Sustainable future: the relationship between personality traits and the sustainable behavior of university students

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ABSTRACT

The main duty of today's society is to reduce unsustainable practices. One of the areas for change concerns the major driver of sustainable development: sustainable consumption behavior. This study investigates the relationship between personality traits and sustainable consumption behavior amongst university students. Using the HEXACO model of personality and Partial Least Squares Structural Equation Modeling (PLS-SEM), this research aimed to explore the influence of conscientiousness, openness to experience, honesty-humility, and agreeableness on sustainable consumption behavior. The research was conducted with 127 participants, showing that conscientiousness and openness to experience are significant and the most important drivers of sustainable consumption behavior. This study demonstrates that including elements targeted at specific personality traits in the various sustainable initiatives, such as marketing campaigns, may positively affect the change in sustainable consumption behavior among students.

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Keywords
Sustainable Consumption Behavior, Personality Traits, HEXACO, PLS-SEM, University Students.

1. INTRODUCTION

Research has proved that climate change and its negative consequences are inevitable (Berrang-Ford et al., 2011) and they are already affecting every region across the globe (IPCC, 2023). Moreover, the deteriorating state of the environment presents both direct and indirect risks to public health and the sustainability of healthcare systems (World Health Organization, 2023). The research consistently supports the view that the main drivers of the progressing climate change are human activities (IPCC, 2021). Therefore, the current environmental crisis requires changes in society. One of the areas for change concerns the major driver of sustainable development: the sustainable consumption behavior (Wang & Udall, 2023). The increase in the planet's population has led to a significant rise in an unsustainable consumption pattern, which exhausts natural resources 50% faster than they can be replenished (De Morais et al., 2021). Research suggests that realistic changes in consumer behavior could significantly reduce carbon footprints (Thøgersen, 2021). Hence, the need to understand the drivers of sustainable consumption practices to increase sustainable consumption behavior is significant.

The phenomenon has been defined by existing literature as a consumption behavior that is based on minimal environmental damage, and usage of natural resources in a way that ensures healthy conditions of living, considering future generations as well (Sargin & Dursun, 2023). Research has revealed that despite increasing environmental awareness in society, consumers are not making enough sustainable decisions (Juvan & Dolničar, 2014). What is more, numerous drivers and their influence of sustainable consumption behavior are being explored by academic literature. Some of the most frequently studied drivers are political affiliation (Mathur & Moschis, 2022); religion (Minton et al., 2015); personal values, beliefs and norms (Onel, 2023); demographic factors and attitudes (Kumar, 2023); intentions (Jang & Cho, 2022); brand loyalty (Panda et al., 2020); environmental knowledge, risk perception and environmental concern (Saari et al., 2021); environmental awareness (Da Costa et al., 2021); marketing practices (Bryła et al., 2022); spirituality (Saxena & Sharma, 2023); and personality traits (Soutter et al., 2020). In most cases drivers are studied in various combinations, for instance Mathur and Moschis (2022), investigate the relationship between political affiliation, personal values, and sustainable consumption. While investigating the relationship between variables from distinct domains leads to profound insights, there is a call for further and more focused research on domains such as demographic factors, personal values, and personality traits (Dimitrova et al., 2022).

There is a considerate need to deepen the knowledge regarding personality traits and their impact on sustainable consumption behavior solely. Thus, the purpose of this paper is to investigate the impact of four most important personality traits from the HEXACO model on sustainable consumption behavior. HEXACO is built on the Big Five model of personality domains, which is developed by Ashton and Lee (Ashton et al., 2014). It represents a hierarchically organized six-dimensional personality framework (Pletzer et al., 2019), which is going to be explained further in the paper. It has been proved that openness to experience, conscientiousness, honesty-humility, and agreeableness has the highest correlation with pro environmental attitudes and behaviors, while extraversion and emotionality had non-significant or small correlations (Soutter et al., 2020; Pavalache-Ilie & Cazan, 2018). Therefore, the research will result in the development of a new model that includes the four most important traits mentioned. Not only will the model enrich the literature by investigating the impact of these personality traits on the sustainable consumption behavior, but it will also contribute to existing research on the topic by examining university students. Students being the future of the planet and adults with agency possess the capacity to effectuate change. This underscores the importance of researching different factors that influence their sustainable consumption behavior. Therefore, the research question that this paper seeks to answer is: *How do personality traits, namely openness, honesty-humility, agreeableness, and conscientiousness influence the sustainable consumption behavior of university students?*

