sciendo

Analysis of the Consumer Knowledge and Attitude toward Innovations in the Fashion Industry

Andreea-Ionela PUIU
The Bucharest University of Economic Studies, Bucharest, Romania
andreeaipuiu@gmail.com

Abstract. *Taking into consideration the complex interaction between new emerging technologies and social transformations, the importance of consumer attitudes toward fashion innovations should not be ignored. There are thousands of new patents related to nanotechnology being announced each year being undoubtedly perceived as one of the fundamental technologies of the present century. When it comes to the fashion sector, nanotechnology offers an innovative mean of processing fabrics that could change the clothing industry. Previous studies conducted in the domain of technology revealed that consumer attitude toward nanotechnology is determined by the perceived risks and benefits of applying nanotechnology and consumer's scepticism when encountering new challenges. This research aims to analyse the determinants that affect the consumer's knowledge toward nanotechnologies used in the fashion industry in Romania. In this respect, I applied a questionnaire in the Romanian public universities to identify individuals' attitude toward technology and their knowledge regarding the usage of nanotechnology in this industry. The consumer's level of knowledge regarding the nanotechnology implementation in fashion production is expected to be influenced by their attitude toward technology. Also, the consumer's requirements regarding the labelling of nanotextile are expected to be influenced by their level of nanotechnology knowledge.*
Based on the empirical results, this study is intended to provide suggestions that could contribute to the expansion of the acceptance of the innovations applied in the clothing industry.

Keywords: Innovation, Innovation Resistance, Fashion Industry, Nanotechnology, Technology, Structural Equation Modelling.

Introduction

Nanotechnology represents the outcome of many related disciplines and abilities of biology, chemistry, physics and digitalization.

One domain where nanotechnology brings extremely encouraging and significant developments in the production process is represented by the fashion industry. Applications of nanotechnology span the entire chain, from producer to consumer.

Considering the meaningful role of the consumer on the market, there has been considerable attention dedicated to understanding the consumers level of knowledge, their expectations and their attitude toward nanotechnology.

Considering those aspects, a research framework was accomplished to examine consumers knowledge regarding nanotechnologies usage in the fashion industry. Based on the empirical results, this study is intended to provide recommendations that could contribute to the spread of the acceptance of the innovations from the fashion industry among consumers.

Literature review

Fashion industry

The fashion industry is recognised as one of the most influential industries in many nations of the world (Batista & Ng, 2012).

Outside the protective function, clothing purchase was associated with the symbolic consumption, in the sense that consumers see clothes as a way of expressing themselves (Goldsmith, 1999). Fashion was defined as a way of behaving (Tzou & Lu, 2009), adopted for a limited period by members of a social group because that behaviour is perceived as socially appropriate for that time and situation.

Although the fashion industry encounters positive aspects, it also faces some difficulties. The challenging nature of the fashion industry arises from the timing issues, short product life cycles, demand uncertainty and people predisposition to resist changes. Marketing strategies, designs, innovative textiles, new methods of production, renewable energy or circular consumption models should be integrated to meet the consumer's needs and future fashion trends. In terms of innovations introduced in the fashion industry, as in any other industries, what might draw customers attention and what might not be adopted by them is uncertain. In this respect, a better understanding of the consumer attitude towards innovations and identification of potential agents that prevent the innovations spread could increase the degree of adoption of new products on the market.

Innovation in fashion

Innovation brings together several features like theoretical perspective, technical invention and industrial exploitation (Trott, 2008). The innovation aim is to improve human's life by finding creative solutions to the existing problems and support companies to achieve stability on the market.

Technology is one of the most efficient agents that improve the fashion industry, providing various benefits for consumers and producers. Along with technology, the process of changing consumers nature and their consumption patterns plays an essential role in the implementation of the innovation process. Research conducted on this topic stated that consumers become more value-conscious, buying less but more aware (Berry et al., 2010).

Those transformations have determined producers to provide more technology-oriented services and products because innovation represents the central component that may help in achieving competitive advantage. In this respect, nanotechnology, one significant innovative technique used in fashion creation, is provided by producers to face the new challenges and environmental constraints imposed by a continuous growing society.

Nanotechnology represents an interdisciplinary technology that is offering a novel method of producing fabrics that could transform the fashion industry. Nanotechnology is characterised as using elements and structures with nanoscale dimensions ($1\ nm = 10^{-9}\ m$) to provide a mixture of useful novel physical, biological and chemical properties that do not exist at larger scales (National Nanotechnology Initiative, 2014).

