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The Development of a Quantitative Measurement Scale to Assess Romanian Knowledge and Attitude Towards Sustainability and Sustainable Clothing

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Abstract

In the recent years, sustainability has received great emphasis, focusing on balancing environmental conservation with economic growth. While different approaches towards sustainability tend to focus on green, ethical, and political consumption practices, there is still a significant gap in the green literature regarding measurement tools for assessing individuals' comprehension and attitudes toward sustainable clothing consumption. To address this highlighted issue, our study proposes the development of a quantitative measurement scale created to evaluate sustainability, knowledge, and attitudes among Romanian consumers. The designed scale includes dimensions related to general sustainability concepts, sustainable clothing practices, and attitudes towards sustainable clothing. Conducted in Romania, our study investigates a sample of 1,087 respondents. With the help of the statistical method Exploratory Factor Analysis, we have determined the construct validity of the scale, showing strong reliability and validity, with high internal consistency and significant correlations between the found dimensions. The main contribution of our study consists of the usefulness brought with this novel tool for both researchers and practitioners to explore knowledge and attitudes toward sustainability and sustainable clothing. The application of the Sustainable Clothing Measurement Scale comes with the potential to assist consumer behaviour studies, along with policy initiatives, and educational activities that have the purpose of promoting or shaping sustainable practices within the textile industry and beyond. Nonetheless, this study offers insights to advocate for the continuous process of developing or discovering different sustainability initiatives in the context of consumer behaviour and industry practices by putting forward a measurement scale for understanding sustainable clothing consumption and closing in the literature's gap.

Keywords: sustainable clothing consumption, sustainability, scale development, measurement scale, attitudes.

JEL Classification: D12; C20; C10; Q56.

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1. Introduction

Sustainability has been recognised in the literature as a multidimensional concept that embodies through delicate consideration the balance of meeting present demands while ensuring future generations' ability to satisfy their own. This wide-ranging concept proposes the creation of an agreement between economic growth and environmental preservation (World Commission on Environment and Development, 1990). In addition, scholars performed a thorough investigation of various approaches to defining and forecasting the broad topic of sustainability (Balderjahn et al., 2013; Costanza & Patten, 1995). Among this vast terrain of inquiry, attention has increasingly converged on sustainable consumption, which encompasses practices such as green consumption (Peattie, 2010), political consumption (Halkier, 2004), and ethical consumption (Devinney et al., 2010; Newholm & Shaw, 2007). However, these approaches often focus on specific aspects or drivers of sustainable behaviour, leaving gaps in understanding the broader scope of sustainable consumption (Balderjahn et al., 2013).

Numerous measurement tools have been developed to capture dimensions of sustainability, including environmental, social, and economic aspects (Balderjahn et al., 2013; Gilg et al., 2005; Iwata, 2006; Pepper et al., 2009). Recent efforts have seen the development of scales that assess sustainable consumption behaviour (Fischer et al., 2017; Geiger et al., 2018) and awareness of sustainable consumption (Balderjahn et al., 2013). Considering this well-documented progress, there is still a lack of theoretical frameworks and measurement scales for assessing individuals' understanding and attitudes toward sustainable clothing consumption.

2. Problem Statement and Research Aims

Intending to address the existing gap that was identified in the literature, the research aim is to develop a scale that will solve the absence of theoretical frameworks that measure sustainable consumption. This novel measurement tool will focus mostly on the sustainable consumption of clothing and the textile market. Unlike other sustainability measures, this particular scale does not refer to specific behaviours or situations; instead, it looks, in general terms, at one's perceptions of sustainability. This study intends to encapsulate the main understanding and attitudes toward sustainability posed by respondents in the fashion context by diverting certain agenda items and considering only those elements which bring benefits to the purpose of the measurement aid.

Importantly, this scale contains the personal assessments of the respondents regarding sustainability in the fashion industry instead of advising how the subject should be reached. This approach contrasts with existing scales that assess attitudes toward governmental, corporate, or educational actions (Michalos et al., 2011) or focus on personal conservation behaviours tied to specific lifestyles (Milfont & Duckitt, 2004).

