

KEY MOTIVATORS FOR IRANIAN E-SHOPPING: A NEURAL NETWORKS BASED APPROACH

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ABSTRACT

There has been a significant growth in Internet shopping over the last few years in Iran. However, there is a little awareness of the effective factors which attract consumers to purchase online. It has been predicted that the city of Isfahan in Iran will experience a sharp increase in the Internet usage in the next decade. However, the factors affect the local e- shopping of different types of products and the demographic characteristics of the local Internet consumers have received a little direct research so far. The present study aims to consider the effective factors on consumer e-shopping behavior and the role of each personal characteristic on these factors for different types of products. The data were obtained from 412 volunteers who have had the Internet shopping experience, and were analyzed using MLP neural networks and logistic regression per product. Then, after comparing the accuracy of these methods, the most essential factors which motivate the consumers to buy online were determined by a trained neural network. Finally, a regression analysis was performed to assess the significant difference between variables of each demographic characteristic per factor.

Keywords: *Consumer Behavior, Artificial Neural Networks, Internet Shopping, E-Commerce, Regression.*

1. INTRODUCTION

The Internet is one of several non-store formats frequently used by today consumers for shopping and it is becoming the fastest growing shopping channel that allow customers to browse and purchase products online [24]. Since the mid-1990s, global e-commerce has been expanding rapidly; based on industry estimates several trillion dollars are being exchanged annually over the web [3]. There is clear evidence that the trend to conduct commerce through the internet is growing in domestic and international markets [32, 14, 4, 30, 7]. Online shopping allows customers to sit in their homes and purchase goods from all over the world and lets Merchant to sell their products to all over the world from home [18]. As electronic commerce over the Internet increases, it will become more important that the Internet marketers have some basis to better market their products or services

over the Internet. The more the Internet store marketers understand the underlying reasons for differences in the consumer choices for different kind of products, the more effectively and profitably they can serve their markets [17]. Some factors are likely to have a profound impact on consumers to choose whether they buy their goods and services through the Internet or in traditional way. For example, prices, physical examination of products, product variety and charges for shipping and handling influence the way consumers decide to purchase their products and on their buying behavior. Also, these factors have a different impact on different product categories.

The market forecast is that the city of Isfahan in Iran will experience a sharp increase in the Internet and World Wide Web (WWW) usage towards the near future. However, the factors effects on the shopping of different products via the Internet and in the traditional stores have received little direct



research attention so far. Thus, there is an inherent need to investigate the nature and perceptions of consumers, and the suitability of different types of products and services and also the role of each factor which impacts on the consumers' behaviors in choosing between buying through the Internet or traditional stores, in Isfahan.

Therefore, this research sets out to illuminate how consumers choose shopping from the Internet or traditional stores using intelligent and soft computing approach, namely the artificial neural networks. We also attempt to determine the factors that impact on consumer's purchasing behavior for different types of products. Moreover, the significant difference between variables of each demographic characteristic for each factor is considered. Specifically, the following key research questions were examined in this paper:

What are the effective factors which attract consumers to purchase online for different types of products?

What are the differences between demographic characteristics of respondents for each factor for different types of products?

The answers to the questions provide significant implications for firms who want to expand their market potential by tapping into customer segments that otherwise would not buy.

2. LITERATURE REVIEW

As a retail channel, the factors effect on the choice between a traditional store and the internet shopping method have been extensively discussed and documented in both the popular press and academic journals. Some of which include personal traits or characteristics [10, 11]; perceived purchase risk [27, 30, 5, 16]; delivery time [28, 6, 12, 15] and cultural differences [2, 13, 29].

The suitability of internet for marketing to consumers depends to a large extent on the characteristics of the products. It is therefore necessary to explicitly consider product characteristics when evaluating the impact of the internet [23]. Several studies have shown that "high touch" products that consumers feel they need to touch, smell or try on are those that require an offline presence at least at the final purchase stage [22, 8, 21]. There are some papers that provide insights into customers' channel choice through analytical models and most studies are based on empirical surveys and statistical analyses [9]. For example, Alba, Lynch, Kent and Srinivasan in [22]

recognized the importance of product types in their comparison of the benefits and costs to consumers of six retail formats including Internet retailing and a more advanced form of electronic shopping which they term interactive home shopping. They concluded that product, situation, and consumer characteristics influence the evaluation and selection of a particular medium.

