

Nicki Janpors et.al

Using an artificial intelligence approach to investigate the effect of brand consciousness in predicting luxury fashion consumption

# Using an artificial intelligence approach to investigate the effect of brand consciousness in predicting luxury fashion consumption

Nicki Janpors<sup>a</sup>, Negar Janpors<sup>b</sup>, Alireza Izadi<sup>c</sup>, Roohollah Barzamini<sup>c</sup> and Farshid Hajati<sup>d</sup>

<sup>a</sup>Faculty of Management, Institution/ Ershad University of Damavand, Iran; Ni.janpors1996@gmail.com

<sup>b</sup>Computer Engineering, Islamic Azad University South Tehran Branch, Tehran, Iran; janpors@alborz.kntu.ac.ir

<sup>c</sup>Electrical Engineering, Islamic Azad University Tehran Central Branch, Tehran, Iran; Ali.izadi.eng@iauctb.ac.ir ; Barzamini@aut.ac

<sup>d</sup>The College of Engineering and Science at Victoria University Sydney, Australia; Farshid.hajati@vu.edu.au

## Abstract

Today, the consumption of luxury fashion and accessories, including clothes, play an important role in societies, so that we cannot ignore accurate marketing, the lifestyle in many parts of the world has moved in this direction. People tend to consume luxury product under titles such as seeking individuality and improving social rank in society. In Iran, despite of the economic recession, the consumption of luxury fashion has increased in recent years, in this article we investigate the effect of values, brand consciousness and behavioral intentions in predicting luxury fashion consumption in clothing. To complete our research and review the final results of knowing the brand consciousness, we used artificial intelligence and presented a detailed model to check the level of accuracy which we were able to achieve 97% accuracy.

## key words:

Marketing, artificial intelligence, luxury fashion, brand consciousness, SVM, XGboost, Random forest

**Tob Regul Sci. <sup>TM</sup> 2023;9(1): 573-582**

**DOI: doi.org/10.18001/TRS.9.1.43**

## 1. Introduction

Businesses which are active today, know very well that in order to be successful in selling goods, it is necessary to examine the behavior of the customers of their goods and services. Due to the fact that today, the wide variety of goods and services has caused customers to be faced with different options of various goods and services, and the decision-making process has become complicated. As a result, businesses in a highly competitive market are trying to attract customers to inferior

## Using an artificial intelligence approach to investigate the effect of brand consciousness in predicting luxury fashion consumption

goods and services by using various marketing management methods and tools [1]. Investigating factors affecting customer behavior in all industries are very important. But in some areas, luxury fashion goods become more common, because the factors affecting the purchase of luxury customers are more complex than ordinary and daily goods. Fashion is phenomena which exists more or less among all strata of society. Today, with the spread of mass communication tools and new computer technologies, this phenomenon has found a wide connection with various societies and cultures, and considering its position in recognizing and understanding values, the selection of desirable norms has become more complicated and difficult. The fashion industry opens new doors to its followers every day, it is estimated that the global market of luxury fashion goods will reach 320-365 billion dollars by 2025 and its annual growth rate will be about 3-5% [2]. The emerging markets have become the world's growth engines [3], which had two vital characteristics: large and young population and positive economic growth that surpasses developed markets. In the perspective of marketing, these characteristics have created significant new opportunities in the form of the middle class, which strengthens the demand for branded goods [4]. Brand consciousness is a personal characteristic of customers that shows a mental orientation to choose goods that have a well-known brand name and have high advertising in the market [5] Customers buy famous expensive brands because expensive brands has a higher quality. Functional and symbolic values associated with luxury brands are considered as a main motivation for purchase behavior due to various explanations in terms of high price, quality, rarity, experience, exclusivity [6]. The value of the luxury product market globally is estimated at 253 billion euros, and the number of luxury goods customers has increased by more than 350 million since 2000 [7].