The identified research gap lies in the lack of a comprehensive measurement tool for assessing Romanian consumers' knowledge and attitudes towards sustainable

clothing consumption. Building on existing literature on sustainable consumption and measurement scales, our study seeks to fill this void by developing a scale tailored to the Romanian context.

Our main research objective is to create a reliable and valid measurement scale to evaluate people's attitudes and knowledge towards regarding the consumption of sustainable clothing, in light of the identified research gap.

The study's findings add to the body of knowledge on sustainable clothing consumption, as well as the practical interventions that may be implemented in Romania to encourage sustainable clothing consumption habits.

The paper overall structure is as follows: the next section details the methodology employed, while main findings are briefly presented in the fourth section. The study's conclusions and recommendations for further in-depth research areas, alongside practical implications are put forward in the final section.

3. Research Methodology

Data were collected in Romania starting from November until December 2020 with the help of an online self-administered questionnaire that has been shared on Facebook, LinkedIn, WhatsApp, and other social media networks. The sample comprises the responses of 1,087 respondents who have voluntarily and anonymously participated. They gave their consent to participate in this study and have been informed of its purpose. The questionnaire embraces both convenience sampling (Baltar & Brunet, 2012) and snowball sampling (Browne, 2005; Heckathorn, 2011) techniques.

3.1 The Development of a Data Collection Tool

In the framework of this study which focusses on sustainable clothing, we intensively evaluated relevant pertinent literature on the development of measurement scales for sustainable clothing. Drawing on the insights gathered from previous research, we formulated a global 13-item scale to assess respondents' comprehension of sustainability in general and sustainable clothing in particular. The Sustainable Clothing Measurement Scale (STB) measures dimensions such as the conceptualisation of sustainability, attitudes toward sustainability, particularly in the context of clothing, and the knowledge regarding sustainable clothing practices.

The components of this proposed scale wish to reflect fundamental notions for understanding of sustainability while incorporating pivotal insights like the need for environmental conservation and the demand for resource preservation. Thus, we introduced items showing the general idea of sustainability and we used, for instance, statements like "Sustainability refers to establishing a balance between economic growth and environmental protection". In addition, we have captured the perception statements appreciating attitude view in regard to sustainability and sustainable clothing like, "A sustainable attitude means taking into account the need to preserve the planet for present and future generations whereas considering the economic, environmental, and social factors". In addition, the STB will assess people's awareness of sustainable clothing by attaining their perception of topics like

restricting the natural environmental impact of agrochemicals and sourcing materials from in an environmentally responsible manner.

The items of the scale were formulated in Romanian as this would guard against cultural alienation and ensure the items were accessible and easily understood. The STB was included as an introduction put in the main questionnaire. Basically, STB was to help identify the perceptions and attitude of the respondent.

Respondents answered the scale using the seven-point Likert scale, from 1 for very low agreement to 7 for very high agreement. Table 1 leaves no place for doubt of what kind of scale constructs were used, so that its methodology is fully transparent and reproducible.

Table 1. Sustainability measurement scale constructs

Dimension	Items	Abbreviation
Sustainability Measurement Scale	Sustainability refers to the quality of an activity that must be carried out without exhausting available resources and without destroying the environment.	STB1
	Sustainability refers to the establishment of a balance between economic growth and environmental protection.	STB2
	Sustainability involves finding alternative resources without compromising the ability to meet the needs of future generations.	STB3
	The principles of sustainability are: reduction, reusing, and recycling.	STB4
	A sustainable attitude means taking into account the need to preserve the planet for present and future generations, while also considering economic, environmental, and social factors.	STB5
	Sustainable fashion implies not changing our clothes based on the ongoing trend, but adapting fashion so as to protect the ecological footprint.	STB6
	Sustainable clothing refers to fabrics derived from environmentally friendly resources, such as sustainably grown fibre crops, or recycled materials.	STB7
	Sustainable clothing is special since they are processed in an environmentally friendly way.	STB8
	Sustainable clothing reduces the impact of agrochemicals on the environment.	STB9
	Through the use of sustainable clothes, it is intended to reduce the amount of clothing discarded in landfills.	STB10
	Having a sustainable attitude towards clothing implies purchasing clothes from second-hand outlets.	STB11
	To have a sustainable attitude towards clothing means donating or recycling clothes in order to be reused or resold.	STB12
	To have a sustainable attitude implies to have few things and of very good quality.	STB13

Source: author's own research.