Phau and Meng Poon in [23] presented an empirical investigation on internet shopping in Singapore. In this research, Internet buying behavior was compared between potential internet buyers and non-internet buyers. It was found that the classification of different types of products and services will significantly influence the consumer choice between a traditional store and internet shopping mall. They mentioned that products and services that have a low outlay, with high frequency of purchase, have intangible value proposition, and relatively high on differentiation are more likely to be purchased via the internet.

Goldsmith and Flynn in [14] examined selected demographic and psychological characteristics that lead consumers to buy clothing online. They surveyed 805 consumers who described their online clothing buying as well as how innovative and involved they were for clothing and fashion, how innovative they were with regard to buying on the Internet, and how much they purchased clothing through catalogues. Although all these variables were positively correlated with amount of online clothing purchase, a multiple regression analysis showed that being an adventurous online buyer and a heavy catalog shopper had the most impact on online clothing buying.

Korgaonkar and O'Leary in [20] investigated an empirical study of factors deemed significant in the context of e-business success or failure. In an attempt to understand the marketing and managerial implications for the success or failure of an e-business, a total of eight sub factors composed of three main factors were included in the study. The main factors were product factors, marketing factors, and Web site design and efficiency factors. A national survey was used in addition to qualitative data gathered from in-depth interviews of managers and owners of e-businesses to validate the influence of these factors separating winners from losers.

Kwek, Tan and Lau in [21] identified the determinants of the customer online purchase intention. They evaluated the impact of shopping orientations on customer online purchase intention.



Also, they identified which construct has the greatest impact on purchase intention. The findings revealed that impulse purchase intention, quality orientation, brand orientation and convenience orientation are positively related to the customer online purchase intention. It was also discovered that convenience orientation is the most important contributor to the online purchase intention.

All of these empirical studies are forms of what Urban and Hauser in [33] called “preference regressions” and they all share the same priori assumption that the process of consumers' channel evaluation is linear compensatory. Although linear compensatory models, which can be easily estimated by statistical methods (such as analysis of variance procedures and logistic regression) are widely used to predict consumer behavior for their ability to imitate consumer choice processes, challenges regarding their reliability have been levied by many research studies. It has been demonstrated that consumers might judge alternatives based on only one or a few attributes, and therefore the process of evaluation might not always be compensatory [19, 26, 9]. Using non-compensatory models to explain consumers' channel choice is also captured in a study conducted by Chiang et al. in [9]. In their survey, the purchases of some distinct products from web stores were contrasted with the corresponding purchases from traditional stores. They have provided statistical evidence that neural networks significantly outperform logistic regression models for most of the surveyed products in terms of the predicting power.

3. MATERIAL AND METHODS

The data gathering instrument was a self-administered questionnaire which has been pretested. Based on the feedbacks, the questionnaire was modified and some revision has been made. The statistical population of our study was the actual Internet shoppers who make their shopping through one of the most famous companies which acts as an intermediary for web stores in Iran. A number of 28000 questionnaires were E_mailed to these people. To motivate them to participate in the survey some gifts were proposed. But the response rote was around 1.5 percent. In other words, only 412 usable questionnaires were gathered. Table 1 shows demographic characteristics of respondents.

In this study, we focus on the following factors to assess the customers' attitude towards the web shopping:

1. Prices
2. Time spent to search for the product
3. Time and effort spent to gather information about the product
4. Possibility of comparing products
5. Possibility of acquiring more information from seller
6. Physical examination of products
7. Immediate possession of products
8. Uncertainty about getting the right item
9. Ability to compare different brands
10. Post purchase service
11. Possibility of returning in case of damage or dislike
12. Quality of the merchandise
13. Charges for shipping and handling
14. The importance of the brand
15. Features of the web site
16. A prior knowledge about the website
17. The effect of advertising

Table1: Sample Demographic characteristics

Due to the nature of web stores, all products are

Demographics	Percent
Sex	
Women	78.74
Men	21.26
Age	
< 30	61.99
30_50	38.01
Marital Status	
Married	47.51
Single	52.49
Education Level	
Diploma	24.08
Bachelor	62.47
Master	11.28
PhD	2.17
Using Internet(hour per week)	
1-5	19.3
5-10	24.3
10-20	27.98
20 +	28.42
Skill for using Internet	
Low	0.65
Middle	26.9
High	72.42
Income	
< 200000T	29.07
200000T-400000T	30.59
400000T-600000T	17.79
600000T-800000T	14.1
800000T +	8.46

not suitable to sale at web stores. Because different products may have different customers' acceptance levels at web stores, six product categories selected



as representatives in our survey questionnaire. The characteristics of survey products are showed in the below:

