics values in Cluster 1, which is undecided in terms of religious belief. However, although the structure of this group is heterogeneous, the presence of high variance shows that the group is also undecided about consumption ethics. In addition, there must be an external factor for this indecisiveness to turn into positive behavior. This actually shows that Cluster 1 is a group open to transformation.

6. Conclusion

In general, there is a positive correlation between religious beliefs and consumer ethics. In the context of postmodern belief, participants are divided into three groups: high, indecisive and distant, with internalized belief values. Not only a correlation but also a cause-and-effect relationship has been determined between these three groups and consumer ethics. The rise in religious beliefs provides an increase in consumer ethics, independent of other factors.

In groups with high values of faith, social benefit is considered rather than individual benefit, and ethical consumption values are also effective in action. At this point, it should be noted that the increase in religious belief also increases consumption ethics with a cause-effect relationship. However, as mentioned in the discussion section, while the rise of ethical values in different geographies in current studies highlights environmental concerns, according to the findings of this research, environmental concerns are at the second. Instead, ethical values based on personal relationships, such as returning excess remainder of money, come first. In addition, it is important to understand what consumers with high religious beliefs understand from ethical consumption and how they use it in terms of marketing. Participants do not question all the ethical values of products or brands separately in their consumption decisions and behaviors based on ethical values. Instead, they evaluate brands according to their ethical

image and make a cumulative purchase decision according to ethical brand value. This confirms the importance of brand image, which is frequently mentioned in postmodern marketing. In other words, it is not enough for consumers to just behave ethically. They need to show their ethical behavior and turn it into a brand image.

In groups that are undecided about religious belief, consumption ethics remain at the cognitive level. This situation can also be understood from the high variance of those who are undecided about religious belief. However, when there is an external factor, ethical consumption values can turn into behavior. This shows that those who are undecided about religious belief have ethical values at the cognitive level but cannot turn them into action. They need an external trigger factor for these values at this level of consciousness to turn into action. This shows that it is possible for brands that create a brand image for ethical values, especially green marketing, to transform this group. However, during this transformation process, individuals who are undecided about religious belief need to be affected by an external factor. This shows that organizing activities that include ethical values such as environmental concern for groups with undecided religious beliefs would be meaningful in terms of marketing. From a tactical perspective, targeting this group through collaborations with social media influencers, corporate social responsibility campaigns, and similar promotional methods seems logical in terms of gaining new customers.

In groups that are distant from religious beliefs, there is individualistic utilitarianism, and especially ethical values that provide social benefit are weakened. However, to correctly interpret the research group that is distant from belief, it should be noted that this group does not consist of non-believers. The participants' beliefs were not directly asked in the research. Instead, their belief values were measured. The most accurate term to describe this group that is most distant from religious belief would be secularism. Because high values towards belief were also determined in this group. However, when it came to dilemmas such as "This world instead of the afterlife", they preferred worldly answers. In terms of the form of religious belief, they think that individuals should develop their own belief systems, and that belief is an individual phenomenon. This shows that participants should be defined as secular rather than irreligious. The most distinctive feature of groups that are distant from religion is that they are individualistic and pragmatist. When the general survey response distribution of this group is examined, they were either undecided or gave low scores in terms of ethical consumption. In particular, the ethical behavior score and moral purchasing reflex score remained low compared to other groups.

As a result, a significant cause and effect relationship has been determined between religious belief and consumption ethics in the postmodern sense. This relationship is that the increase in religious belief positively affects ethical consumption thought and behavior. While the secular group that is distant from religious belief is also distant from ethical consumption values, the group that is undecided about religious belief has ethical consumption values at the cognitive level. However, they cannot turn this consciousness into action. They need an external factor to turn this consciousness into action. The group that has a particularly operational difference in ethical consumption is the participants with high postmodern belief levels. The consumption ethics of consumers with high religious belief values also increase.

7. Limitations and Future Studies

In studies conducted on religious belief, the religious belief of the group from which the sample is collected is also important. Since this research was conducted in Türkiye, the religious belief defined as high by the participants consists of an Islamic belief. For this reason, the differences in samples with different religious beliefs constitute the recommendations of this study. Even sectarian differences within the same religious belief can highlight different ethical values. For example, in the study of Das et al. (2025) in India, it was determined that ethical consumption in Hinduism triggers environmental ethical values in an altruistic form. However, while an idealistic environmental ethical value was observed in the Ramayana group, a realistic environmental ethical value was observed in the Mahabharata group. Significant ethical value differences will emerge depending on the differentiation of religious beliefs regarding ethical consumption, especially in specific sectors such as meat consumption. For example, while halal meat consumption is the focus of ethics in meat consumption in Muslim groups (Rahman, Razimi, Ariffin & Hashim, 2024), ethical consumption values of groups with

spiritual orientations in the same sector result in veganism (Makkar, Yang & Lamarche-Beauchesne, 2024). Another limitation regarding the sample was that the sample was collected from Konya province of Türkiye.