Embedding nanosized particles in materials result in improved fabric properties without meaningful changes in weight or thickness of the final piece of clothing. In this way, the introduction of those significant changes results in novel materials with multifunctional features such as UV protection, waterproof, antimicrobial, antistatic, advanced durability, improved softness or water repellency (Srinivasan et al., 2018).

Despite those positive aspects, we should not underestimate the difficulty in marketing science and technology (Hung & Chu, 2006) since nanotechnology represents a

novel and emerging domain.

Consumer's attitude toward nanotechnology should be considered in the earliest stage of technology development (Renn & Roco, 2006). Several studies have investigated the consumer's benefits and risks perception regarding nanotechnology as well as their knowledge and attitude toward nanotechnology (Bainbridge, 2002; Cobb & Macoubrier, 2004; Nerlich et al., 2007; Scheufele & Lewenstein, 2005, Chen et al., 2012).

However, there has been limited research conducted in Romania regarding the consumer's knowledge toward nanotechnology applied in the clothing industry. The present research intends to discover consumer's knowledge regarding nanotechnology and their attitude toward technology. In this respect, I proposed a questionnaire on technology attitude, nanotechnology knowledge and Nano-labelling requirements.

Research framework and hypothesis development

The concept of attitude was described as people predisposition to respond in a consistently favourable or unfavourable approach to an event or stimulus (Fishbein & Ajzen, 1975). In cognitive psychology, attitudes are recognised as one of the principal factors that determine human behaviour.

The attitude toward the technology dimension reflects the belief in technological progress to solve the world's problems in the future (Bredahl, 2001). If consumers believe that scientific progress could bring society more welfare, then consumers will hold a more positive attitude toward technology, that will result in a more likely behaviour to perceive more benefits and fewer risks in applying nanotechnology and vice versa.

Concerning the dimension regarding nanotechnology knowledge, previous research established that consumers knowledge about nanotechnology is very limited. A survey realised by the European Commission (2010) revealed that only 46.00% of the Europeans have ever heard of nanotechnology, while majority 54.00% have never heard of it. According to their report, those that are most likely to hear about nanotechnology are managers or those with full-time education, over the age of 20 and everyday users of the internet. Those less familiar with nanotechnology are people who left school at the earliest opportunity and non-users of the internet (European Commission, 2010).

Regarding the knowledge related to nanotechnologies, it is believed that if a person's knowledge is complete, that persons would have no uncertainty because psychological uncertainty is closely related to risks. Individual comprehension is determined by the level of understanding of science.

The third proposed dimension refers to an adequate process of nanotextiles labelling. The labelling of goods that include innovative technologies has been one policy tool that governments used to address the uncertainty of the consumers. The present study develops evidence regarding opinions on the labelling of products realised using nanotechnologies.

Labelling is a tool that quickly provides information's to consumers so they can make an informed decision regarding a suitable product (D'Silva & Bowman 2010). It is argued that each consumer has the right to know what he is buying, this right providing him with the freedom to purchase or not the product. An increased level of transparency attending a greater trust between consumers and producers could lead to a greater acceptance of the nanotechnology-based products. Moreover, it is believed that labelling helps consumers to become more aware and therefore to be more informed about nanotechnology-based products (Capon et al., 2015).

Based on the information previously exposed, the following hypotheses are proposed:
H1: The consumer's attitude toward technology positively influences the nanotechnology knowledge dimension.
H2: The consumer's needs regarding the labelling of nanotextile products are negatively influenced by their level of nanotechnology knowledge.

Methodology

The instrument and method of analysis

The method of analysis used in the present paper is a questionnaire which count of three dimensions related to attitude toward technology and knowledge regarding the nanotechnologies applied in the fashion industry. The questionnaire contains nine statements related to technology and nanotechnology. Each stat is measured on a five-point Likert scale with anchors of one to indicate "strongly disagree" and five to indicate "strongly agree". The collected results would be analysed using an Exploratory Factor Analysis model. In the second part of the research, I will propose a Structural Equation Modelling. Both analyses were performed in the R programming and statistical software (R Core Team, 2018).

The sample and data collection

The questionnaire has been distributed in the Romanian public universities. The target population is constituted by people who follow an education system with ages between 18 and 45. General socio-demographics were also collected (gender, age, last level of graduate education, income and the employment status).

