Eco-friendly Textile and Apparel Perception of Hitit University Academicians

Hitit Üniversitesi Akademisyenlerinin Çevre Dostu Tekstil ve Konfeksiyon Algısı

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Abstract

Petroleum and textile apparel industry cause major pollution problems for the environment and agricultural land. Therefore, interest in eco-friendly textile and apparel (EFTA) products has increased in recent years. This paper aimed to determine empirically the factors affecting academicians' perception of EFTA. A questionnaire study was performed on Hitit University academicians in March - April 2018 period. Data were analyzed using exploratory factor analysis, confirmatory factor analysis and structural equation model. Based on the explanatory factor analysis results, a four-factor structure was obtained, which constitutes 83% of the total variance. These factors were 'Emotional Value', 'Social Value', 'Quality Value' and 'Price Value' with Cronbach's alpha coefficients of 0.901, 0.910, 0.922 and 0.933, respectively. It was concluded that EFTA products are not economical but preferred because of their quality, social and emotional values. Encouragement of use and production of EFTA products is important for sustainable agriculture and environmental policies.

Keywords: Eco-Textile, Consumer Behaviors, Perception, Waste

Öz

Petrol ve tekstil hazır giyim endüstrisi, çevre ve tarım arazileri için büyük kirlilik sorunlarına neden olmaktadır. Bu nedenle, çevre dostu tekstil ve hazır giyim (EFTA) ürünlerine ilgi son yıllarda artmıştır. Bu çalışmada akademisyenlerin EFTA algısını etkileyen faktörlerin ampirik olarak belirlenmesi amaçlanmıştır. Hitit Üniversitesinde çalışan akademisyenlere Mart - Nisan 2018 döneminde anket uygulanmıştır. Veriler açımlayıcı faktör analizi, doğrulayıcı faktör analizi ve yapısal eşitlik modeli kullanılarak analiz edilmiştir. Açımlayıcı faktör analizi sonuçlarına dayanarak, toplam varyansın% 83'ünü oluşturan dört faktörlü bir yapı elde edilmiştir. Bu faktörler sırasıyla Cronbach alfa katsayıları 0.901, 0.910, 0.922 ve 0.933 ile 'Duygusal Değer', 'Sosyal Değer', 'Kalite Değer' ve 'Fiyat Değeri'dir. EFTA ürünlerinin ekonomik, kaliteli, sosyal ve duygusal değerleri nedeniyle tercih edildiği sonucuna varılmıştır. EFTA ürünlerinin kullanımının ve üretiminin teşvik edilmesi sürdürülebilir tarım ve çevre politikaları için önemlidir.

Anahtar Kelimeler: Eko-Tekstil, Tüketici Davranışları, Algı, Atık

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1. Introduction

Textile and apparel industry makes major contributions to economies of developing countries. Textile-apparel is one of the leading sectors in Turkey and accounts for about 17% of Turkish exports (Institute, 2018). Considering the significant share of textiles in Turkish economy which accounts for 16.3% of industrial production and one-third of industrial employment, it is clear that studies involving this sector would directly contribute to sustainable development of the country (Tan et al., 2016).

Based on the current demographic trends, Turkish population, currently 81 million, is expected to reach 87 million by 2023 and 100 million by 2040 (Institute, 2018). These projections point to increasing demand for textiles in near future, which will necessitate use of more resources and result in higher amount of pollution discharge into the ecosystem (Shrivastava, 1995; Jakhar, 2015). Along with increasing population and consumption, use of resource and resources of pollution are also expected to rise (Özdoğan et al., 2007).

Environmental problems arise from increasing material and consumption-related material flows worldwide. According to 2011 FAO/ICAC survey of the United Nations, consumption of fiber and fiber-related end products (garment, home textile and industrial textiles) has increased 30-fold since 1950's(Tomovska et al., 2017) .

Textile and apparel industry is responsible for 10% of world's carbon emission (Muthukumarana et al., 2018). Thus, it is considered the second leading industrial polluter after petroleum industry (Conca, 2015). There are investigations to make activities of textile and apparel industry more eco-friendly to restore polluted environment and impaired natural balance (İşmal and Yıldırım, 2012). "Ecological Textile" concept aiming textile production in accordance with environmental and human health concerns has been introduced in 1990's to diminish the adverse effect of textile and apparel industry on environment (Oral et al., 2012).

EFTA practices could be defined as production of textile and apparel products using raw materials obtained from renewable resources, energy and other materials. In other words, EFTA products are manufactured using raw materials and energy from completely renewable resources (Muthu et al., 2012; Bruntland, 1987).

EFTA means materials produced in a manner considering the environmental considerations in all production stages from fiber to final product, a material which is not harmful to user and can be recycled after use (Bayraktar, 2005). Research areas related to EFTA products involve chemicals used in the processes throughout life of textile products from raw material to final product and its disposal, environment- and human health-related issues such as waste water, noise level and chimney gases (Oral et al., 2012).