This paper is a step towards closing the knowledge gap of personality influence, allowing to focus on one domain as opposed to most research papers concerned with the sustainable consumption behavior. An alternative theoretical framework that could have been utilized in this paper, is the Big Five personality traits model. The model has been used frequently in recent years in the field of sustainability and sustainable consumption behavior (e.g. Arpacı et al., 2022; Soutter et al., 2020; Akbar et al., 2020; Awais et al., 2020). However, Pletzer et al. (2019) state that "Up until now consensus existed among personality scholars that five domains capture most of the personality variance (…) Although the B5 is the predominant model of personality, re-analyses of lexical data that have become available (…) offer support for six cross-culturally replicable factors of personality, which are commonly known by the HEXACO acronym: Honesty-Humility, Emotionality, Extraversion, Agreeableness, Conscientiousness, and Openness to Experience" (pp. 370-371). Consequently, the model used in this paper is going to be the HEXACO six-factor model, to add on to the literature on the relationship between the model and sustainable consumption behavior.

From a theoretical perspective, a comprehensive literature review is going to be conducted, regarding the sustainable consumer behavior theories and psychological studies of personality traits. Furthermore, quantitative research will be utilized, with usage of primary data collected from university students. The process of collection of empirical data will be conducted through an online distributed survey. Moreover, design of the model and analysis of the results will be facilitated through the Partial Least Squares Structural Equation Modeling (PLS-SEM) methodology.

In order to change the consumption behavior, we must be aware of what is affecting it and to what extent. Since personality traits influence individuals universally, the findings of the study have significant potential for further academic investigation. The paper aims to give a better perspective of how personality traits affect sustainable consumption behavior and add on to the literature from the domain. Additionally, the findings may prove useful as a groundwork for development of actual strategies and initiatives for changing the consumption behavior in terms of personality across universities, organizations, and the society as a whole.

The paper will continue with a literature review which will result in the development of a theoretical model. Furthermore, in the methodology section the sample utilized in this paper, the operationalization of measurement models, and the method chosen will be described. Next, the analysis of the measurement and structural model will be conducted, and the results of the theoretical model will be presented. Moreover, the discussion and implications section include hypotheses testing and an explanation of the results obtained from both practical and theoretical perspectives. Lastly, the conclusion highlights the contributions and limitations of this paper and opportunities for future research.

2. LITERATURE REVIEW AND THEORETICAL MODEL

2.1 Sustainable Consumption Behavior and Personality

Sustainable consumption behavior is a complex and difficult to explain phenomenon (Sharma & Jha, 2017) that, as defined in the previous section, represents an approach of resource utilization and product consumption that minimizes environmental impact while considering the needs of present and future generations (Sargin & Dursun, 2023). While there is no specific author or timeframe of the development of the sustainable consumption behavior theory, literature suggests that the first discussions about the topic took place in 1950s (Chappells & Trentmann, 2015). Sustainable consumption behavior is related to terms such as environmental consumer behavior (Korkmaz & Uzunöz, 2023), proenvironmental consumer behavior (Folwarczny & Otterbring, 2021) and green consumption behavior (Ogiemwonyi & Jan, 2023). While the three initial terms have similar definitions, green consumption is defined by the authors more concretely as a behavior that promotes the use of green (or eco-friendly) products. Moreover, in recent years, there has been an increasing amount of research on the topic, due to the growing recognition of the environmental and social impact that consumption behavior has (Lim, 2017). What we know about the sustainable consumption behavior is largely based upon studies that investigate how consumption behavior is impacted by social and psychological factors (Wang & Udall, 2023).

Previous literature includes an extensive research on psychological and social drivers of sustainable consumption behavior, such as attitudes, values, and norms (e.g. Hong et al., 2024; Onel, 2023; Valentina et al., 2024; Arya et al., 2024), perceived behavioral control (e.g. Botha & Wiese, 2024), environmental knowledge, risk perception and concern (e.g. Zeng et al., 2023), and environmental awareness (e.g. Ali et al., 2021). However, there is a considerate need to expand the research on the relationship between personality traits and sustainable consumption behavior, since "Personality is a fundamental driver of individuals' motivations, beliefs, values, and consequently their attitudes and behavioral decisions, and could serve as a potent precursor to the development of pro-environmental attitudes and behaviors''(Hidalgo-Crespo et al., 2023).