A total of 200 responses were collected. Table 1 summarizes the socio-demographic characteristics of the sample that participated in this questionnaire. There is a predominance of female subjects (70.00%) and respondents with a Bachelor's Degree (39.00%). The age range of 18-25 constitutes the majority (61.50%). Across the overall sample, most people reported that they do not have a regular monthly income (20.05%), while 19.00% of the respondents said that they register a monthly income between 2000-2999 lei.

Table 1. Sample Profiles

Item	Classification	N = 200	
		No.	Percentage (%)
Gender	Male	60	30.00
	Female	140	70.00
Age	18-25	123	61.50
	26-35	50	25.00
	36-45	27	13.50
Residence	Urban	170	85.00
	Rural	30	15.00
Graduated Education	High School	64	32.00
	College	11	5.50
	Bachelor's degree	78	39.00
	Master's degree	42	21.00
	PhD	5	2.5
Employed	Yes	108	54.00
	No	92	46.00
Monthly Income	No regular income	41	20.05
	Less than 1000 lei	24	12.00
	1000-1999 lei	37	18.50
	2000-2999 lei	38	19.00

Item	Classification	N = 200	
		No.	Percentage (%)
	3000-3999 lei	23	11.50
	4000-4999 lei	18	9.00
	More than 5000 lei	19	9.50

Source: Authors' own research.

Regarding the frequency of clothes acquisitions, the respondents stated that they buy clothes predominant monthly or when it's needed. Concerning the clothing labels, the majority of the female said that always read the label of the clothing pieces, before buying them, while most of the male said that they read the label of the clothing items when they had time.

Measurement and Reliability

This study analyses the existing relationships among the following constructs; the consumer's attitude toward technology, nanotechnology knowledge and the consumer's attitude toward the Nano-labelling procedure on fashion items. Moreover, respondents were asked to designate if they are aware of the existed innovations from the fashion industry and to indicate which are the concepts that are familiar to them.

Also, respondents were asked to indicate the maximum price that they are willing to pay for that nanotechnology product to be labelled adequately. Furthermore, respondents were asked to indicate what is the maximum increase price they would be willing to pay for an identical fashion product realised without nanomaterials. Those last two questions were designed to indicate the consumer's willingness to invest in nanotechnology (see Annex).

In the second part of the research, structural equation modelling analysis was conducted to test the proposed hypotheses in this study to assess the effect and the significance level of each path in the research framework.

First of all, I tested the reliability with the Cronbach's Alpha Metric using the *psych* package (Revelle, 2018) from the R library and the *alpha* function. The Cronbach's Alpha indicator is desired to register values above 0.7, in the case of exploratory analysis, criterion accomplished for all dimensions.

Table 2. Reliability Matrix

	Mean	SD	Alpha
Attitude toward technology	4.008	0.026983	0.81
Nanotechnology knowledge	2.201	0.000053	0.90
Nano-labelling requirements	3.673	0.009308	0.88

'SD- Standard Deviation Source: Authors' own contribution.

In the first part of the analysis, I conducted an exploratory factor analysis (EFA) for the nanotechnology knowledge and Nano-labelling requirements. In the second part, I conducted structural equation modelling. Through this methodology is possible to find an existing relationship between the considered variables, to estimate dependency relations among them and to find the measurement error in model variables (Vargas, 2016).

Regarding the sample size, according to some authors, the threshold for any variety of structural equation modelling is about 150 respondents for models where constructs contain three or four indicators (Anderson & Gerbing, 1984). The criterion regarding the sample size

was accomplished to allow to perform the structural equation modelling.

Results and discussions

For the first part of the analysis, I conducted a factor analysis with orthogonal rotation, usually applied for independent factors. The attitude toward the technology was investigated in previous research, in this case, the exploratory factor analysis not being necessary (Chen et al., 2012). The EFA revealed that the standardized root mean square residual (SRMR) registers a value below the 0.08 cut-off recording a value of 0.01 and the Tucker-Lewis Index registers a value of 0.95. The factor loadings for each factor were presented in Table 3.

Table 3. Factor Loadings

Dimension	Item	F1	F2
Nanotechnology knowledge	I'm comfortable with the idea of nanotechnology overall.	0.716	
	I'm comfortable with the idea of engineered nanomaterials in fashion products.	0.996	
	I'm comfortable with the idea of nanotechnology being applied to the fashion industry.	0.899	
Nano-labelling requirements	Clothes stored in packaging materials containing engineered nanomaterials should be labelled with an additional nanotechnology label.		0.873
	Fashion products produced using nanotechnology should be labelled with an additional nanotechnology label.		0.871

Source: Authors' own contribution.