Wastes of textile and apparel industry has been on increase along with the expanding production. It is important for textile industry that 97% of these wastes are recyclable. However, recycling of textile products as non-dangerous solid wastes are generally disregarded (Jordeva et al., 2015). In addition to technological processes applied to textile wastes, sorting and collecting them according to color and/or fiber content make it difficult to recycle the textile wastes (Larney and van Aardt, 2010).

Textile and apparel industry depends heavily on cotton production. Farmers willing to increase their cotton production tend to use higher amount of pesticides. For example, cotton farmers worldwide use more than 25% of world's total pesticide use of 2.6 billion dollars every year (Kang et al., 2013). Chemical fertilizers and pesticides decrease soil fertility and cause damage to environment and society. In addition, they can lead to serious environmental and health problems such as biodiversity loss, water pollution and poisoning (Kang et al., 2013). However, although pesticides are used in production of some natural fibers like cotton and wool, they are still environmentally friendly compared to petroleum-based fiber products (E. and S., 2011).

More than 50% of wastes in textile industry result from late processes such as dyeing and finishing (Smith, 1994). Excess use of water, energy, dyeing materials and other chemicals in textile finishing leads to environmental pollution (İşmal and Yıldırım, 2012).

Annual global production of textile and apparel industry is over 80 million tones, and improvements of environmental performance in this industry is quite important (Chen and Burns, 2006; Niinimäki, 2013). This necessitates a production considering product designing, marketing and after-use processes. Nevertheless, scientific

eco-friendly production methods that could benefit businesses are still not sufficiently used. Consumers using textile and apparel products are not involved in sustainable designing processes (Thomas, 2008).

Since textile and apparel industry contributes to national economies and global wealth, it is clear that downsizing these industries will not be immediate solution of environmental problems (Kunz et al., 2007; Kang et al., 2013). Increasing the awareness of consumers towards the environmental problems has been suggested as a way for solving these problems (Kang et al., 2013; Fletcher, 2008).

Both policies and social attitudes towards EFTA products promote textile and apparel manufacturers for eco-friendly production activities. Some brands (Ecsquel, Saint Angelo, Levi's, Nike) made environmental problems a new competition advantage and started offering the consumers EFTA products (Liu et al., 2012).

In addition to social responsibilities, environmental awareness supported by legal regulations has been developing recently(Chi and Kilduff, 2011). Nevertheless, use of EFTA products are still limited (Kim and Damhorst, 1998; Tomovska et al., 2017). Perceived value and awareness levels of consumers towards EFTA products are important in terms of their contribution to sustainable agriculture, environment and, consequently, to economy.

Value of the product is considered as a major component of marketing (Chi, 2015). Perceived value by consumers is a general indication for the use of good or service they buy (Zeithaml, 1988; Chi and Kilduff, 2011). Major value forms perceived by consumers towards good or services are emotional value, social value, quality value and price value (Chi, 2015; Sweeney and Soutar, 2001).

Due to increasing population and consumption, chemical processes and wastes produced after the use of products of textile and apparel industry make a considerable contribution to environmental problems. Increasing the awareness of youth for these problems are legally the responsibilities of educationalists. Because of role academicians play for education of youth, investigation of their perceptions towards EFTA products is important. Academicians have been studied as an example in this study because they are professionals and social role models for younger generations. Aim of the present study was to determine empirically the factors affecting EFTA perception of academicians.

2. Materials and Methods

The present study was conducted at Hitit University, Çorum, Turkey in March-April 2018. Hitit University is located in the Black Sea region of Turkey and accepts students from all over the world. Hitit University has over 18,000 students and 698 academics. Data were collected through a questionnaire carried out on Hitit University academicians. Factors affecting the EFTA perception of the academicians were examined because of their significance as professional and social role models for younger generations. Surveys were conducted online (134) and through face-to-face interviews (130). Surveys were created using Google forms and were sent via e-mail and social media to participants. In the study, 19 items were used. EFTA perception of participants was assessed with expressions in the form of a five-point Likert-type scale. These are 'Strongly Disagree, Disagree, Indifferent, Agree and Strongly Agree'. Demographics, shopping frequency and shopping choice of the respondents were included in the questionnaire. (Onurlubaş and Çakirlar 2017)

A total of 264 questionnaire forms returned and 24 of them were eliminated because they were inconsistent or incomplete. A previously verified scale was used in the study (Chi, 2015; Chi and Kilduff, 2011). Sample adequacy was tested using KMO and Bartlett's Test of Sphericity (Kaiser, 1974). A KMO value less than 0.50 shows inadequacy of data for the Exploratory Factor Analysis (EFA). KMO values between 0.5 and 0.7 are moderate, while those between 0.7 and 0.8 are good, between 0.8 and 0.9 are excellent, and above 0.9 are the best (Field, 2009). Data were analyzed by EFA using SPSS statistics v.22 software. Principal Component Analysis and Varimax rotation technique were employed for data analysis (Öztürk and Karakaş 2016)

The reliability of the scales used was tested by Cronbach's alpha and composite reliability test. Cronbach's Alpha and Composite Reliability (CR) coefficients of over 0.7 are considered reliable (Hair et al., 2014). In addition, the criterion of convergent validity test average variance extracted (AVE) score must be above the threshold of 0.5(Fornell and Larcker, 1981; Nunnally, 1994).