Taking into account that clothing is an inseparable part of identity, mental self-image and social self-esteem, most likely people to They pay a lot of attention and are cautious about choosing the right clothes to enhance their appearance and status. There is a growing market in Iran for the consumption of luxury brands in the clothing sector, and this issue needs to be studied as much as possible. It specifies this section. Limited research has been done on customer behavior in Iran. For marketers, it is important to know who their customers are, where to find them and what are the key factors that guide their behavior, therefore, it is very important to know what motivates Iranian customers to buy luxury fashion clothing. it is possible. The purpose of this article is to investigate this research gap using artificial intelligence, we checked the accuracy level in this article by presenting a detailed model and we were able to achieve 97% accuracy.

## 2- Relations, methods and dataset

We used a quantitative research method to carry out this article, in this method the relationship and effect between the variables are analyzed according to the purpose of the research, also in terms of the classification of the research in terms of data collection or in other words the research plan, it is a descriptive research that It describes the characteristics of the sample and then generalizes those characteristics to the statistical community. It is a descriptive research on several types, which

# Using an artificial intelligence approach to investigate the effect of brand consciousness in predicting luxury fashion consumption

in this article, according to the use of survey type structural equation modeling method, research questions have been examined through questionnaire analysis and structural equation modeling. This means that in the form of a communication research, the required data is collected through a questionnaire and the research questions are answered. Therefore, this research in terms of the practical purpose and in terms of the method of collecting information, is in the category of survey research, and in terms of investigating the effect of variables on each other, it is of the correlation type.

The statistical population of the research is the customers (women over 20 years old) of luxury fashion clothing in Tehran, for this purpose, the sampling method has been used. In general, in the structural equation modeling methodology, the sample size can be determined between 5 and 15 observations for each measured variable and determined according to equation 1.

$$5q < n < 15q \quad (1)$$

where q is the number of observed variables or the number of questionnaire questions and n is the sample size.

Considering that the number of questions in this questionnaire model of this research is 19 questions, so the sample size is between 95 and 285 and the random sampling method is cluster, for this purpose, first a number of stores were randomly selected and then in these stores, according to the required number has been collected randomly and on different days from buyers and attendees, the information has been collected. We have used standard questionnaires on a 5-point Likert scale to collect our unique dataset, which can be seen in Table No. 1. For this purpose, the tools of standard final value questionnaires and Kautish's instrument [9] consisting of 10 questions, brand consciousness awareness consisting of 6 questions, behavioral intentions consisting of 3 questions have been used.

In this research, to check the validity of the questionnaire, "content validity" methods have been used, and a number of experts were asked, so that after the initial design of the questions, the questionnaire was given to the experts and their opinions were used to evaluate of the adequacy of the measurement tool, and finally, by examining their opinion and after the final review and approval by the professors, the distribution of the research tool was started, and the reliability of the questionnaire was also calculated using SPSS software and Cronbach's alpha method. In this research, first, the questionnaire was distributed among a sample group of 30 people to check the reliability of the research tool. and Cronbach's alpha values for each variable which results are presented in Table No. 1.

Table 1: Cronbach's alpha values for research variables

Cronbach's alpha value	questions	variable
0.892	5	final value
0.928	5	Instrumental value

0.788	6	brand consciousness
0.723	3	Behavioral intentions

Descriptive and inferential statistical methods have been used to analyze data and test hypotheses. The data collected in descriptive statistics are arranged in frequency distribution tables. In the inferential statistics section, the structural equation modeling method has been used to analyze the data and test the research hypotheses. Spss version 22 software was used for the first statistical test to determine whether the distribution of the research data is normal or not.

### 3- Data analysis and simulation

In order to generalize the results to other populations, questions related to demographic characteristics, including age and level of education, have been included in the questionnaire. Table 2 shows the age and Table 3 shows the level of education of the respondents.

Table 2: Age of respondents to the questionnaire

Abundance percentage	Abundance	Age
47.72	136	21 to 30 years
23.51	67	31 to 40 years
12.28	35	41 to 50 years
16.49	47	over 50 years old
100	285	total

Table 3: Education of respondents to the questionnaire

Abundance percentage	Abundance	Educational certificate
1.05	3	under College
15.44	44	College
14.39	41	Associate Degree
35.44	101	bachelor Degree
33.68	96	Master's degree and above
100	285	total

In Table 4, you can see the statistical description of the variables.