To perform the structural equation modelling, I used the *lavaan* package (Yves, 2012) from the R software. The output revealed that the fit indices register desired values for a good fit. The chi-squared test (X^2) evaluates the overall fit and the actual discrepancy between the fitted covariance matrix and the actual sample. The null hypothesis (H_0) of the chi-squared test states that the model fits perfectly. In the case of the performed structural equation modelling, the obtained p-value is 0.019, lower than the 0.05 threshold. Therefore, we reject the null hypothesis.

Furthermore, the goodness of fit index (GFI) represents the proportion of variance accounted for by the estimated population covariance. The goodness of fit index is similar to R^2, and according to the specialised literature (Kline, 2016), the cut-off value is 0.95. In this model, the goodness of fit index registers a value of 0.932, below the threshold. Regarding the adjusted goodness of fit (AGFI), the obtained value is 0.890, below the 0.90 thresholds.

The normed fit index (NFI) analyses the discrepancy between the chi-squared value of the hypothesized model and the chi-squared value of the null model (Bentler & Bonett, 1980). This index tends to be negatively biased (Bentler, 1990). The cut-off for a good fit is 0.95 (Kline, 2016), in this case registering a value of 0.936, below the cut-off. On the other hand, the non-normed fit index (known as Tucker-Lewis Index) measures the goodness of fit taking into account the size of the correlations in the data and the number of parameters in the model. For the NNFI index, the obtained value is 0.972, above the threshold.

In the case of the comparative fit index, the cut-off value for the good fit is 0.90, in the present analysis registering a score of 0.978. Regarding the root mean square error of approximation (RMSEA), the obtained value should be lower than the 0.08 threshold, in this case, registering a value of 0.048. In the case of the standardized root mean square residuals

(SRMR), the obtained value is 0.052, lower than the 0.08 cut-off.

Table 4. Fit indices for Structural Equation Modelling (SEM)

Measure	Name	Value	Cut-off for good fit
X^2	Model Chi-Square	0.019	p-value> 0.05
(A)GFI	(Adjusted) Goodness of Fit	GFI=0.932 AGFI=0.890	GFI ≥ 0.95 AGFI ≥0.90
(N)NFI TLI	(Non) Normed-Fit Index Tucker-Lewis index	NFI=0.936 NNFI (TLI)=0.972	NFI ≥ 0.95 NNFI ≥ 0.95
CFI	Comparative Fit Index	0.978	CFI ≥.90
RMSEA	Root Mean Square Error of Approximation	0.048	RMSEA < 0.08
SRMR	(Standardized) Root Mean Square Residual	0.052	SRMR <0.08

Source: Authors' own research.

The parameter estimates function implemented in the *lavaan* package (Yves, 2012) gives us the relationship of each variable to the underlying factor, the so-called factor loading (Table 5). In the structural equation model, the factor loading for the first observed variable on the attitude toward technology factor is 1.000 that means that for each unit increase in the latent attitude dimension, the model predicts a 1.000 increase in the first variable (x_1). The same factor loading is registered by the first observed variable of each dimension from the analysis. In the case of the second observed variable of the attitude toward technology dimension, the factor loading is 1.079 meaning that for each unit increase in the latent attitude dimension, the model predicts a 1.079 increase in the observed variable (x_2).

In the case of the factor loading for the second observed variable on the nano-labelling requirements, the model predicts a 0.786 increase in the ninth variable (x_9).

Table 5. Factor Loading

Latent Factor	Indicator	Estimator	Standard Error	Z	P-value	Beta
F1	x_1	1.000	-	-	0.000	0.673
F1	x_2	1.079	0.133	8.104	0.000	0.699
F1	x_3	1.104	0.138	7.992	0.000	0.687
F1	x_4	1.251	0.143	8.766	0.000	0.811
F2	x_5	1.000	-	-	0.000	0.730
F2	x_6	1.359	0.096	14.118	0.000	0.992
F2	x_7	1.260	0.093	13.614	0.000	0.919
F3	x_8	1.000	-	-	0.000	0.990
F3	x_9	0.786	0.430	1.823	0.068	0.788

Source: Authors' own contribution.

Furthermore, I investigated the relationship among the nanotechnology knowledge dimension and control variables like age, employment status and people knowledge regarding the existed innovations from the fashion industry.

Table 6. SEM Regressions

Direct Effects	Variable	Estimate	Standard Error	Z	P-value	Beta
F2	Innovations	0.396	0.051	7.711	0.000	0.526

F2	Age	0.314	0.113	2.788	0.005	0.198
F2	Employment	0.069	0.108	0.643	0.520	0.045
F2	F1	0.035	0.055	0.643	0.520	0.051
F2	F3	-0.049	0.079	-0.621	0.525	- 0.045

Source: Authors' own contribution.