Confirmatory Factor Analysis (CFA) was used to measure the fitness of the factors obtained by the EFA. In addition, Structural Equation Model was used to determine whether the model was valid and to produce a path diagram. Robust statistic fit indices have been used in the psychometric literature. Fit indices were calculated through the

structural equation model. Among them are Normed Fit Index (NFI), Relative Fit Index (RFI), Comparative Fit Index (CFI), Incremental Fit Index (IFI), Tucker Lewis Index (TLI) or Non-Normed Fit Index (NNFI), Root Mean Square Error of Approximation (RMSEA), minimum discrepancy function (CMIN) and Degrees of Freedom (DF) (Bentler, 1990; Byrne, 2016; Fan et al., 1999; Kline, 2015; Hu and Bentler, 1999; Tucker and Lewis, 1973; Schreiber et al., 2006; Lomax and Schumacker, 2004). These fit indices are given in Table 1.

Table 1. Fit Statistics and Accepted Criteria

NFI	$0.90 \leq$ NFI <1	TLI	≥ 0.90	CFI	$0.93 \leq$ CFI <1	X^2/df	$2< X^2 <5$
RFI	$0.90 \leq$ RFI <1	RMSEA	≤ 0.08	IFI	$0.90 \leq$ IFI <1	NNFI	≥ 0.90

3. Results

Average age of the academicians who participated in the study was 38.2 years, and 44.6% were female and 55.4% were male. About 78% of them were married while 22% were single. In terms of their positions, 45% were lecturers, 32% were lecturers with Ph.D., 12% were Associate Professor, 6.3% were Researcher and 4.2% were Full Professors. Participants' preferences for shopping places in decreasing order were malls, large scale retailers, internet, local stores and other shopping places. In terms of shopping frequency, 6.3% of the participants shopped more than once a week, 16.7% once a week, 46.3% once a month, 17.9% once in three months (quarterly), 5% on special days and 7.9% as needed (Table 2).

Table 2. Participants' Demographic Characteristics and Purchasing Preferences

		N	%
	23-34	80	33.3
Age Mean: 38.16	35-43	120	50.0
	44-66	40	16.7
Gender	Female	107	44.6
	Male	133	55.4
	Researcher	15	6.3
Academic	Lecturer	108	45.0
Position	Lecturer with Ph. D.	78	32.5
	Assoc. Prof.	29	12.1
	Full Prof.	10	4.2
Marital status	Single	53	22.1
	Married	187	77.9
	Malls	119	49.6
Most favorite	Large Scale Retailers	59	24.6
place to shop	Local Stores	17	7.1
	İnternet	40	16.7
	Other	5	2.1
	More than once a week	15	6.3
	Once a week	40	16.7
Shopping	Once a month	111	46.3

frequency	Quarterly	43	17.9
	Special Days	12	5.0
	Other	19	7.9

KMO and Bartlett's Tests were used to test the adequacy of study sampling. Field (2000) mentioned that 0.50 should be the lower limit for Kaiser-Meyer-Olkin test and that factor formation of data group is not possible when KMO is equal to or lower than 0.50. KMO values approaching to 1 is generally desired (Büyüköztürk, 2017). Calculated KMO test value was 0.783. Results from Bartlett's Test of Sphericity indicated that chi-square was also significant (X^2= 3303.658; P<0.01). Results of both tests showed that sample size was sufficient (Çokluk et al., 2012) for factor analysis.

After suitability of sample size was checked, EFA analysis was performed to determine factors affecting EFTA perceptions. Varimax rotation method was used in the EFA. Factor loadings less than 0.30 were not reported. Eigenvalues obtained by EFA and component number scree plot were given in Figure 1.
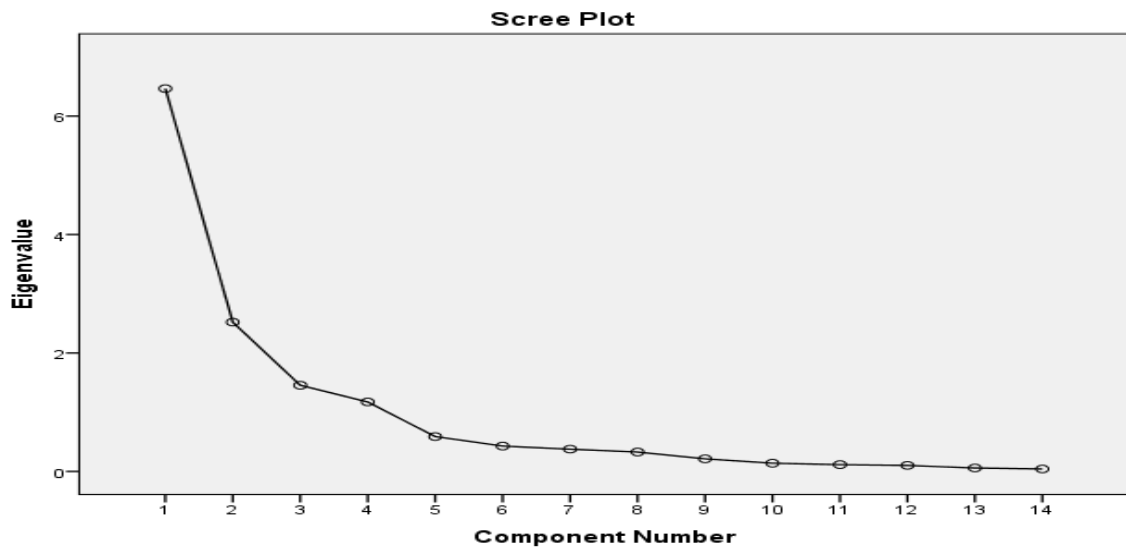