Table 4: Statistical description of variables

Behavioral intentions	brand consciousness	Instrumental value	final value	Indicator
256	256	256	256	Number
2.973	2.572	2.955	2.792	average
0.94636	0.80710	1.03114	0.97681	standard deviation
0.896	0.651	1.063	0.954	Variance

Using an artificial intelligence approach to investigate the effect of brand consciousness in predicting luxury fashion consumption

-0.043	0.258	-0.153	0.035	The amount of skewness
-0.520	-0.206	-0.829	-0.787	Stretch amount

Kolmogorov-Smirnov test was used to check the normality of the data. The null hypothesis in this test says that the data has a normal distribution. We have statistically:

H0: The data distribution is normal.

H1: The data distribution is not normal.

The results of this test for each of the data are shown in table 5, as it is clear from the table, considering the significance level, it can be claimed with 95% probability that the distribution of the related data is normal for all agents. Cronbach's alpha value above 0.70 indicates good internal consistency. Therefore, by examining the Cronbach's alpha of the model variables reported in Table 5, it can be concluded that the model constructs have acceptable reliability.

As you know, the value of composite reliability in PLS path models for a variable is more than 0.70, indicating that the desired variable has the necessary internal reliability. The relevant results can be seen in Table 5 and these variables have the required composite reliability.

Table 5: The results related to the normality test of factors, Cronbach's alpha values and Composite Reliability

Average Variance Extracted (AVE)	Composite reliability	Cronbach's alpha	level of significance	Kolmogorov- Smirnov z	Number	Factor
0.712	0.925	0.892	0.104	1.216	285	final value
0.778	0.946	0.928	0.063	1.314	285	Instrumental value
0.537	0.822	0.788	0.073	1.286	285	brand consciousness
0.648	0.846	0.723	0.084	1.260	285	Behavioral intentions

According to the average variance criterion shown in Table 5, it can be said that the convergent validity of all structures of the measurement model is high.

In order to check the prediction criteria of the overall performance of the model, we used GOF, the relation of which is shown below.

$$Gof = \sqrt{\text{communalitis} \times \overline{R^2}} \quad (2)$$

So that  $\overline{\text{communalitis}}$  is the sign of the average values of Communality of each structure (first order), according to Table 6, 0.668 was obtained.

Table 6: Common values and coefficients of determination

Factor	Communality	R2
final value	0.712	-
Instrumental value	0.778	-
brand consciousness	0.537	0.514
Behavioral intentions	0.648	0.392
average	0.668	0.453

In relation 2,  $\overline{R^2}$  is also the average value of the determination coefficients of the endogenous structures of the model, which is calculated as 0.453 for the current model. Finally, the GOF of the present model was extracted as 0.550.

To investigate the research hypotheses, we first calculated the path coefficients for each of the hypotheses. Therefore, in Figure 1, the output of the path coefficients of the structural equation model is shown to test the hypotheses of the research, which was also confirmed in the previous stages of its fitting.

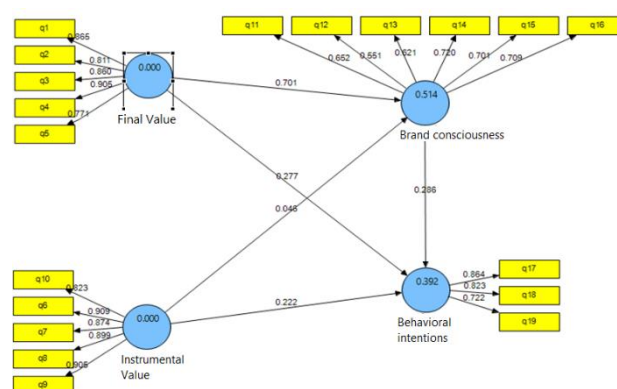


Figure 1: Standard path coefficients for testing hypotheses

Since it is not possible to comment on the significance of those coefficients by the size or smallness of the coefficients of the standard estimation model, the T-value model was used to measure the significance of the path coefficients. And if the significant values are greater than the absolute value of 1.96, these relations are significant at the 95% confidence level. Figure 2 shows the model of significant numbers related to each route.