- Books and magazines: Literature and information products.

variable was then converted to a binary variable with 1 representing a “web store shopper” and 0 representing a “traditional store shopper.” Note that, in reality, customers may buy the same products from different channels. Therefore, a web (traditional) store shopper can be interpreted as a shopper with a higher propensity to shop from a

Table 2: Predictive accuracy of neural networks (ANN) and logistic regression (Log Reg)

	Clothes		Food		Domestic tools		Makeup		Movie and music		Books and magazines	
	Log Reg	AN N	Log Reg	AN N	Log Reg	AN N	Log Reg	AN N	Log Reg	AN N	Log Reg	AN N
Accuracy (%)	79.21	93.5	77.79	93.6	81.6	92.8	61.35	92.3	78.99	92.5	78.96	93.7
MSE (%)	4.19	1.45	4.77	1.47	3.18	1.29	7.14	0.89	4.28	1.8	3.65	1.63

- Movie and music CDs and DVDs: Entertaining products with very low cost, most of the customers are young and with low budgets, also they are naturally close to the e-shopping.
- Makeup: Consumptive and leisured product bought with high involvement.
- Domestic tools: Durable product with relatively higher cost and requiring maintenance.
- Food: Essential and perishable products.
- Clothes: Products with special needs to physical trial.

web (traditional) store.

4. RESULTS

To compare the performance of the neural network approach with that of the logistic regression approach, we compare their accuracy and their MSE (mean square error) to decide which one is better for predicting the factors which can influence on consumers to shop online. For doing this, we applied a standard five-fold cross-validation method and trained the data by using neural network and averaged the predictive accuracy and their MSE of 15 cross-validation runs and then compare it with the results of logistic regression for each product which is showed in Table 2.

In this study, the perceived performance of web stores on each attribute for each product category was measured with simple scales using the perceived performance of the traditional retail on each attribute as the benchmark. To measure consumers' perception of each channel attribute for each product, we used questions like “Compared with buying from traditional stores, how would you describe the quality of the following items when buying from a web store?” Respondents were asked to indicate their perception of each attribute for web stores on a five-point ordinal scale.

As can be seen in Table 2, we can conclude that the neural network method produced a better performance across all types of products.

For measuring consumers' perceptions of attribute performance on web stores, we assessed a behavioral response regarding consumer patronage. Our survey asked “Compared with buying in traditional stores, how likely are you to buy the following items from a web store?” Response options ranged from 0(absolutely no) to 10(absolutely yes). The behavioral response

For considering the influencing factors that motivate consumers to shop online, we apply neural network models because it has higher accuracy with lower MSE comparing with logistic regression. As we said before, there are 17 factors as the input of the neural networks. For determining the factors which influence consumers' behaviors in shopping on the Internet, we omit each factor and measure the amount of accuracy and the error of the network. We did it 15 times for each factor and then we measured the average of the accuracy and error for having better results. If the average of the accuracy of the network was more than 0.75, we did not consider it as an influencing factor, however, if the average of the accuracy of the network was lower than 0.75, we considered it as an influencing factor. The results are showed in Table3.



Table3: Factors affecting consumers' behavior on the Internet shopping by omitting each input variable

	Factors	Product category					
		Book and magazine	Movie, CD and music	Makeup	domestic tools	Food	Cloth
1	Prices	69.95	73.92	70.85	70.60	73.02	77.14
2	Amount of time spend to search for product	75.65	79.81	73.58	74.46	79.79	78.19
3	Amount of time and effort spend to gather information about products	74.98	78.68	75.74	74.37	78.07	77.00
4	Possibility of comparing products	72.36	74.51	72.93	72.81	76.83	77.80
5	Possibility of acquiring more information from seller	75.58	76.03	73.25	75.09	79.95	77.90
6	Physical examination of products	77.14	78.41	72.13	70.19	76.17	73.29
7	Immediate possession of products	74.69	76.57	75.28	75.51	75.48	75.17
8	Uncertainty about getting the right item	76.77	75.38	74.02	75.05	76.46	76.07
9	Ability to compare different brands	74.15	69.77	72.53	69.53	72.66	75.63
10	Post purchase service	76.57	76.63	71.28	69.74	76.69	74.83
11	Possibility of returning in case of damage or dislike	74.08	74.69	72.24	68.19	74.07	72.76
12	Quality of the merchandise	68.43	69.58	71.26	68.97	76.87	75.30
13	Charges for shipping and handling	76.60	74.87	70.22	73.22	76.28	73.17
14	The importance of the brand	74.04	73.00	66.14	66.80	72.55	73.51
15	Feature of the web site	72.83	71.36	71.94	70.19	75.54	73.99
16	Knowing the website	71.65	73.00	69.04	68.16	73.12	69.36
17	The effect of advertising	66.49	67.62	68.38	68.24	72.74	72.89

For considering differences between demographic characteristics of respondents for each factor, we use SPSS software.