Figure 1. Scree Plot of Factor and Items

The factors obtained in the EFA were named as Emotional Value (EV), Social Value (SV), Quality Value (QV) and Price Value (PV). The results of the item loadings, the eigenvalues and the variance that explained the percentages of the factors confirmed the four-factor structure.

EFA results showed that four factors explained 82.949% of the total variance. According to the results, the most significant factor to affect EFTA perception of participants was EV. EV explained 26.729% of the total variance. In addition, SV explained 23.425% of the total variance while QV explained 18.168% and PV explained 14.627% (Table 3).

Table 3. Results of the exploratory factor analysis

Factors and Items		Factor Loadings	Initial Eigenvalues % of Variance Explained	Rotation Sums of Square Loadings % of Variance Explained	Cumulative Variance % of explained	Cronbach's Alpha Coefficient
EV1	It makes me feel good	0.909				
EV2	I prefer to wear	0.880				
EV3	Wearing pleases me	0.841	46.391	26.729	26.729	0.901
EV4	I like to wear	0.683				
EV5	I feel comfortable when I wear it	0.667				

SV1	It provides social acceptance	0.886				
SV2	It provides good perception of style	0.869				
SV3	It makes a good impression on others	0.844	17.773	23.25	50.54	0.910
SV4	It feels belonging socially	0.743				
QV1	It is produced well	0.886				
QV2	It has consistent quality	0.859	10.424	18.168	68.322	0.922
QV3	It has an acceptable quality standard	0.762				
PV1	Its price is fair	0.959				
PV2	It is economical	0.939	8.36	14.627	**82.949**	0.933

Total Variance Explained = 82.949%, Extraction Method: Principal Component Analysis with Varimax Rotation.

To strengthen the goodness of fit, covariance was calculated between some items under the same factor. In order to measure goodness of fit, NFI, RFI, CFI, IFI, TLI (NNFI), RMSEA and X^2/DF values were calculated, and fit values were given in Table 5. It is clear that an X^2/DF of 2.015 and an RMSEA of 0.065 mean adequate fit. In addition, NFI, RFI, CFI, IFI and TLI were also acceptable (Table 4).

Table 4. Fit Indices Criteria and Results

Fit Indices	Criterion	Finding			
NFI	0.90 ≤ NFI <1	0.974	TLI	≥0.90	0.972
RFI	0.90 ≤ RFI <1	0.946	RMSEA	≤0.08	0.065
CFI	0.93 ≤ CFI <1	0.986	CMIN/DF	2< X^2/DF <5	2.015
IFI	0.90 ≤ IFI <1	0.987	NNFI	≥0.90	0.931