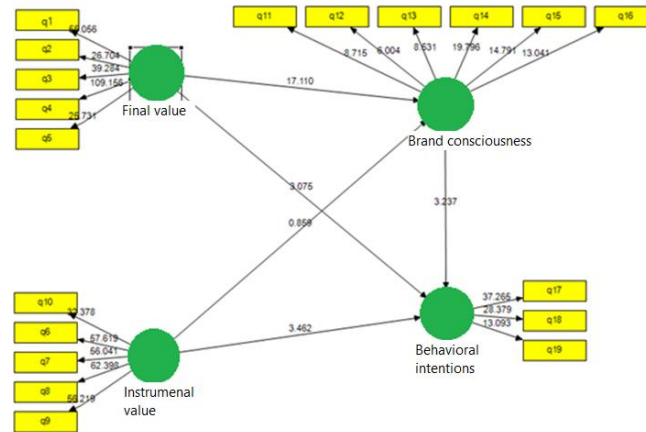


Figure 2: Significant path coefficients for testing hypotheses

We used artificial intelligence to complete our research and the final review of the results of brand consciousness, and by presenting several accurate, classified and supervised models including SVM, XGboost, Random forest, we checked and compared the level of accuracy in this article.

The linear activation function for the SVM model is equal to rbf.

To evaluate the performance of AI models, we applied 5-fold cross-validation (5F CV) to the dataset. Each time we randomly presented 0.2 of the test data and 0.8 of the whole data set and did this 10 times.

The data set was first grouped and in each group 5 times the responses were first randomly generated and then grouped in all types of responses to generate 5 times the response in the entire data set. It is called class validation.

The linear activation function for the XGboost model is linear.

And for the Random Forest model, we go to a depth of 4.

We used different performance measures in 5F classified CV to evaluate AI models. The first is model accuracy (ACC), which is the percentage of correct predictions in the labeled data set. The second is the F1 score, which is the harmonic mean of precision and recall of the labeled data set. The conditions are calculated as follows:

$$\text{Precision} = \frac{TP}{TP+FP} \quad (3)$$

$$\text{Recall} = \frac{TP}{TP+FN} \quad (4)$$

$$F_1\text{score} = 2 \cdot \frac{\text{Precision} \cdot \text{recall}}{\text{Precision} + \text{recall}} \quad (5)$$

Using an artificial intelligence approach to investigate the effect of brand consciousness in predicting luxury fashion consumption

Where a true positive (TP) indicates the correct predicted response type, a false positive (FP) indicates an incorrect predicted response type, a true negative (TN) indicates a correctly predicted non-response type. has been predicted, while a false negative (FN) indicates that the type of non-given response has been predicted incorrectly.

that we were able to achieve 97% accuracy in the SVM model and the accuracy results can be seen in Table 7, Figure 3 shows the results of the confusion matrix of the model.

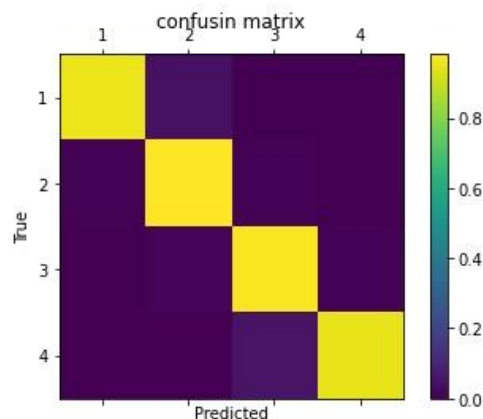


Figure 3. The results from the Confusion Matrix.

Table 7. The results of accuracy and comparison using SVM.

	precision	recall	f1-score	support
1	0.96	0.96	0.96	23
2	0.97	0.98	0.98	108
3	0.97	0.97	0.97	109
4	0.97	0.95	0.96	40
5	1.00	1.00	1.00	5
accuracy			0.97	285
macro avg	0.98	0.97	0.97	285
weighted avg	0.97	0.97	0.97	285

We also used Random forest and XGboost models to check the results, and we achieved 90% and 82% accuracies, respectively, and the results can be seen in Table 8.