If $\alpha < 0.05$: there is statistically significant difference between variables

If $\alpha > 0.05$: there is no statistically significant difference between variables

The results for each type of product appear in Tables 4 to 9.

As can be seen in table 4, the differences between demographic characteristics of respondents for each factor for books and magazine are shown. It is clearly observe that the variables which considered there is statistically significant difference between them are depicted with * for each factor. As this table shows, factors no. 13 for the first demographic characteristic (sex), 14, 15, 16, and 17 for the second demographic characteristic (marital

status), 12, 14 and 16 for the third demographic characteristic (age), 11 for the fourth demographic characteristic (education level) , 3 and 6 for the fifth demographic characteristic (hours of using internet), 15 for the sixth demographic characteristic (skill for using internet) and 13 and 16 for the seventh demographic characteristic (skill for using internet) are the ones which show that there is significant difference between variables for each demographic characteristics for each factor and for the rest of them, there is no significant difference between variables .

As can be seen in table 5, the differences between demographic characteristics of respondents for each factor for movie, music CDs and DVDs are shown. As can be seen, factors no. 1 and 4 for the first demographic characteristic (sex), 12 and 16 for the second demographic characteristic (marital status), 12, 14 and 16 for the third demographic



Table4: differences between demographic characteristics of respondents for each factor for Books and magazine

	Factors	Books and magazines						
		Sex	Marital Status	Age	Education Level	Using Internet (hour per week)	Skill for using Internet	Income
1	Prices	.870	.962	.992	.510	.484	.589	.551
2	Amount of time spend to search for product	.252	.780	.375	.504	.216	.797	.788
3	Amount of time and effort spend to gather information about products	.735	.917	.145	.363	.022*	.217	.418
4	Possibility of comparing products	.146	.927	.085	.935	.850	.295	.397
5	Possibility of acquiring more information from seller	.568	.508	.728	.196	.078	.305	.823
6	Physical examination of products	.478	.895	.975	.742	.008*	.187	.161
7	Immediate possession of products	.892	.785	.993	.675	.913	.299	.117
8	Uncertainty about getting the right item	.350	.144	.123	.992	.454	.929	.189
9	Ability to compare different brands	.805	.895	.588	.407	.160	.228	.320
10	Post purchase service	.540	.307	.542	.969	.594	.079	.057
11	Possibility of returning in case of damage or dislike	.324	.325	.961	.041*	.135	.547	.733
12	Quality of the merchandise	.194	.052	.027*	.607	.495	.537	.173
13	Charges for shipping and handling	.017*	.716	.345	.050	.175	.173	.047*
14	The importance of the brand	.186	.007*	.004*	.140	.944	.095	.096
15	Feature of the web site	.700	.012*	.203	.073	.237	.024*	.942
16	Knowing the website	.998	.001*	.000*	.299	.835	.252	.002*
17	The effect of advertising	.741	.031*	.391	.417	.949	.158	.850

* = There is statistically significant difference between variables

characteristic (age), 11 for the fourth demographic characteristic (education level), 6 for the fifth demographic characteristic (hours of using Internet), 15 for the sixth demographic characteristic (skill for using internet) and none of them for the seventh demographic characteristic (skill for using internet) are the ones which show that there is significant difference between variables for each demographic characteristics for each factor.

As can be seen in table 6, the differences between demographic characteristics of respondents for each factor for makeup are shown. As this table shows, factors no. 9 for the first demographic characteristic (sex), 6 for the second demographic characteristic (marital status), 4 and 16 for the third demographic characteristic (age), none of them for the fourth demographic characteristic (education level) and

the fifth one (hours of using Internet), 6 and 13 for the sixth demographic characteristic (skill for using internet) and 1 and 2 for the seventh demographic characteristic (skill for using internet) are the ones which show that there is significant difference between variables for each demographic characteristics for each factor and for the rest of them, there is no significant difference between variables.