It was found that the group with high religious belief in Cluster 2 also had consumption ethics values. However, when the demographic variables of the sample were examined, it was determined that the income level of this group was higher. However, since the research was not developed by considering the variables of income, belief and ethical consumption, an in-depth analysis could not be made on this finding. For this reason, studies designed to investigate the main variables of belief, income and ethical values constitute the recommendations of this study.

One of the important limitations of this research is that the religious belief value measured is a postmodern belief structure. The reason why belief is considered in a postmodern context in this research is that it constitutes a more meaningful sample because it constitutes the structure of the current era. However, the changes that will be seen if the belief forms shift from the moderate state of postmodernism to more radical points are ignored in this research.

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Araştırma Makalesi

Post-modern Religiosity and Consumer Ethics: A Research by K-Means Based Consumer Segmentation and Random Forest Assisted Classification

Post-modern Dindarlık ve Tüketici Etiği: K-Means Tabanlı Tüketici Segmentasyonu ve Random Forest Destekli Sınıflandırma Araştırması

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Genişletilmiş Özet

Bu çalışma, postmodern toplum yapısı içerisinde bireylerin dindarlık düzeylerinin tüketici etiği üzerindeki etkisini makine öğrenimi teknikleri kullanarak incelemektedir. Tüketim olgusu, modern dünyada yalnızca ekonomik ihtiyaçların karşılanmasından ibaret olmaktan çıkmış; sosyal, kültürel ve manevi anlamlar barındıran bir pratik haline gelmiştir. Bu bağlamda tüketici davranışlarının etik değerlerle ve dinsel yönelimlerle ilişkili biçimde şekillendiği düşüncesi, özellikle postmodern toplum bağlamında giderek daha fazla önem kazanmıştır. Araştırma, etik tüketim davranışlarının çok boyutlu nedenlerini ortaya koymakta; bu nedenler arasında özellikle bireylerin postmodern dindarlık düzeylerinin belirleyici olduğunu savunmaktadır. Bu kapsamda çalışma hem teorik düzeyde hem de istatistiksel modelleme teknikleriyle desteklenmiş kapsamlı bir analiz sunmaktadır.

Araştırma, Konya ilinde yaşayan 121 bireyle gerçekleştirilmiştir. Katılımcıların yaş aralığı 18 ile 35 arasında değişmektedir. Veri toplama sürecinde, postmodern dindarlık ölçeği ile etik tüketim ölçeği uygulanmıştır. Etik tüketim ölçeği, bireylerin tüketici etiğine ilişkin tutum ve davranışlarını yedi alt boyutta ölçmektedir: yasa dışı eylemlerden faydalanma, sorgulanabilir yasal uygulamalardan yararlanma, zararsız kötücül eylemler, telif haklarını ihlal, çevreye duyarlılık ve doğru olanı yapma eğilimi gibi alt başlıklardan oluşmaktadır. Postmodern dindarlık ölçeği ise bireylerin inancı nasıl yaşadıklarını, dini uygulamaların bireysel mi yoksa kurumsal mı algılandığını, seküler unsurlarla inanç arasındaki ilişkiyi ve bireysel anlam üretimi kapasitesini ölçmektedir. Elde edilen toplam 49 sayısal değişken veri bilimi yaklaşımları ile analiz edilmiştir. Veriler etiketleyici kodlama ve standardizasyon işlemine tabi tutulduktan sonra K-Means kümeleme algoritması kullanılarak üç tüketici kümesi elde edilmiştir. Daha sonra bu kümeler Random Forest, K-En Yakın Komşu (KNN) ve Karar Ağaçları algoritmalarıyla sınıflandırılmıştır. Model başarımleri dikkate alındığında en yüksek doğruluk oranı %92 ile Random Forest modeline aittir. SHAP analizi ile modelin karar verme süreçlerinde hangi değişkenlerin ne ölçüde etkili olduğu açıklanabilir hale getirilmiştir.

Kümeleme sonucunda üç temel tüketici profili ortaya çıkmıştır. İlk grup, dini değerlere mesafeli olan, seküler ve pragmatist bireylerden oluşmaktadır. Bu bireylerde etik tüketim davranışları, bireysel fayda temellidir ve çoğunlukla içselleştirilmemiştir. Tüketim kararları bireysel çıkar ve statü odaklı biçimde şekillenmektedir. Bu grup, dini değerleri seküler biçimde algılamakta, dünyaya yönelik yaşıntıyı öne çıkarmakta ve etik davranışları da bu pragmatik çerçevede değerlendirmektedir. İkinci grup hem dini hem de etik tutumlar açısından kararsız olan bireyleri içermektedir. Bu grupta bireylerin bilişsel düzeyde etik duyarlılık geliştirdiği ancak bu duyarlılığın davranışa dönüşmediği görülmüştür. Etik ilkelere yönelik zihinsel farkındalık mevcuttur, ancak bu farkındalık, dışsal etkenler olmaksızın istikrarlı bir

davranışa evrilmemektedir. Bu durum, bireylerin etik davranış için sosyal onay, kültürel destek ya da rol modeller gibi dışsal motivasyonlara ihtiyaç duyduğunu göstermektedir. Üçüncü grup ise hem dini inançlarını hem de etik değerlerini içselleştirmiş bireylerden oluşmaktadır. Bu grupta yer alan bireyler hem bireysel dürüstlük hem de çevresel duyarlılık açısından yüksek skorlar elde etmişlerdir. Geri kalan para iadesi, izinsiz parola paylaşmama gibi bireysel etik davranışlar konusunda güçlü bir hassasiyet sergilemektedirler. Aynı zamanda çevreye duyarlılık ve etik markalara yönelme eğilimi de bu grupta yaygındır.