EFTA path diagram was drawn using the data. Average score of EV in path diagram was 4.42 (Diagram 1). This meant that use of EFTA products made academicians feel better. In other words, they preferred using them and were satisfied with them. Average score of SV was 4.02 (Diagram 1). It was found that academicians perceived social value and acceptance by using EFTA products, which resulted in good impression in society and made academicians feel social affiliation. QV score was 4.5, which meant that academicians perceived EFTA products are produced in a good manner and had quality standards. Scores of PV were 2.02 for both components (Figure 2), showing that participant academicians thought that environment-friendly textile and apparel products were expensive, not economical (Figure 2).
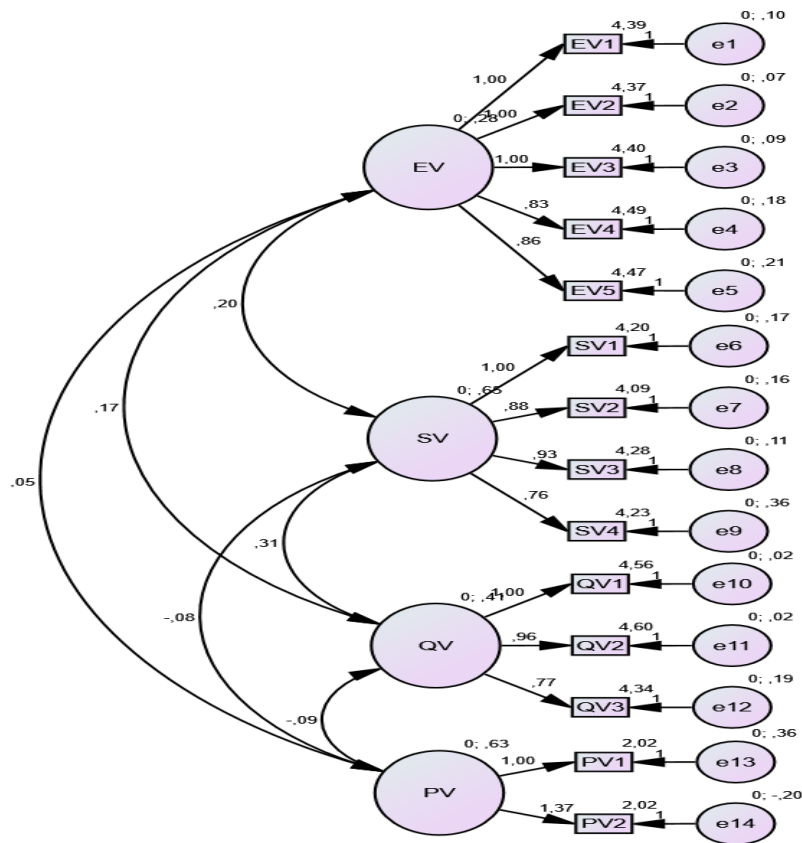
Figure 2. The path diagram of EFTA

CR was calculated to test validity and reliability of scale produced. The reliability of the scale was assessed using both Cronbach's alpha and CR. CR reflects the internal consistency between all items measuring the specific construct (Fornell and Larcker, 1981). In addition, assessment of construct validity was tested using AVE. AVE scores should be equal to or greater than 0.70 (Fornell and Larcker, 1981). Based on these tests, construct reliability and construct validity of the scale indicating the EFTA perception of academicians met the expected criteria (Table 5).

Table 5. Results of Construct Reliability and Construct Validity Tests.

Factors	CR	Criterion	AVE	Criteria
EV	0.898	≥0.70	0.643	≥0.50
SV	0.903	≥0.70	0.701	≥0.50
QV	0.875	≥0.70	0.701	≥0.50
PV	0.948	≥0.70	0.901	≥0.50

4. Discussion and Conclusion

In the textile and apparel industry, chemical suspended solids and heavy metals that interfere with water bodies are used in production processes. Liquid and solid waste from the use of these chemicals can cause serious problems for the environment (Paryanto, 2015). EFTA products are handled with eco-friendly methods in all productions processes from fiber to product and they are degradable in nature. Scientific studies conducted so far have shown that social pressure has a positive effect on consumers in order to purchase environmentally friendly products (Biswas and Roy, 2015; Zhao et al., 2014; Lorek and Fuchs, 2013; Wang et al., 2014; Ritter et al., 2015; Vermeir and Verbeke, 2008; Liobikienė and Juknys, 2016). Consumers prefer EFTA products when compared to a product produced with less environmental concern, since it is not a potential threat to the environment and is sustainable in its production, use and disposal (Khan & Islam, 2015; Biswas et al., 2019). Boztepe (2012) mentioned that it is important for consumers to be able to evaluate the effects of using certain products on environment both for themselves and for their social

environment. An individual who purchases an eco-friendly product shows that s/he has a responsibility for the society and value this positive social stand(Barber et al., 2014).

For purchasing a product, consumers decide considering their needs and tastes. Meeting the needs satisfies some rational reasons as well as some experience- and taste-based ones. Rationale consumers could prefer eco-friendly behaviors such as energy and water saving since they want to protect their interests in general. On the other hand, consumers who consider their pleasure only are not careful about protecting natural resources. However, consumers, especially those belonging to the Z generation, are increasingly interested in sustainability and therefore expect clothing brands to increasingly sell eco-friendly products (De Angelis et al., 2020). Nevertheless, consumers tend to purchase more eco-friendly products. Because these products increase their reputation (Liobikienė et al., 2017; Liobikienė and Juknys, 2016). In the present study which aimed to determine the perceptions of participants towards EFTA products, participants mentioned that EFTA products gave them reputation and good impression and made themselves feel good, providing social acceptance and affiliation. In general, participants mentioned that EFTA products are of good quality and they enjoyed and wanted to use EFTA products, but they were expensive.

Natural fibers such as cotton, organic cotton, flax and wool used in EFTA products are biodegradable, consume less energy during the production processes and release less CO_2, resulting in less damage to human health and ecosystem (Muthu et al., 2012). Synthetic fibers such as polyester, polypropylene and acrylic are not as sustainable as fibers obtained from renewable resources. In addition, since their degradation period in nature is very long, they result in serious damage to environment and agricultural land, making a major impediment for sustainable economic development. Increasing consumption of textile and apparel products is also an indication of increasing textile wastes (Tomovska et al., 2017). Therefore, it is necessary to support the eco-friendly products in textile and apparel industry through legal enforcement and increasing awareness levels of consumers for the purpose of protecting the environment.