The prominent theories that have contributed to investigating the relationship between personality traits and sustainable consumption behavior are the Theory of Planned Behavior (TPB), and Value-Belief-Norm Theory (VBN). VBN theory developed by Stern assumes that individuals' environmental values lead to the formation of environmental beliefs, which influences sustainable personal norms for behaviour (Lind et al., 2015). In literature on the domain, it has been applied in the context of consumers' sustainable fashion choices (e.g. Yang et al., 2024), and sustainable development of tourism (e.g. Park et al., 2022), for instance. Moreover, the theory also helped to establish that Big Five personality traits have a significant impact on individuals' pro-environmental behaviors (Hidalgo-Crespo et al., 2023). Furthermore, Ajzen's TPB suggests that attitudes, subjective norms, and perceived behavioral control are influenced by specific beliefs related to the behavior, social norms, and perceived barriers or facilitators to performing the behavior (Ajzen, 1991). In the literature on sustainable consumption behavior, the theory has been used in areas such as water conservation (e.g. Shahangian et al., 2024), or sustainable food consumption (e.g. Randall et al., 2024). In the context of personality, this theory has illuminated significant correlations

between the Big Five's agreeableness, openness, conscientiousness, and neuroticism with intentions toward household energy conservation (Q. Wang et al., 2021).

The most commonly used models for investigation of the relationship between personality and sustainable consumption behavior are going to be briefly reviewed in this section. A prevailing model in the literature in the domain is the previously mentioned Big Five model (Digman, 1990), nonetheless, models such as HEXACO (Ashton & Lee, 2001) or NEO-PI (McCrae et al., 2005) have also been used to investigate the relationship between personality and sustainable consumption behavior or its derivative factors. The table below will summarize some of that literature in chronological order.

Table 1. Previous research on the relationship between personality and sustainable consumption

Study	Personality traits model	Outcome variable	Study findings (relevant for this paper)
Fraj and Martinez (2006)	Big Five	Ecological consumer behavior	Direct effect (+) of extraversion, agreeableness, conscientiousness
Hirsh and Dolderman (2007)	Big Five	Environ-mentalism	Direct effect (+) of agreeableness, openness
Hirsh (2010)	Big Five	Environ-mental concern	Direct effect (+) of extraversion, openness, agreeableness, conscientiousness
Nga and Shamuganathan (2010)	Big Five	Sustain-ability	Direct effect (+) of agreeableness, conscientiousness
Markowitz et al. (2012)	NEO Personality Inventory, Six Factor Personality Questionnaire, HEXACO, Big Five	Pro-environ-mental behaviors	Direct effect (+) of openness, conscientiousness — Direct effect (−) of extraversion, neuroticism
Brick and Lewis (2014)	HEXACO	Emissions reducing behavior	Direct effect (+) of openness, conscientiousness, extraversion, agreeableness, honesty-humility — Direct effect (−) of emotionality
Song and Kim (2016)	Big Five	Socially respon-sible consum-ption and disposal behavior	Direct effect (+) of openness, conscientiousness

Soutter et al. (2020)	Big Five and HEXACO	Pro-environmental attitudes and behaviors	Direct effect (+) of openness conscientiousness, extraversion (small but significant), agreeableness, and honesty-humility Nonsignificant effect of neuroticism
Gustavsen and Hegnes (2020)	Big Five	Consumption of organic food	Direct effect (+) of agreeableness, openness Direct effect (−) of extraversion, conscientiousness, neuroticism

Source: The primary source of this table is Bowen et al. (2022). Additional information has been incorporated from Soutter et al. (2020) and Gustavsen and Hegnes (2020).

As can be observed from the table, the results of previous research appear to be ambiguous. There are significant differences between the effects of personality traits on outcome variables connected to the domain of sustainable consumption behavior. Moreover, there is a small number of studies that examine the relationship between personality and the construct of sustainable consumption behavior or the relationship itself without any additional variables. Hence, further examination of the relationship is needed.

2.2 HEXACO Model

The paper aims to investigate the relationship between personality traits and sustainable consumption behavior using the HEXACO model, which was developed by Ashton and Lee (2001). Despite the widespread usage of the Big Five model, recently there is a growing support for the six-dimensional model of personality (Marcus & Roy, 2017). In the HEXACO model, extraversion, conscientiousness, and openness correspond closely to their counterparts in the Big Five model, however emotionality and agreeableness are shifted variants of the Big Five dimensions. Additionally, the development of HEXACO resulted in a new factor of honesty-humility, which some researchers argue is an important aspect of personality not fully captured by the Big Five model (Ashton et al. 2014).