As we can see (Table 6), all explanatory variables had a positive influence on the nanotechnology knowledge dimension. The p-value is very low in the case of the innovation's knowledge dimension, also in the case of the age of the respondents. In this way, we have a high level of confidence that those predictors are impacting in a significant way the dependent variable. Also, we can see that there is a negative influence of the nanotechnology knowledge dimension on the nano-labelling dimension.

At the end of the SEM process, I designed a graphical representation of the structural equation modelling. In the following plot we have represented the factor loadings, the variances of the estimators, the registered covariances between dimensions (factors) and the coefficient of the conducted regressions, previously commented (Figure 1).

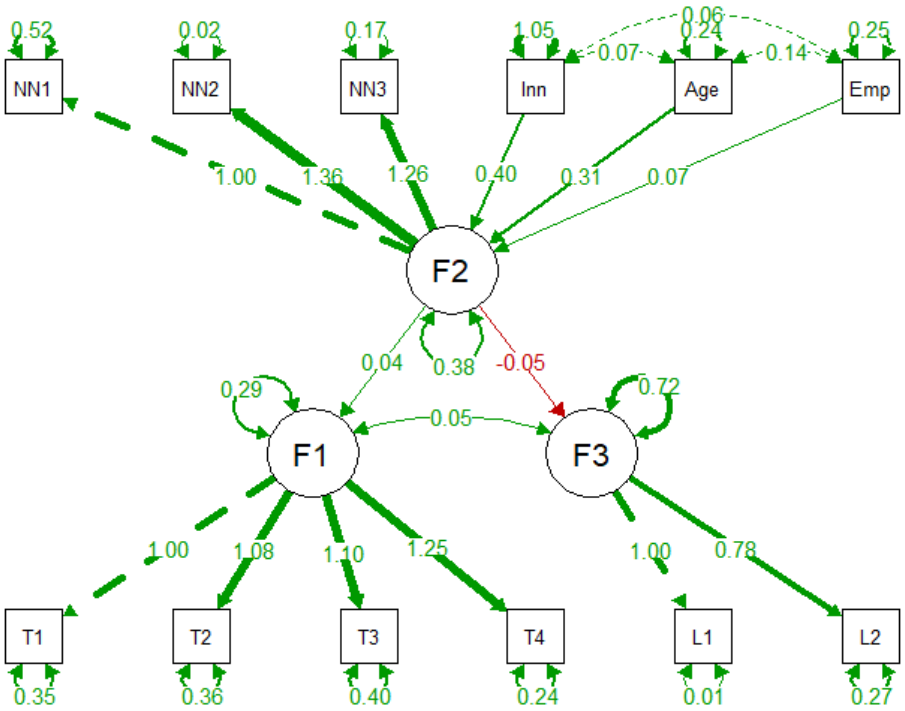

Figure 1. Plot Structural Equation Modelling (SEM)

'Processed using *semPath* function

Source: Authors' own contribution.

As previously mentioned, consumers were asked to indicate which of the existed innovations from the fashion industry are familiar to them. The most common concepts indicated by the respondents were renewable energy, artificial intelligence, followed by biotechnology, bio-based materials and nanotechnology. Concepts that were not so familiar to the respondents were nanomaterials, blockchain and internet of things, wearable technologies and biomimicry (Figure 2).

Regarding the consumers' willingness to invest in nanotechnology it seems that

39.50% of the respondents do not agree to pay extra for that nanotechnology product to be labelled adequately. 20.00% of them agree to pay maximum 5% from the product price while, only, 4.00% of the respondents agreed that they are willing to pay additional 25% from the product price for a corresponding labelling process.

Also, 49.50% of the respondents said that they are not willing to pay an extra price for an identical piece of item that was not realised using nanotechnology procedure.