Studies have been carried out on recycling or reuse of the textile and apparel industries in industrialized countries. For example, the textile and garment industry products after use in the USA are divided into second-hand clothing markets, such as export markets in emerging countries or disaster relief (Hawley, 2006). In Sweden, about 17% of purchased garments annually are donated to Eastern Europe, allowing the re-use of these products (Palm, 2011). In Turkey, these activities are performed on a voluntary basis, not based on legal regulations. However, practices in industrialized countries should be promoted and extended in Turkey using legal regulations.

Some companies in Spain have implemented a take-back program to save and recycle clothing. The life of the collected clothes was extended with second hand sales and donations and recycled (Pereira et al., 2019). Garment donation boxes have been used recently in Turkey. These boxes should be spread in all provinces as supported by legal regulations in addition to social responsibilities. Collecting products in donation boxes are important both for providing them to needy people and for recycling. Donated objects which are not suitable for reuse can be turned into insulation material.

Reason for higher level of use of EFTA products in the European Union (Network, 2010) could be the legal regulations. Production, marketing, selling and consumption of EFTA products should be promoted in Turkey. Firms realizing eco-friendly productions and marketing should be provided with various incentives. In order to decrease wastes, extend re-use and raise awareness for recycling in textile and apparel industry, source sorting should be promoted and public service announcements should be carried out. R&D studies should be conducted to use and recycle textile and apparel industry products in different areas. Considering the great amount and variety of wastes from textile products, academic and social studies aiming to extend eco-friendly approaches should be supported. Consequently, it is necessary to pass laws in accordance with sustainable agriculture and environment and to carry out studies creating awareness in this context.

In the textile and apparel industry, the use of biodegradable and environmentally friendly textiles in product designs is important for sustainable development. In the present study, aiming to determine the factors affecting EFTA perception of academicians using exploratory factor analysis and path coefficient analysis, 'Emotional Value', 'Social Value', 'Quality Value' and 'Price Value' factors explained 83% of the total variance. Academicians thought that EFTA products are not economical but preferred because of their quality, social and emotional values. Encouragement of use and production of EFTA products is important for sustainable agriculture and environmental policies.

Acknowledgement

References

Barber, N. A.; Bishop, M. & Gruen, T. (2014). "Who pays more (or less) for pro-environmental consumer goods? Using the auction method to assess actual willingness-to-pay", Journal of Environmental Psychology, 40, 218-227.

Bayraktar, T. (2005). Tekstil ve Konfeksiyon Sektöründe Ekoloji ve Ekolojik Etiketler. İTKİB AR&GE ve Mevzuat Şubesi, İstanbul, 1-3.

Bentler, P. M. (1990). Comparative fit indexes in structural models. Psychol Bull, 107(2), 238-46.

Biswas, A., & Roy, M. (2015). Green products: an exploratory study on the consumer behaviour in emerging economies of the East. Journal of Cleaner Production, 87, 463-468.

Biswas, K.M.; Ridwan, K.M., & Datta, A. (2019). A proposal of sustainable and integrated plant for jute fiber extraction in an eco-friendly manner. International Journal of Scientific & Engineering Research Volume 10, Issue 1, January-2019 801 ISSN 2229-5518.

Bruntland, G. (1987). Our common future. The World Commission on Environment 1 and Development, 45-65.

Büyüköztürk, Ş. (2017). Sosyal bilimler için veri analizi el kitabı. Pegem Atıf İndeksi, 1-213.

Byrne, B. M. (2016). Structural equation modeling with AMOS: Basic concepts, applications, and programming. Routledge.

Chen, H.-L., & Burns, L. D. (2006). Environmental Analysis of Textile Products. Clothing and Textiles Research Journal, 24(3), 248-261. doi:10.1177/0887302x06293065.

Chi, T. (2015). Consumer perceived value of environmentally friendly apparel: an empirical study of Chinese consumers. The Journal of The Textile Institute, 106(10), 1038-1050. doi:10.1080/00405000.2014.985879.

Chi, T., & Kilduff, P. P. D. (2011). Understanding consumer perceived value of casual sportswear: An empirical study. Journal of Retailing and Consumer Services, 18(5), 422-429. doi:https://doi.org/10.1016/j.jretconser.2011.06.004.

Conca, J. (2015). Making climate change fashionable—the garment industry takes on global warming. Accessed, 1, 2017.

Çokluk, Ö., Şekercioğlu, G., & Büyüköztürk, Ş. (2012). Sosyal Bilimler için Çok Değişkenli İstatistik: Spss ve Lisrel Uygulamaları, 2. Baskı, Ankara: Pegem Akademi Yay. Eğt. Dan. Hizm. Tic Ltd. Şti, Şubat.