Table8. The results of accuracy and comparison using Random forest and XGboost .



	precision	recall	f1-score	support
1	1.00	0.26	0.41	23
2	0.77	0.94	0.85	108
3	0.82	0.86	0.84	109
4	0.93	0.65	0.76	40
5	1.00	1.00	1.00	5
accuracy			0.82	285
macro avg	0.91	0.74	0.77	285
weighted avg	0.84	0.82	0.80	285

a) with using XGboost.

	precision	recall	f1-score	support
1	1.00	0.91	0.95	23
2	0.90	0.91	0.90	108
3	0.85	0.92	0.88	109
4	1.00	0.82	0.90	40
5	1.00	1.00	1.00	5
accuracy			0.90	285
macro avg	0.95	0.91	0.93	285
weighted avg	0.91	0.90	0.90	285

b) with using Random forest.

#### 4- Results

There is a strong social dimension in the perceived value of the luxury brand, which makes people have a strong desire to consume luxury goods. Based on the studies of Kautish et al. [8], values can be understood as stable structures that guide behavior and help people adapt to the environment. The ultimate value is the expression of individual views and forms the final states that a person strives to reach.

We examined the results of our research that the results related to the final and instrumental values related to brand awareness as well as customers' behavioral intentions for luxury fashion clothing are very positive and acceptable.

For the final review of the results of brand consciousness awareness, we used artificial intelligence and by presenting several accurate, classified and supervised models, including SVM, XGboost, Random forest, we checked the accuracy level, we used the SVM model to accurately We reached 97% and by using XGboost we were able to achieve 82% accuracy and the accuracy achieved by using Random forest is equal to 90%. The results can be seen in Table 9.

Table 9: The results of artificial intelligence models

Model	accuracy	F <sub>1</sub> Score	Recall	Precision
SVM	97%	97%	97%	97%

Random forest	90%	93%	91%	90%
XGboost	82%	80%	82%	82%

## References

1. Duong, N. M. (2019). A Conceptual Framework of Luxury Brand Purchase Intention in Vietnam: The Moderating Effect of Brand Consciousness. *ECONOMICS, MANAGEMENT AND BUSINESS*, 1119
2. Adeola, O., Moradeyo, A. A., Muogboh, O., & Adisa, I. (2021). Customer values, online purchase behaviour and the fashion industry: an emerging market context. *PSU Research Review*.
3. Sinha, M., & Sheth, J. (2018). Growing the pie in emerging markets: Marketing strategies for increasing the ratio of non-users to users. *Journal of Business Research*, 86, 217-224.
4. Kumar, V., Sunder, S., & Sharma, A. (2015). Leveraging distribution to maximize firm performance in emerging markets. *Journal of Retailing*, 91(4), 627-643.
5. Calza, F., Pagliuca, M., Risitano, M., & Sorrentino, A. (2020). Testing moderating effects on the relationships among on-board cruise environment, satisfaction, perceived value and behavioral intentions. *International Journal of Contemporary Hospitality Management*.
6. Giovannini, S., Xu, Y., & Thomas, J. (2015). Luxury fashion consumption and Generation Y customers: Self, brand consciousness, and consumption motivations. *Journal of Fashion Marketing and Management*.
7. Zhang, L., & Cude, B. J. (2018). Chinese customers' purchase intentions for luxury clothing: A comparison between luxury customers and non-luxury customers. *Journal of International Customer Marketing*, 30(5), 336-349.
8. Kautish, P., Khare, A., & Sharma, R. (2020). Influence of values, brand consciousness and behavioral intentions in predicting luxury fashion consumption. *Journal of Product & Brand Management*.
9. Kautish, P., & Sharma, R. (2018). Customer values, fashion consciousness and behavioural intentions in the online fashion retail sector. *International Journal of Retail & Distribution Management*.
10. Izadi, R., Barzamini, F., Hajati, N., Janpors " UAVs' Flight Control Optimization for Delivering Motion-Sensitive Blood Goods" *Neuro Quantology Journal*, DOI: 10.14704/nq.2022.20.10.NQ55754
11. S. Razmara, R. Barzamini, A. Izadi, N. Janpors " A Hybrid Neural Network Approach for Congestion Control in TCP/IP Networks" *Specialis Ugdymas Journal* 2022.Issue43