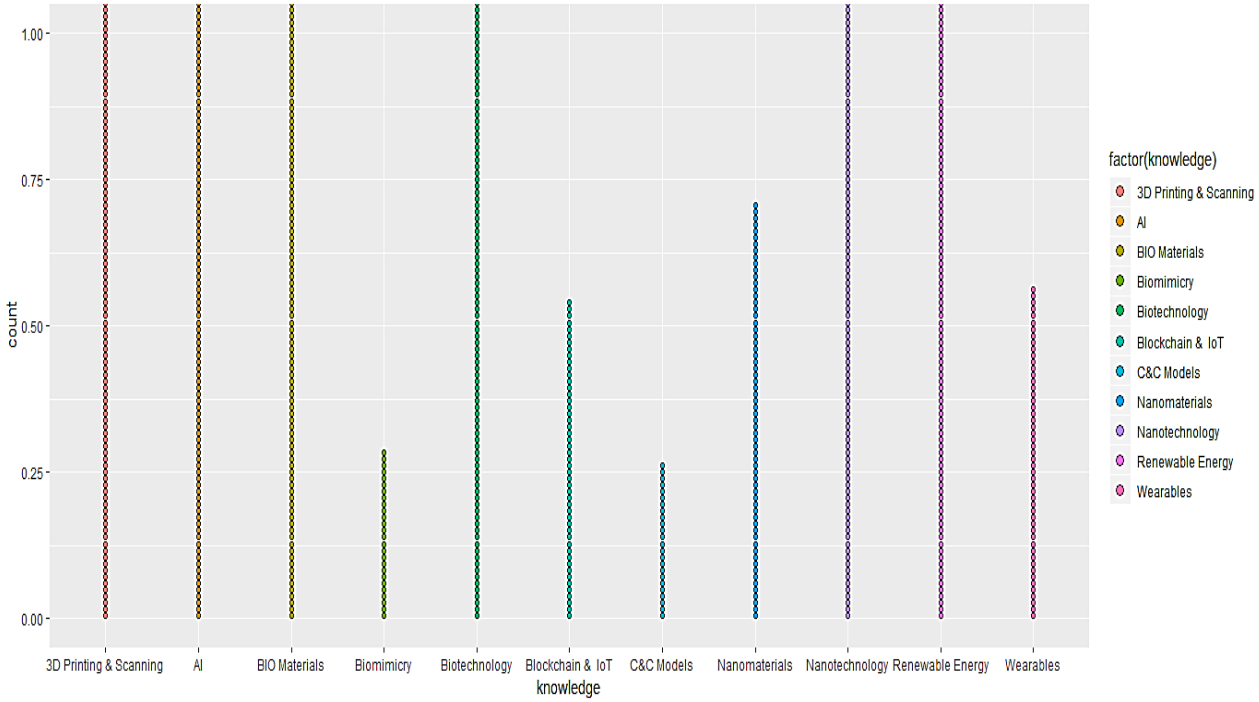

Figure 2. Consumers Level of Knowledge Regarding Fashion Innovations
Source: Authors' own contribution.

Conclusion

This study proposes to explore some determinants that affect the consumer's knowledge toward nanotechnologies used in the fashion industry in Romania.

Based on the conducted research, the present study developed the following hypothesis; consumer's attitude toward technology is expected to influence in a positive way the consumer's level of knowledge regarding nanotechnologies, while the consumer's requirements regarding the labelling of nanotextile items are expected to be negatively influenced by the consumer's level of knowledge regarding nanotechnologies.

The reliability measurements performed applying the Cronbach's Alpha metric revealed pretty good scores for both dimensions, 0.90 for the nanotechnology knowledge, respectively 0.88 for Nano-labelling requirements.

In the structural equation modelling, some of the fit indices registered good scores, below the recommended cut-offs. Also, the conducted regression revealed that there is a positive influence of the age and consumer's awareness regarding the existed innovations in the fashion industry on nanotechnology dimension. Both variables, registered very low p-values, meaning that those two variables influence in a significant way the consumer's knowledge regarding nanotechnologies.

Regarding the attitude toward technology, it was found that technology positively influences the consumer's level of knowledge regarding the usage of nanotechnologies, while the consumer's requirements regarding the labelling of nanotextiles are negatively influenced by their level of knowledge toward nanotechnology. In both cases, the level of influence was not significant from a statistical point of view.

Also, it appears that consumers are willing to invest in nanotextiles, but they do not admit paying an additional amount of money for an adequate labelling of these products.

The consumer's more positive attitude toward technology, more nanotechnology knowledge and more social trust in the related institutions could contribute positively to the perceived risks from applying nanotechnologies. Thus, how to increase the public's perceived benefits and decrease the perceived risks of applying nanotechnology represents an essential task for the government and producers. Therefore, the early introduction and explanation of regulations may reduce the risk that consumer interest will prevent the acceptance of nanotechnology. If consumers are against technology, its likelihood of success is drastically reduced. Educating the consumer represents a good method for enabling him to understand better nanotechnology, turning him to form a more positive attitude toward this innovation.