As can be seen in table 7, the differences between demographic characteristics of respondents for each factor for domestic tools are shown. It is clear that, factors no. 3 for the first demographic characteristic (sex), 16 for the second demographic characteristic (marital status), 4, 5, 10, 13 and 16 for the third demographic characteristic (age), 1 for the fourth demographic characteristic (education level), 5 and 9 for the fifth demographic characteristic (hours of using internet), none of them for the sixth

Table5: differences between demographic characteristics of respondents for each factor for Movie, music, CDs,DVDs

	Factors	Movie and music and CDs and DVDs						
		Sex	Marital Status	Age	Education Level	Using Internet (hour per week)	Skill for using Internet	Income
1	Prices	.033*	.720	.126	.968	.656	.257	.058
2	Amount of time spend to search for product	.252	.936	.189	.181	.344	.350	.546
3	Amount of time and effort spend to gather information about products	.632	.865	.217	.120	.169	.229	.868
4	Possibility of comparing products	.007*	.780	.302	.751	.403	.337	.298
5	Possibility of acquiring more information from seller	.314	.769	.877	.168	.055	.649	.471
6	Physical examination of products	.191	.945	.947	.468	.018*	.968	.632
7	Immediate possession of products	.879	.635	.567	.729	.848	.722	.220
8	Uncertainty about getting the right item	.087	.825	.293	.506	.612	.610	.078
9	Ability to compare different brands	.413	.438	.176	.873	.100	.489	.752
10	Post purchase service	.775	.666	.323	.926	.592	.280	.284
11	Possibility of returning in case of damage or dislike	.070	.389	.826	.008*	.079	.777	.830
12	Quality of the merchandise	.506	.014*	.003*	.742	.300	.586	.605
13	Charges for shipping and handling	.200	.829	.154	.119	.341	.195	.201
14	The importance of the brand	.399	.053	.012*	.051	.832	.259	.056
15	Feature of the web site	.672	.353	.928	.131	.167	.021*	.965
16	Knowing the website	.590	.010*	.000*	.535	.732	.648	.607
17	The effect of advertising	.663	.062	.786	.358	.779	.160	.497

* = There is statistically significant difference between variables



Table6: differences between demographic characteristics of respondents for each factor for Makeup

	Factors	Makeup						
		Sex	Marital Status	Age	Education Level	Using Internet (hour per week)	Skill for using Internet	Income
1	Prices	.189	.438	.324	.825	.319	.909	.004*
2	Amount of time spend to search for product	.621	.221	.084	.743	.395	.895	.025*
3	Amount of time and effort spend to gather information about products	.756	.622	.385	.705	.811	.289	.447
4	Possibility of comparing products	.968	.887	.026*	.463	.530	.765	.709
5	Possibility of acquiring more information from seller	.678	.476	.227	.407	.073	.363	.607
6	Physical examination of products	.816	.028*	.081	.968	.160	.029*	.820
7	Immediate possession of products	.787	.346	.660	.260	.862	.077	.479
8	Uncertainty about getting the right item	.562	.689	.480	.260	.733	.911	.832
9	Ability to compare different brands	.033*	.466	.789	.071	.053	.081	.503
10	Post purchase service	.257	.817	.908	.211	.376	.176	.087
11	Possibility of returning in case of damage or dislike	.247	.841	.231	.108	.075	.469	.696
12	Quality of the merchandise	.208	.971	.946	.552	.486	.090	.315
13	Charges for shipping and handling	.465	.491	.133	.051	.345	.041*	.705
14	The importance of the brand	.794	.193	.102	.147	.604	.710	.190
15	Feature of the web site	.400	.537	.707	.139	.417	.197	.332
16	Knowing the website	.640	.249	.014*	.641	.077	.800	.765
17	The effect of advertising	.871	.141	.103	.519	.218	.164	.941

* = There is statistically significant difference between variables

Table7: differences between demographic characteristics of respondents for each factor for Domestic tools