3.2 Research Methods

For the statistical procedures we used R software, version 4.0.3 (R, 2021). We launched our analysis by checking primarily the reliability of the measurement scale, along with the correlation matrix and the adequacy test. We continued with the evaluation of the construct validity of the scale and conducted an exploratory factor analysis (EFA) to determine potential latent constructs within the STB dimension. The functions involved in performing EFA for this study, are accessible in the "psych" package in R. For the purpose of this paper, we use the principal axis as an extraction method and the "varimax" rotation. Exploratory factor analysis is a useful strategy for model specification prior to cross-validation with confirmatory factor analysis (Gerbing & Hamilton, 1996). Therefore, subsequently to extracting the factors, we performed a confirmatory factor analysis (CFA) to evaluate the model performance (Schreiber et al., 2006). The confirmatory factor analysis functions are found in the "lavaan" package in R (R, 2021).

4. Findings

The final sample consists of 1,018 respondents (87.3% female), aged 10 to 80 (mean 33.75, SD = 11.88), 84.2% of them having a monthly income greater than 1000 RON. We structured our findings in three sections: the first one approaches the reliability and homogeneity of the instrument, followed by the exploratory factor analysis, while the last one explores the confirmatory factor analysis. We have chosen this method for a more complete summarisation of the data.

4.1 Exploratory Factor Analysis (EFA)

We started the analysis by testing the reliability and homogeneity. During this stage, we used Cronbach's Alpha reliability index, the Kaiser-Meyer-Olkin (KMO) coefficient, and the Bartlett test to control whether the data were suitable for further tests. For a KMO coefficient above the threshold of 0.60 and a significant result obtained with Bartlett's test, we consider to have an indication of the data stability for factor analysis (Çelikler & Aksan, 2016). Furthermore, Cronbach's alpha returned satisfactory results, above the 0,7 threshold (Cortina, 1993).

We gather enough evidence to demonstrate the suitability of the data set for the factor analysis based on Bartlett's test, which was carried out to evaluate the stability for the factor analysis of the data from our 13-item scale, the significant statistic chi-square, the KMO coefficient and Cronbach's alpha. The results are shown in Table 2.

Table 2. Reliability and homogeneity tests' results

Measurement index	Value	
Cronbach's alpha	0.86	
KMO measure of sample adequacy	0.92	
Bralette's test approximate Chi-square value	1566.2	Df = 2, p-value <2.2e-16

Source: author's own research.

Following the exploratory factor analysis (EFA), three factors were identified, with a cut-off point of 0.4. The total variance accounted for by them was 50%, while the total variance estimated by each factor was 21%, 18%, and 11%. According to the standard methodology for the EFA, the item factor should be 0.30 or greater. Research on scale development and adaptation indicates that item factor load values should be at least 0.30 concerning this subject. Based on our estimations, we discovered that item 13 had a value below the proposed threshold, for this reason it was decided to be dropped from the scale. Therefore, the main principle for evaluating the results of the factor analysis is the factor load, defined as the correlation between variables and factors (Çelikler & Aksan, 2016).

Using the "varimax rotation technique" (R, 2021), the items were dispersed between three distinctive factors, with factor load values ranging between 0.43 and 0.80. An evaluation of the content indicated that they were grouped under factors with good internal compatibility. This gave us the opportunity to name the factor-based subject of their respective latent variable. Furthermore, we performed an analysis to calculate the Cronbach Alpha to determine the reliability of the dimension scores. The alpha reliabilities of the first, second, and third factors were calculated as 0.8, 0.82, and 0.68. The estimated values illustrated these factors to perform reliable assessments. The factor values identified for the sustainability measurement scale items along with their given dimensions and their reliability index are shown in Table 3.