Postmodern dindarlık, çalışmada bireysel anlam üretimi, inancın kurumsal çerçeveden uzaklaştırılarak kişisel düzeyde yaşanması, farklı inanç sistemlerinden öğelerin sentezlenmesi gibi özelliklerle tanımlanmıştır. Geleneksel dindarlığın dogmatik ve hiyerarşik yapısının yerine bireyselleşmiş, çoğulcu ve deneyim temelli bir dindarlık formu ön plana çıkmaktadır. Araştırma, bu postmodern dindarlık biçiminin etik tüketim davranışları üzerindeki etkisini üç ayrı inanç profilinde incelemiştir. Dini değerlere uzak olan grup, inancı bireysel ve seküler temelde değerlendirmekte ve etik davranışları da bu çerçevede pragmatist bir biçimde anlamlandırmaktadır. Kararsız grup ise geleneksel inanç yapıları ile modern değerler arasında bir geçiş evresi yaşamaktadır. Bu grupta bireyler, bazen dini değerlere önem verirken, bazen de seküler normları benimsemektedir. Bu durum hem inanç hem de etik davranışlarda tutarsız bir yapının oluşmasına neden olmaktadır. Üçüncü grup ise dini değerleri hem bireysel hem de toplumsal düzeyde benimsemiş, inançlarını yalnızca düşünsel değil, aynı zamanda davranışsal düzeyde de yaşayan bireylerden oluşmaktadır. Bu bireylerde etik tüketim davranışları yüksek bir içselleştirme ile sergilenmektedir.

Etik tüketim davranışları, çalışmada SHAP analizi aracılığıyla detaylı biçimde incelenmiş ve özellikle bireysel etik farkındalığın (örneğin parayı iade etme, telif haklarına riayet gibi davranışlar) etik tüketici profillerinin belirlenmesinde çok daha etkili olduğu görülmüştür. Bu bağlamda bireylerin yalnızca çevresel duyarlılık göstermeleri değil, aynı zamanda bireyler arası ilişkilerde etik ilkelere bağlı kalmaları da sınıflandırma açısından belirleyici bir unsur olarak ortaya çıkmıştır. Ayrıca çevresel duyarlılık, özellikle yüksek inanç düzeyine sahip bireylerde bir ahlaki görev olarak algılanmakta, tüketim tercihleri de buna göre şekillenmektedir. Etik marka imajı bu gruptaki bireyler için oldukça önemlidir. Markalar yalnızca ürün kalitesiyle değil, aynı zamanda etik duruşlarıyla değerlendirilmekte, bu da etik sadakat davranışlarını tetiklemektedir.

Araştırmanın bulguları, postmodern inanç sistemlerinin bireylerin tüketim davranışlarını doğrudan etkilediğini göstermektedir. Dindarlık düzeyinin artması, etik tüketim davranışlarının bilişsel ve davranışsal düzeyde artış göstermesine neden olmaktadır. Seküler bireyler etik davranışları çoğunlukla bireysel yarar çerçevesinde değerlendirirken, kararsız bireylerde etik farkındalık olmasına rağmen davranışsal düzeyde bu farkındalığın karşılığı görülmemektedir. Ancak bu grup, doğru dışsal etkenlerle dönüşüme açık bir yapıdadır. Etik marka iletişimi, sosyal sorumluluk kampanyaları ve dini değerlerle uyumlu pazarlama stratejileri, bu grubu davranışsal etik tüketiciye dönüştürebilecek potansiyele sahiptir. İnancını içselleştirmiş bireylerde ise tüketim davranışı, etik ve dini değerlere dayalı biçimde tutarlı ve bilinçlidir. Bu grup, toplumsal dönüşümün taşıyıcı aktörleri olabilir.

Sonuç olarak, postmodern dindarlık ile etik tüketim davranışları arasında istatistiksel olarak anlamlı bir nedensellik ilişkisi saptanmıştır. Dini inanç düzeyinin artışı, etik tüketim davranışlarını doğrudan olumlu etkilemektedir. Bu ilişki yalnızca korelasyon düzeyinde değil, aynı zamanda davranışsal düzeyde de gözlemlenmektedir. Araştırmanın önerileri arasında, farklı dini yapıların, mezhepsel farklılıkların ve kültürel etkenlerin etik tüketim üzerindeki etkilerinin karşılaştırmalı biçimde araştırılması bulunmaktadır. Özellikle etik tüketim bilincinin artırılmasına yönelik pazarlama stratejileri geliştirilirken, bireylerin dini yönelimleri ve etik değer sistemleri göz önünde bulundurulmalıdır. Bu bağlamda çalışma, tüketici davranışları literatürüne, makine öğrenimi uygulamalarıyla desteklenmiş özgün bir katkı sunmaktadır.