	Factors	Domestic tools						
		Sex	Marital Status	Age	Education Level	Using Internet (hour per week)	Skill for using Internet	Income
1	Prices	.199	.823	.945	.007*	.680	.894	.609
2	Amount of time spend to search for product	.274	.152	.099	.306	.913	.856	.181
3	Amount of time and effort spend to gather information about products	.012*	.575	.642	.779	.084	.786	.244
4	Possibility of comparing products	.520	.898	.022*	.422	.721	.357	.335
5	Possibility of acquiring more information from seller	.930	.298	.008*	.952	.034*	.642	.642
6	Physical examination of products	.663	.092	.191	.392	.199	.484	.258
7	Immediate possession of products	.102	.122	.641	.595	.896	.456	.480
8	Uncertainty about getting the right item	.341	.480	.247	.163	.677	.375	.723
9	Ability to compare different brands	.205	.871	.805	.078	.007*	.311	.879
10	Post purchase service	.618	.065	.010*	.929	.737	.897	.953
11	Possibility of returning in case of damage or dislike	.919	.444	.800	.547	.409	.400	.922
12	Quality of the merchandise	.767	.173	.244	.604	.199	.247	.383
13	Charges for shipping and handling	.367	.125	.001*	.779	.977	.361	.962
14	The importance of the brand	.477	.288	.358	.618	.573	.520	.548
15	Feature of the web site	.347	.615	.800	.150	.370	.088	.867
16	Knowing the website	.576	.019*	.000*	.824	.383	.364	.255
17	The effect of advertising	.792	.339	.415	.964	.263	.140	.996

* = There is statistically significant difference between variables



Table8: differences between demographic characteristics of respondents for each factor for Food

	Factors	Food						
		Sex	Marital Status	Age	Education Level	Using Internet (hour per week)	Skill for using Internet	Income
1	Prices	.087	.439	.586	.025*	.490	.968	.042*
2	Amount of time spend to search for product	.264	.142	.151	.525	.902	.876	.120
3	Amount of time and effort spend to gather information about products	.445	.118	.179	.871	.259	.186	.026*
4	Possibility of comparing products	.941	.701	.587	.465	.459	.688	.560
5	Possibility of acquiring more information from seller	.466	.021*	.131	.767	.044*	.632	.906
6	Physical examination of products	.378	.089	.052	.603	.835	.605	.835
7	Immediate possession of products	.797	.513	.507	.442	.744	.772	.483
8	Uncertainty about getting the right item	.866	.894	.759	.449	.447	.614	.958
9	Ability to compare different brands	.282	.954	.643	.297	.135	.023*	.925
10	Post purchase service	.921	.587	.476	.363	.692	.608	.026*
11	Possibility of returning in case of damage or dislike	.943	.534	.210	.307	.234	.406	.907
12	Quality of the merchandise	.037*	.402	.891	.504	.092	.242	.628
13	Charges for shipping and handling	.324	.818	.007*	.377	.759	.980	.635
14	The importance of the brand	.657	.405	.080	.236	.570	.169	.376
15	Feature of the web site	.340	.067	.139	.216	.303	.219	.980
16	Knowing the website	.445	.098	.042*	.698	.031*	.463	.507
17	The effect of advertising	.116	.063	.009*	.539	.069	.463	.637

* = There is statistically significant difference between variables

demographic characteristic (skill for using internet) and the seventh one (skill for using internet) are the ones which show that there is significant difference between variables for each demographic characteristics for each factor and for the rest of them, there is no significant difference between variables .

As can be seen in table 8, the differences between demographic characteristics of respondents for each factor for Food are shown. It is clearly observe that, factors no. 12 for the first demographic characteristic (sex), 5 for the second demographic characteristic (marital status), 13, 16 and 17 for the third demographic characteristic (age), 1 for the fourth demographic characteristic (education level) , 5 and 16 for the fifth demographic characteristic (hours of using internet), 9 for the sixth demographic characteristic (skill for using internet)

and 1, 3 and 10 for the seventh demographic characteristic (skill for using internet) are the ones which show that there is significant difference between variables for each demographic characteristics for each factor and for the rest of them, there are not significant difference between variables .

As can be seen in table 9, the differences between demographic characteristics of respondents for each factor for clothes are shown. As this table shows, factors no. 9 for the first demographic characteristic (sex), 1 and 6 for the second demographic characteristic (marital status), 3, 13 and 14 for the third demographic characteristic (age), non of them for the fourth demographic characteristic (education level) , 9 for the fifth demographic characteristic (hours of using internet), none of them for the sixth demographic

characteristic (skill for using internet) and 2 for the seventh demographic characteristic (skill for using internet) are the ones which show that there is significant difference between variables for each

demographic characteristics for each factor and for the rest of them, there are not significant difference between variables .