Table 3. Sustainability measurement scale constructs

Dimension	**Items**	**Factor 1 0.21**	**Factor 2 0.18**	**Factor 3 0.11**
General Sustainability 0.8	STB1: Sustainability refers to the quality of an activity that must be carried out without exhausting available resources and without destroying the environment.	0.61		
	STB2: Sustainability refers to the establishment of a balance between economic growth and environmental protection.	0.62		
	STB3: Sustainability involves finding alternative resources without compromising the ability to meet the needs of future generations.	0.66		
	STB4: The principles of sustainability are: reduction, reusing, and recycling	0.58		
	STB5: A sustainable attitude means taking into account the need to preserve the planet for present and future generations, while also considering economic, environmental, and social factors.	0.58		

Dimension	Items	Factor 1 0.21	Factor 2 0.18	Factor 3 0.11
Sustainable clothing 0.82	STB6: Sustainable fashion implies not changing our clothes based on the ongoing trend, but adapting fashion so as to protect the ecological footprint.		0.43	
	STB7: Sustainable clothing refers to fabrics derived from environmentally friendly resources, such as sustainably grown fibre crops, or recycled materials.		0.61	
	STB8: Sustainable clothing is special since they are processed in an environmentally friendly way.		0.71	
	STB9: Sustainable clothing reduces the impact of agrochemicals on the environment.		0.66	
	STB10: Through the use of sustainable clothes, it is intended to reduce the amount of clothing discarded in landfills.		0.50	
Sustainable attitude 0.8	STB11: Having a sustainable attitude towards clothing implies purchasing clothes from second-hand outlets.			0.80
	STB12: To have a sustainable attitude towards clothing means donating or recycling clothes in order to be reused or resold.			0.62

Source: author's own research.

4.2 Confirmatory Factor Analysis (CFA)

Confirmatory factor analysis (CFA) was performed to assess the structural validity of the instrument developed according to the model attained following the exploratory factor analysis. During this stage of the analysis, the Root Mean Square Error of Approximation (RMSEA), the Standardised Root Mean Square Residuals (SRMR), the Comparative Fit Index (CFI) and the Tucker-Lewis Index (TLI) were used as the model's fit indices. Their values were juxtaposed with those described and identified in the literature. Therefore, we took into account the general cut-off for the four indexes, RMSEA lower than 0.06, SRMR lower than 0.08, CFI above 0.9, and TLI above 0.9. Based on the results obtained, the fit indices were determined as RMSEA = 0.045, SRMR = 0.029, CFI = 0.976 and TLI = 0.969. The results were satisfactory, therefore, we proceeded to explore a second-order model with a four-factor solution. We checked for the same goodness-of-fit indicators using two different statistical methods. For the "marker" method provided by the "lavaan" library (R, 2021), the results were as follows: RMSEA = 0.053, SRMR = 0.055, CFI = 0.966, TLI = 0.958. We also tested the model using the "var std" method, from the same library (R, 2021), and the identified values for our second order model were RMSEA = 0.048, SRMR = 0.034, CFI = 0.973, TLI = 0.966. The results of this analysis are provided in Table 4.

Table 4. Confirmatory Factor Analysis Goodness of Fit Indices

	RMSEA (*< 0.06)	**SRMR** (* < 0.08)	**CFI** (* > 0.9)	**TLI** (* > 0.9)
Three factor model	0.045	0.029	0.976	0.969
Second order model 1	0.053	0.055	0.966	0.958
Second order model 2	0.048	0.034	0.973	0.966

Source: author's own research.

According to our confirmatory factor analysis, both the three-factor and the four-factor models have good performance, and in this sense, they seem to be measuring the same thing. Both second-order models show that there is an integrative latent construct, namely the meaning of sustainability.

5. Conclusions

In this study, our aim of addressing the research gap on the measurement of Romanian consumers' knowledge and attitudes toward sustainable clothing consumption has culminated in the development and validation of the Sustainable Clothing Measurement Scale (STB). By synthesising insights from existing literature and drawing from principles of sustainability, we constructed a comprehensive instrument tailored to the Romanian context.