Also, as shown by some studies (Chen et al., 2012), trust plays an essential role in the consumer's opinion regarding nanotechnology. In this respect serves as a primary mission to inform precisely consumers about the potential risks and benefits for using nanotechnologies.

Limitations

The empirical findings from this study are helpful for a better understanding of the consumer's attitude toward technology and his level of knowledge regarding the nanotechnologies utilised in the fashion industry and to contribute to further research in this field. However, there are some limitations of this research that should be borne in mind when generalizing the findings from this study.

The first limitation comes from the fact that the sample is somehow biased, we have more females than males and more respondents from the urban area than from rural area. The second limitation comes from the fact that structural equation modelling is approximated by omitting variables that are implicated in the causal process or other features of the model. This kind of omissions presents a misleading image of the measurement method commonly resulting in biased estimates and inaccurate measures of the standard errors (Tomarken & Waller, 2005).

References

Anderson, J.C., & Gerbing, D.W. (1984). The effect of sampling error on convergence, improper solutions, and goodness-of-fit indices for maximum likelihood confirmatory factor analysis. *Psychometrika*, 49(2), 155–173.

Srinivasan K, Rajanikumar K, Sheetal Bhardwaj K, Lalitha Kumari B, Murthy Chavali. Nanotechnology Trends in Fashion and

Textile Engineering. Curr Trends Fashion Technol Textile Eng . 2018; 2(3): 555590

Srinivasan K, Rajanikumar K, Sheetal Bhardwaj K, Lalitha Kumari B, Murthy Chavali. Nanotechnology Trends in Fashion and

Textile Engineering. Curr Trends Fashion Technol Textile Eng . 2018; 2(3): 555590

Srinivasan K, Rajanikumar K, Sheetal Bhardwaj K, Lalitha Kumari B, Murthy Chavali. Nanotechnology Trends in Fashion and

Textile Engineering. Curr Trends Fashion Technol Textile Eng . 2018; 2(3): 555590
Srinivasan K, Rajanikumar K, Sheetal Bhardwaj K, Lalitha Kumari B, Murthy Chavali. Nanotechnology Trends in Fashion and
Textile Engineering. Curr Trends Fashion Technol Textile Eng . 2018; 2(3): 555590
Srinivasan K, Rajanikumar K, Sheetal Bhardwaj K, Lalitha Kumari B, Murthy Chavali. Nanotechnology Trends in Fashion and
Textile Engineering. Curr Trends Fashion Technol Textile Eng . 2018; 2(3): 555590
Bainbridge, S. W. (2002). Public Attitudes Toward Nanotechnology. *Journal of Nanoparticle Research*, 4. 561-570.
Batista, L., & Ng. I. (2012). The emergence of relationship-based retailing-a perspective from the fashion sector. Oxford Retail Futures Conference - New Technologies, Business Models and Customer Experience.
Retrieved from https://ueaeprints.uea.ac.uk/60849/ Accessed 05 April 2019.
Bentler, P. M., & Bonett, D. G. (1980). Significance tests and goodness of fit in the analysis of covariance structures. *Psychological Bulletin*, 88, 588-606.
Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107(2), 238-246.
Berry, L. L., Bolton, R. N., Bridges, C. H., Meyer, J., Parasuraman, A., & Seiders, K. (2010). Opportunities for innovation in the delivery of interactive retail services. *Journal of Interactive Marketing,* 24(2), 155-167.
Bredahl, J. L., (2001). Determinants of Consumer Attitudes and Purchase Intentions with Regard to Genetically Modified Food – Results of a Cross-National Survey. *Journal of Consumer Policy.* 24.
Brown, J., Fatehi, L., & Kuzma, J. (2015). Altruism and skepticism in public attitudes toward food nanotechnologies. *Journal of Nanoparticle Research*. 17. 122.
Capon, A., Gillespie, J., Rolfe, M., & Smith, W. (2015). Comparative analysis of the labelling of nanotechnologies across four stakeholder groups. *Journal of nanoparticle research: an interdisciplinary forum for nanoscale science and technology*, *17*(8), 327.
Chen, M., Lin, Y., & Cheng, T. (2013). Public attitudes toward nanotechnology applications in Taiwan. *Technovation*, 33(s 2-3), 88–96.
Cobb, D. M. & Macoubrier, J. (2004). Public perceptions about nanotechnology: Risks, benefits and trust. *Journal of Nanoparticle Research,* 6, 385-405.
D'Silva, J., & Bowman, D.M (2010) To label or not to label? It's more than a Nano-sized question. *European Journal of Risk Regulation,* 4, 420–427.
European Commission. (2010). Eurobarometer 73.1 Biotechnology Report. Retrieved from http://ec.europa.eu/commfrontoffice/publicopinion/archives/ebs/ebs_341_en.pdf Accessed 10 April 2019.
Fishbein, M., & Ajzen, I. (1975). Belief. Attitude, Intention and Behaviour: An introduction to theory and research, Addison-Wesley.
Goldsmith, R. E., Moore, M. A., & Beaudoin, P. (1999). Fashion innovativeness and self-concept: a replication". *Journal of Product & Brand Management,* 8(1), 7-18.
Hung, S.C, & Chu, Y.Y. (2006). Stimulating new industries from emerging technologies: challenges for the public sector. *Technovation*, 26 (1), 104-110.
Kline, R.B. (2016). Principles and Practice of Structural Equation Modelling, Fourth Edition. The Guilford Press: New York.
National Nanotechnology Initiative. (2014). Retrieved from https://www.nano.gov/nanotech-101/special Accessed 08 April 2019.
Nerlich, B. D., Clarke, D., & Ulph, F. (2007). Risks and benefits of nanotechnology: How young adults perceive possible advances in nanomedicine compared with conventional treatments. *Health, Risk & Society*, 9(2), 159-171.
R Core Team (2018). R: A language and environment for statistical computing. R Foundation for Statistical Computing, Vienna, Austria.
URL: https://www.r-project.org/