Table9: differences between demographic characteristics of respondents for each factor for Clothes

	Factors	Clothes						
		Sex	Marital Status	Age	Education Level	Using Internet (hour per week)	Skill for using Internet	Income
1	Prices	.159	.044*	.382	.064	.957	.323	.487
2	Amount of time spend to search for product	.662	.147	.220	.179	.379	.964	.028*
3	Amount of time and effort spend to gather information about products	.247	.413	.030*	.491	.059	.125	.390
4	Possibility of comparing products	.633	.736	.343	.622	.807	.964	.868
5	Possibility of acquiring more information from seller	.896	.150	.132	.828	.116	.294	.990
6	Physical examination of products	.263	.004*	.065	.774	.554	.580	.838
7	Immediate possession of products	.220	.546	.618	.575	.707	.924	.883
8	Uncertainty about getting the right item	.630	.389	.087	.354	.483	.251	.951
9	Ability to compare different brands	.011*	.515	.783	.094	.023*	.748	.862
10	Post purchase service	.878	.941	.308	.119	.675	.980	.248
11	Possibility of returning in case of damage or dislike	.839	.773	.142	.228	.066	.238	.933
12	Quality of the merchandise	.176	.197	.394	.096	.055	.357	.230
13	Charges for shipping and handling	.134	.641	.023*	.669	.959	.323	.383
14	The importance of the brand	.375	.791	.019*	.102	.994	.852	.106
15	Feature of the web site	.529	.780	.869	.631	.425	.754	.424
16	Knowing the website	.477	.950	.233	.872	.781	.199	.247
17	The effect of advertising	.838	.234	.198	.870	.055	.472	.969

* = There is statistically significant difference between variables

5. DISCUSSION

In the present study, 17 factors as inputs were given to the neural networks. A reverse engineering scheme was employed after a complete and successful training to mark the most important factors in the Internet shopping for each group of products respectively. The factors which considered as the influencing ones are depicted with \checkmark in Table 10. As this table shows, factors no. 11, 14, 16, and 17 are the most effective according to the neural networks trained for all types of products. Factors no. 1, 9, and 13 are of importance next. Study of

those effective factors could be of essence for people who are involved in the e-marketing in Iran. The role of possibility of returning, e-shopping experience, and brand are interesting and worth to be analyzed more. Again, web site design, prices, comparability are amongst the influencing factors too.

As a result, there are some suggestions which can be proposed to help companies in increasing their Internet sale in Iran.

- Price is the most influencing factor for attracting consumers to buy online in some

types of products such as books and magazines, movie and music CDs and DVDs, makeup, domestic tools and food. To do that, companies can put some discount for their products, issue credit cards for their company, having some reward cards and try to have auction in their web sites. Furthermore, to decrease the prices for online consumers, they can have some opportunities for buyers to buy together which help them to have cheaper delivery.

- Amount of time spent to look a product up is an influencing factor in online shopping for some types of products such as makeup and domestic tools. To attract more consumers, companies can put a place for searching the products in the first page of their web site which helps customers to find the needed products faster. Moreover, companies can show the products which consumers buy them more than the others in the first page of their web site. Also, companies can depict the similar products in the same page which help consumers to select more quickly and effectively.

Table 10: Factors which considered as the influencing ones

	Factors	Product category					
		Books and magazines	Movie and music	Makeup	Domestic tools	Food	Clothes
1	Prices	√	√	√	√	√	
2	Amount of time spend to search for product			√	√		
3	Amount of time and effort spend to gather information about products	√			√		
4	Possibility of comparing products	√	√	√	√		
5	possibility of acquiring more information from seller			√			
6	Physical examination of products			√	√		√
7	Immediate possession of products	√					
8	Uncertainty about getting the right item			√			
9	Ability to compare different brands	√	√	√	√	√	
10	Post purchase service			√	√		√
11	possibility of returning in case of damage or dislike	√	√	√	√	√	√
12	Quality of the merchandise	√	√	√	√		
13	Charges for shipping and handling		√	√	√		√
14	The importance of the brand	√	√	√	√	√	√
15	Feature of the web site	√	√	√	√		√
16	Having experience in buying in a special site	√	√	√	√	√	√
17	The effect of advertising	√	√	√	√	√	√

- Amount of time and effort spent to gather information about the products is the influencing factor for attracting consumers in some types of products such as books and magazines and also domestic tools.