The STB, consisting of thirteen handmade items, serves as a versatile tool to assess multiple dimensions of sustainable fashion consumption. Based on the fundamental principles of sustainability, the scale includes aspects such as the conceptualisation of sustainability, attitudes toward sustainability in the context of clothing, and knowledge of sustainable clothing practices. The new developed tool was measured on a seven-point Likert-type scale and, by translating the items, we ensured the cultural relevance and accessibility of the scale to our target respondents in Romania. The new instrument was then evaluated by 1,018 respondents.

The findings of both the exploratory factor analysis (EFA) and the confirmatory factor analysis (CFA) showed strong evidence of the STB's reliability and validity. With the help of the EFA the scale used in this study was found to consist of three distinct factors: general sustainability, sustainable clothing, and sustainable attitude. These factors showed satisfactory internal consistency as indicated by high Cronbach's alpha values. Additionally, the CFA supported the structural validity of the scale, with both three-factor and four-factor models exhibiting good fit indices.

Here, the "meaning of sustainability" is established as an overarching latent construct. Accordingly, there is a strong focus by STB on the integrative nature of sustainability. With such an overarching perspective, there is a view to going beyond the specific dimensions, underlining the complementarity of the economic, ecological, and social factors in the development of sustainable behaviors.

This paper should have major practical and academic implications for actions aimed at promoting sustainable fashion consumption in Romania. The development process of STB contributes de facto to the academic literature with the development

of a new instrument promising to assess someone's knowledge and attitude towards sustainable clothing consumption and, therefore, pave the path for future empirical investigations in this field of research. The results of this study could also serve as an inspiration in designing programmes and policies aimed at inducing sustainable behaviour among Romanian consumers.

One of the key actors who would very greatly benefit from STB's findings is the fashion industry. This could be done by employing the scale to better discover and understand consumers' perceptions and preferences for shaping the group's needs with regard to sustainable fashion. These are the insights the tool provides, with which businesses can make adjustments to their marketing strategies and product offerings in a manner that resolves consumers' needs and at the same time reflects their values. It is, at last, going to benefit and contribute to the ecosystem's betterment in terms of sustainable fashion. There are certain limitations that need to be acknowledged, despite of the highlighted contributions made through this study. One of these limitations stands in the different biases that can appear as a result of using the online survey method and also based on the reliance on self-reported data. These biases could restrict the applicability of our findings. Another limitation of this study stands in a demographic characteristic, namely the large percentage of sample's respondents that had greater monthly incomes. This specific part of the sample has the potential of skewing our results in favour of a more affluent demographic. However, future research could correct this limitation through the use of different method approaches that would broaden this study's viability and include a larger demographic group. Also, it is possible that when designed, the scale's items have not included all of the relevant characteristics on the subject of sustainability and sustainable clothing. Future studies should be conducted to identify and correct these flaws to improve its return of value. Acknowledging these limitations stands as a starting point for further research wishing to contribute to the consumption of sustainable clothing.

On a concluding note, this study's development and validation of the Sustainable Clothing Measurement Scale wants to make a first step in comprehending sustainable clothing consumption in Romania. This also constitutes a step toward fostering a more sustainable future for the fashion industry and past it.

Bibliography

[1] Balderjahn, I., Peyer, M., Paulssen, M. (2013). Consciousness for fair consumption: Conceptualization, scale development and empirical validation. International Journal of Consumer Studies, 37(5), 546–555. https://doi.org/10.1111/ijcs.12030.

[2] Baltar, F., Brunet, I. (2012). Social research 2.0: Virtual snowball sampling method using Facebook. Internet Research, 22(1), 57-74. https://doi.org/10.1108/10662241211199960.

[3] Browne, K. (2005). Snowball sampling: Using social networks to research non-heterosexual women. International Journal of Social Research Methodology, 8(1), 47-60. https://doi.org/DOI: 10.1080/1364557032000081663.