De Angelis M., Amatulli C., & Pinato G. (2020) Sustainability in the Apparel Industry: The Role of Consumers' Fashion Consciousness. In: Muthu S., Gardetti M. (eds) Sustainability in the Textile and Apparel Industries. Sustainable Textiles: Production, Processing, Manufacturing & Chemistry, Springer, Cham.

E., H. B. J., & S., N. P. (2011). Willingness to pay for socially responsible products: case of cotton apparel. Journal of Consumer Marketing, 28(5), 344-353. doi:doi:10.1108/07363761111149992.

Fan, X., Thompson, B., & Wang, L. (1999). "Effects of sample size, estimation methods, and model specification on structural equation modeling fit indexes", Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 56-83.

Field, A. (2009). Discovering statistics using SPSS. Sage publications.

Fletcher, K. (2008). Sustainable fashion and textiles: design journeys, Earthscan. London, Sterling.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. Journal of marketing research, 39-50.

Hair, J. F., Gabriel, M., & Patel, V. (2014). AMOS covariance-based structural equation modeling (CB-SEM): Guidelines on its application as a marketing research tool.

Hawley, J. M. (2006). Digging for diamonds: A conceptual framework for understanding reclaimed textile products. Clothing and Textiles Research Journal, 24(3), 262-275.

Hu, L. t., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. Structural Equation Modeling: A Multidisciplinary Journal, 6(1), 1-55. doi:10.1080/10705519909540118.

Institute, T. S. (2018). http://www.tuik.gov.tr/PreTablo.do?alt_id=1046.

İşmal, Ö., & Yıldırım, L. (2012). Tekstil Tasarımında Çevre Dostu Yaklaşımlar, 1. Uluslararası Moda ve Tekstil Tasarımı Sempozyumu, Akdeniz Üniversitesi, Antalya, 38-42.

Jakhar, S. K. (2015). Performance evaluation and a flow allocation decision model for a sustainable supply chain of an apparel industry. Journal of Cleaner Production, 87, 391-413. doi:https://doi.org/10.1016/j.jclepro.2014.09.089.

Jordeva, S., Tomovska, E., Trajković, D., & Zafirova, K. (2015). "Current state of pre-consumer apparel waste management in Macedonia", Fibres & Textiles in Eastern Europe.

Kaiser, H. F. (1974). An index of factorial simplicity. Psychometrika, 39(1), 31-36.

Kang, J., Liu, C., & Kim, S.-H. (2013). "Environmentally sustainable textile and apparel consumption: the role of consumer knowledge, perceived consumer effectiveness and perceived personal relevance", International Journal of Consumer Studies, 37(4), 442-452. doi:10.1111/ijcs.12013.

Khan, M. M., & Islam, M. M. (2015). Materials and manufacturing environmental sustainability evaluation of apparel product: knitted T-shirt case study. Textiles and Clothing Sustainability at https://doi.org/10.1186/s40689-015-0008-8, 1-12.

Kim, H.-S., & Damhorst, M. L. (1998). Environmental Concern and Apparel Consumption. Clothing and Textiles Research Journal, 16(3), 126-133. doi:10.1177/0887302x9801600303.

Kline, R. B. (2015). Principles and practice of structural equation modeling. Guilford publications.

Kunz, G. I., Garner, M. B., & Karpova, E. (2007). Going global: The textile and apparel industry. Fairchild New York.

Larney, M., & van Aardt, A. M. (2010). Case study: apparel industry waste management: a focus on recycling in South Africa. Waste Manag Res, 28(1), 36-43. doi:10.1177/0734242x09338729.

Liobikienė, G., Grincevičienė, Š., & Bernatonienė, J. (2017). "Environmentally friendly behaviour and green purchase in Austria and Lithuania", Journal of cleaner production, 142, 3789-3797.

Liobikienė, G., & Juknys, R. (2016). The role of values, environmental risk perception, awareness of consequences, and willingness to assume responsibility for environmentally-friendly behaviour: the Lithuanian case. Journal of Cleaner Production, 112, 3413-3422.

Liu, X., Wang, C., Shishime, T., & Fujitsuka, T. (2012). "Sustainable consumption: Green purchasing behaviours of urban residents in China", Sustainable Development, 20(4), 293-308. doi:doi:10.1002/sd.484.

Lomax, R. G., & Schumacker, R. E. (2004). A beginner's guide to structural equation modeling. psychology press.

Lorek, S., & Fuchs, D. (2013). Strong sustainable consumption governance–precondition for a degrowth path? Journal of cleaner production, 38, 36-43.

Muthu, S. S., Li, Y., Hu, J. Y., & Mok, P. Y. (2012). "Quantification of environmental impact and ecological sustainability for textile fibres", Ecological Indicators, 13(1), 66-74. doi:https://doi.org/10.1016/j.ecolind.2011.05.008.

Muthukumarana, T. T., Karunathilake, H. P., Punchihewa, H. K. G., Manthilake, M. M. I. D., & Hewage, K. N. (2018). "Life cycle environmental impacts of the apparel industry in Sri Lanka: Analysis of the energy sources", Journal of Cleaner Production, 172, 1346-1357. doi:https://doi.org/10.1016/j.jclepro.2017.10.261.