So, companies can put a place for finding the information about the products in the web sites. In addition, they can put the essential information about the products along with the picture of each product and other information in a separate page of the

- web site which helps customers to get the necessary information more easily.
- Possibility of comparing products is the effective factor for attracting consumers to buy online in some types of products such as books and magazines, movie and music CDs and DVDs, makeup and domestic tools. To attract consumers, companies can put similar products in the same page and they can also rank the products from the best to the worst by the other buyer's opinions and use online communities and social networks which help customers to compare products more easily.
 - Possibility of acquiring more information from the seller is the effective factor on online shopping for some types of products such as makeup. To satisfy consumers more, companies can consider online contact facilities and FAQ sections in their web sites. Moreover, they can put some extra information about the products over there.
 - Physical examination of products is the effective factor for attracting consumers in some types of products such as makeup, domestic tools and clothes. To attract consumers, companies can give a sample of some products which customers need before they actually buy them. Furthermore, for satisfying and attracting customers, companies can promise them that if the products are not the ones that they really need, they can return or change them.
 - Immediate possession of products is the influencing factor for attracting consumers to buy online in some types of products such as books and magazines. For attracting consumers, companies can put some places in their web site to automatically consider customers' order very quickly and try to send products to buyers very fast.
 - Uncertainty about getting the right item is the influencing factor for attracting consumers to buy online in some types of products such as makeup. To attract consumers, companies can make it possible for the buyers to return their products, if it is not the ones that they actually need. In addition, by putting some clear picture with the essential information for each product, customers can choose their products with more accuracy.
 - Ability to compare different brands is the influencing factor for attracting consumers to buy online in some types of products such as books and magazines, movie and music CDs and DVDs, makeup, domestic tools and food. For doing this, companies can put some similar products with different brands beside each other with the essential information about each brand, which help customers to compare them easier.
 - Post purchase service is the effective factor for attracting consumers to buy online in some types of products such as makeup, domestic tools and clothes. For motivating consumers to buy from their web site, companies can have post purchase service for some of their products. They must clearly let customers know what type of post Purchase services they have.
 - Possibility of returning in case of damage or dislike is the influencing factor for attracting consumers to buy online in all types of products. To attract consumers, companies can give opportunities for customers to return their products in case of damage or dislike in a particular time (for example in 2 years).
 - Quality of the merchandise is the influencing factor for attracting consumers to buy online in some types of products such as books and magazines, movie and music CDs and DVDs, makeup and domestic tools. For doing this, companies can increase the quality of their products (comparing with their competitors) and advertising their products' quality in their web site which motivate customers to buy from their companies instead of their competitors.
 - Charges for shipping and handling is the effective factor for attracting consumers to buy online in some types of products such as movie and music CDs and DVDs, makeup, domestic tools and clothes. For doing this, companies should decrease

- these charges which help to attract more customers.
- The importance of the brand is the influencing factor for attracting consumers to buy online in all types of products. To attract consumers, companies can increase their customers by advertising their products' brands.
 - Feature of the web site is the influencing factor for attracting consumers to buy online in some types of products such as books and magazines, movie and music CDs and DVDs, makeup, domestic tools and clothes. For doing this, companies can attract customers by using skillful designers for designing their web site very well. Moreover, they can use attractive texts and figures in their web site and especially in the first page of it which motivate customers to spend their time much longer on that web site.
 - Knowing the website is the effective factor for attracting consumers to buy online in all types of products. To attract consumers, companies can advertise their web site which let people get to know about their web site. Furthermore, by trying to increase the satisfaction of buyers, more customers will talk about the advantages they get from that company to other people which attract more new customers.
 - The effect of advertising is the effective factor for attracting consumers to buy online in all types of products. To attract consumers, companies can increase advertising about the companies' name, its web site and its products which let customers to know about the companies and its products.

6. CONCLUSION

In this paper, we employed the artificial neural networks and logistic regression models to analyze and predict the effective factors on the Internet consumers' online shopping behavior for different types of products. It can help companies to invest on these factors to get higher online profit. In order to identify new predictors of customers' online shopping behavior, we conducted an empirical survey in this study. Specifically, in the survey, purchases from the web stores were contrasted with purchases from the traditional stores for six distinct

product categories. The respondents' perceived attribute performance was then used to predict the most important factors that effect on their choice between the web and traditional stores. We have provided statistical evidence that neural networks significantly outperform logistic regression models for all types of products in terms of the predictive performance. Moreover, to determine the differences between different demographic characteristics of respondents for each factor, we use the SPSS software and the significant difference between variables of each demographic characteristic for each factor was considered. At the end, we proposed some suggestions that help companies to increase their profit by investing on the factors which can attract consumers to purchase online from them. For further research, it would be interesting to investigate what are the effective factors which attract consumers to purchase online for different types of products in different cultures, what are the other factors which are also important to attract consumers to purchase online and what are the effective factors for attracting consumers to purchase online for other types of products.

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