[4] Çelikler, D., Aksan, Z. (2016). The development of an attitude scale to assess the attitudes of high school students towards renewable energy sources. Renewable and Sustainable Energy Reviews, 54, 1092-1098. https://doi.org/10.1016/j.rser.2015.10.049.

[5] Cortina, J.M. (1993). What is coefficient alpha? An examination of theory and applications. Journal of Applied Psychology, 78(1), 98-104. https://doi.org/10.1037/0021-9010.78.1.98.

[6] Costanza, R., Patten, B.C. (1995). Defining and predicting sustainability. Ecological Economics, 15(3), 193-196. https://doi.org/10.1016/0921-8009(95)00048-8.

[7] World Commission on Environment and Development (1990). Our Common Future. Oxford University Press.

[8] Devinney, T.M., Auger, P., Eckhardt, G.M. (2010). The Myth of the Ethical Consumer Hardback with DVD. Cambridge University Press.

[9] Fischer, D., Böhme, T., Geiger, S.M. (2017). Measuring young consumers' sustainable consumption behavior: Development and validation of the YCSCB scale. Young Consumers, 18(3), 312-326. https://doi.org/10.1108/YC-03-2017-00671.

[10] Geiger, S.M., Fischer, D., Schrader, U. (2018). Measuring What Matters in Sustainable Consumption: An Integrative Framework for the Selection of Relevant Behaviors. Sustainable Development, 26(1), 18-33. https://doi.org/10.1002/sd.1688.

[11] Gerbing, D.W., Hamilton, J.G. (1996). Viability of exploratory factor analysis as a precursor to confirmatory factor analysis. Structural Equation Modeling: A Multidisciplinary Journal, 3(1), 62-72. https://doi.org/10.1080/10705519609540030.

[12] Gilg, A., Barr, S., Ford, N. (2005). Green consumption or sustainable lifestyles? Identifying the sustainable consumer. Futures, 37(6), 481-504. https://doi.org/10.1016/j.futures.2004.10.016.

[13] Halkier, B. (2004). Political Virtue and Shopping: Individuals, Consumerism and Collective Action. Perspectives on Politics, 2(3), 575-576. https://doi.org/10.1017/S1537592704310376.

[14] Heckathorn, D.D. (2011). SNOWBALL VERSUS RESPONDENT-DRIVEN SAMPLING. Sociological Methodology, 41(1), 355-366. https://doi.org/10.1111/j.1467-9531.2011.01244.x.

[15] Iwata, O. (2006). An Evaluation of Consumerism and Lifestyle as Correlates of a Voluntary Simplicity Lifestyle. Social Behavior and Personality: An International Journal, 34, 557-568. https://doi.org/10.2224/sbp.2006.34.5.557.

[16] Michalos, A.C., Creech, H., McDonald, C., Kahlke, P.M.H. (2011). Knowledge, Attitudes and Behaviours. Concerning Education for Sustainable Development: Two Exploratory Studies. Social Indicators Research, 100(3), 391-413. https://doi.org/10.1007/s11205-010-9620-9.

[17] Milfont, T.L., Duckitt, J. (2004). The structure of environmental attitudes: A first- and second-order confirmatory factor analysis. Journal of Environmental Psychology, 24(3), 289-303. https://doi.org/10.1016/j.jenvp.2004.09.001.

[18] Newholm, T., Shaw, D. (2007). Studying the ethical consumer: A review of research. Journal of Consumer Behaviour, 6(5), 253-270. https://doi.org/10.1002/cb.225.

[19] Peattie, K. (2010). Green Consumption: Behavior and Norms. Annual Review of Environment and Resources, 35(1), 195-228. https://doi.org/10.1146/annurev-environ-032609-094328.

[20] Pepper, M., Jackson, T., Uzzell, D. (2009). An examination of the values that motivate socially conscious and frugal consumer behaviors. International Journal of Consumer Studies, 33, 126-136. https://doi.org/10.1111/j.1470-6431.2009.00753.x.

[21] R, P. (2021). R: The R Project for Statistical Computing. https://www.r-project.org/

[22] 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. https://doi.org/10.3200/JOER.99.6.323-338.