Network, G. F. (2010). Ecological footprint atlas 2010. Retrieved May, 25, 2014.

Niinimäki, K. (2013). Sustainable fashion: new approaches. Aalto University.

Nunnally, J. C. (1994). The assessment of reliability. Psychometric theory.

Oral, O., Dirgar, E., & Erdoğan, Ç. (2012). "Tekstil ve hazır giyim üretiminde ekoloji", Akdeniz Sanat Dergisi, 4(8), 31-34.

Onurlubaş, E , Çakirlar, H . (2017). Gazli İçecek Tüketiminde Tüketicilerin Marka Algisinin Belirlenmesi: Izmir Ili Örneği. journal of Life Economics, 4 (3), 93-112. Retrieved from http://dergipark.gov.tr/jlecon/issue/37047/425895

Özdoğan, E., Korkmaz, A., & Seventekin, N. (2007). "Eko-Teks ve AB Çevre Etiketi", Tekstil Ve Konfeksiyon, 17(3), 148-152.

Öztürk, D , Karakaş, G . (2016). The Determination of Factors Influencing Brand Choice of the University Students: a Research on the Apparel Industry. Journal of Life Economics, 3 (4), 69-78. DOI: 10.15637/jlecon.175.

Palm, D. (2011). Improved waste management of textiles. IVL Report B, 1976.

Paryanto, Hans A. P. (2015). Dyes from Banana Leaf Stalks (musa ssp.) J E kuilibrium, vol.14, no. 2, hal.39-43.

Pereira Sánchez, M. Á., Vence Deza, X., Alcalde García, X. M., & Carballo Penela, A. (2019) INDITEX A Circular Economy Business Model Case. http://www.r2piproject.eu/wp-content/uploads/2019/05/Inditex-Case-Study_1.pdf

Ritter, Á. M., Borchardt, M., Vaccaro, G. L. R., Pereira, G. M., & Almeida, F. (2015). "Motivations for promoting the consumption of green products in an emerging country: exploring attitudes of Brazilian consumers", Journal of Cleaner Production, 106, 507-520. doi:https://doi.org/10.1016/j.jclepro.2014.11.066.

Schreiber, J. B., Nora, A., Stage, F. K., Barlow, E. A., & King, J. (2006). "Reporting structural equation modeling and confirmatory factor analysis results: A review", The Journal of educational research, 99(6), 323-338.

Shrivastava, P. (1995). The Role of Corporations in Achieving Ecological Sustainability. The Academy of Management Review, 20(4), 936-960. doi:10.2307/258961.

Smith, B. (1994). The Future of Pollution Prevention An Alternative to Costly Waste Treatment.

Sweeney, J. C., & Soutar, G. N. (2001). Consumer perceived value: The development of a multiple item scale. Journal of Retailing, 77(2), 203-220. doi:https://doi.org/10.1016/S0022-4359(01)00041-0.

TAN, M., Ayhan, E., & Baydaş, M. (2016). "Sustainability and cleaner production: case of textile and clothing sectors in Bingöl", The Journal of MacroTrends in Energy and Sustainability, 4(1), 22-33.

Thomas, S. (2008). From "Green Blur" to Ecofashion: Fashioning an Eco-lexicon. Fashion Theory, 12(4), 525-539. doi:10.2752/175174108X346977.

Tomovska, E., Jordeva, S., Trajković, D., & Zafirova, K. (2017). "Attitudes towards managing post-industrial apparel cuttings waste", The Journal of The Textile Institute, 108(2), 172-177. doi:10.1080/00405000.2016.1160764.

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. Psychometrika, 38(1), 1-10.

Unal F., Avinc O., Yavas A. (2020) Sustainable Textile Designs Made from Renewable Biodegradable Sustainable Natural Abaca Fibers. In: Muthu S., Gardetti M. (eds) Sustainability in the Textile and Apparel Industries. Sustainable Textiles: Production, Processing, Manufacturing & Chemistry. Springer, Cham.

Vermeir, I., & Verbeke, W. (2008). Sustainable food consumption among young adults in Belgium: Theory of planned behaviour and the role of confidence and values. Ecological Economics, 64(3), 542-553. doi:https://doi.org/10.1016/j.ecolecon.2007.03.007.

Wang, P., Liu, Q., & Qi, Y. (2014). "Factors influencing sustainable consumption behaviors: a survey of the rural residents in China", Journal of Cleaner Production, 63, 152-165. doi:https://doi.org/10.1016/j.jclepro.2013.05.007.

Zeithaml, V. A. (1988). Consumer Perceptions of Price, Quality, and Value: A Means-End Model and Synthesis of Evidence. Journal of Marketing, 52(3), 2-22. doi:10.2307/1251446.

Zhao, H.-h., Gao, Q., Wu, Y.-p., Wang, Y., & Zhu, X.-d. (2014). "What affects green consumer behavior in China? A case study from Qingdao", Journal of Cleaner Production, 63, 143-151.