Renn, O., & Rocco, M.C. (2006). Nanotechnology and the need for risk governance. *Journal of Nanoparticle Research*. 8(2). 153-191.
Revelle, W. (2018). psych: Procedures for Personality and Psychological Research, Northwestern University, Evanston, Illinois, USA, https://cran.r-project.org/web/packages/psych/ Version = 1.8.12.
Scheufele, D., & Lewenstein, B. (2005). The Public and Nanotechnology: How Citizens Make Sense of Emerging Technologies. *Journal of Nanoparticle Research*, 7, 659-667.
Srinivasan K, Rajanikumar K, Sheetal Bhardwaj K, Lalitha Kumari B, Murthy Chavali. Nanotechnology Trends in Fashion and
Textile Engineering. Curr Trends Fashion Technol Textile Eng . 2018; 2(3): 555590
Srinivasan, K., Rajanikumar, K., Sheetal, B. K., Lalitha, K. B, & Murthy, C. (2018). Nanotechnology Trends in Fashion and Textile Engineering. *Current Trends Fashion Technology and Textile Engineering,* (3).
Tomarken, A. & Waller, G.N. (2005). Structural Equation Modelling: Strengths, Limitations, and Misconceptions. *Annual review of clinical psychology*. 1. 31-65.
Trott, P. (2008). Innovation Management and New Product Development. 3rd edition. Pearson Education.
Tzou, R., & Lu, H. (2009). Exploring the emotional, aesthetic, and ergonomic facets of innovative product on fashion technology acceptance model. *Behaviour & Information Technology,* 28(4), 311-322.
Vargas, M. (2016). Structural Equation Modelling in R (Part 1). Retrieved from R-bloggers: https://www.r-bloggers.com/structural-equation-modelling-in-r-part-1 .
Yves, R. (2012). lavaan: An R Package for Structural Equation Modelling. *Journal of Statistical Software*. 48(2). 1-36.
URL: https://www.jstatsoft.org/article/view/v048i02.

Annex

Questionnaire:

Dimension	Item
Technology (Chen, Lin & Cheng, 2013)	Technology makes life more comfortable.
	Technology is necessary for the survival of an increasing world population.
	Scientific progress implies social welfare.
	Technology has improved the quality of life.
Consumer's Willingness to Invest in Nanotechnology (Brown & Kuzma, 2013)	Let's assume that adding an additional nanotechnology label increases the product's cost. Who should pay that extra cost?
	If the cost of the additional nanotechnology label was placed in part or totally on consumers through raising the price of labeled products, what is the maximum increase you would be willing to pay for a product to have it labeled with a nanotechnology label, if the initial cost without the nanotechnology label is 20 lei? Starting price without nanotechnology label 20 lei.
	Imagine that nanotechnology product labeling is mandatory in Romania and that for all products containing nanomaterials, you have the option of buying the product without nanomaterials. If the product containing nanomaterials is 20 lei, what is the maximum increase price you would be willing to pay for the product without nanomaterials?