Two out of six factors from the HEXACO model (emotionality and extraversion) are going to be excluded from this research due to multiple reasons. Firstly, Soutter et al. (2020) uncovered only marginal correlation between emotionality and proenvironmental attitudes and behavior, while also noting a non-significant correlation between extraversion and the studied outcome variable. Moreover, Zhao (2023) and Pavalache-Ilie and Cazan (2018) yielded similar results, revealing that emotionality is the weakest predictor of sustainable behavior. Hence, based on prior research, the aim is to narrow the focus of the study to HEXACO personality traits that are likely to be more directly linked to sustainable `consumption behavior. In the following paragraphs, the descriptions of domain-level scales and facet-level scales are founded upon the HEXACO-PI, developed based on Ashton and Lee (2007; 2008), and Ashton et al. (2014).

Firstly, honesty-humility and openness to experience domain-level and facet-level scales are going to be described. People with scoring high on the honesty-humility scale avoid manipulating others for personal gain, are uninterested in breaking rules, lavish wealth, and luxuries, and feel no special entitlement to elevated social status. The facets of the domain are sincerity (tendency to be genuine), fairness (tendency to avoid fraud and corruption), greed avoidance (tendency to be uninterested in possessing lavish wealth and high social status), and modesty (tendency to be modest and unassuming). Individuals scoring high on the openness to experience scale immerse themselves in the beauty of art and nature, exhibit curiosity across diverse fields of knowledge, freely engage their imagination in daily life, and express interest in unconventional ideas or individuals. The facets include aesthetic appreciation (one's enjoyment of beauty in art and in nature), inquisitiveness (tendency to seek information about, and experience with, the natural and human world), creativity (preference for innovation and experiment), and unconventionality (tendency to accept the unusual).

Openness to experience has often been the strongest determinator of proenvironmental behavior (e.g. Markowitz et al., 2012; Brick & Lewis, 2014; Marcus & Roy, 2017). It is also worth mentioning, that Big Five's openness to experience (it is a different, but a similar construct to HEXACO's openness), has also been most frequently and significantly connected to proenvironmental behavior (Puech et al., 2019). Moreover, in the previous research honesty-humility has often had a somewhat weaker impact on environmentally friendly behavior (Brick & Lewis, 2014; Hilbig et al., 2012), or showed no relationship at all (Markowitz et al., 2012). However, in a more recent study of Soutter et al. (2020), that investigated the influence of HEXACO personality traits on proenvironmental attitudes and behavior, both honesty-humility and openness to experience positively influence the target construct. Therefore, on the basis of the most novel study on the relationship investigated in this paper (study of Soutter et al. (2020), literature presented in Table 1, and literature on HEXACO's openness to experience, the following hypotheses have been developed.

H1: Higher levels of honesty-humility positively influence sustainable consumption behavior.

H2: Higher levels of openness to experience positively influence sustainable consumption behavior.

Subsequently, domain-level and facet-level scales of agreeableness and conscientiousness are going to be described. Persons with very high scores on the agreeableness scale are forgiving, lenient in judging others, willing to compromise and cooperate with others, and can easily control their temper. Facets of the domain include forgiveness (willingness to feel trust and liking toward those who may have caused harm), gentleness (tendency to be lenient in dealings with other people), flexibility (willingness to compromise and cooperate with others), and patience (tendency to remain calm rather than become angry). Moreover, scoring high on conscientiousness means that a person can organize their time and their physical surroundings, work in a disciplined way toward their goals, strive for accuracy and perfection, and deliberate carefully when making decisions. Facets of this domain are organization (tendency to seek order in one's physical surroundings), diligence (tendency to work hard), perfectionism (tendency to be concerned with details) and prudence (tendency to deliberate carefully and to inhibit impulses).

Milfont and Sibley (2012) found that greater environmental value was significantly associated with higher Big Five's agreeableness and conscientiousness. In addition, Soutter et al. (2020) proved that HEXACO's equivalents of agreeableness and conscientiousness had also similar, but weaker than openness and honesty-humility, associations with proenvironmental behaviors and attitudes. On that basis, and previously discussed connection

between personality and sustainable consumption behavior investigated through VBN and TPB, as well as previous research presented in Table 1., the following hypotheses will be examined in the paper.

H3: Higher levels of conscientiousness positively influence sustainable consumption behavior.

H4: Higher levels of agreeableness positively influence sustainable consumption behavior.

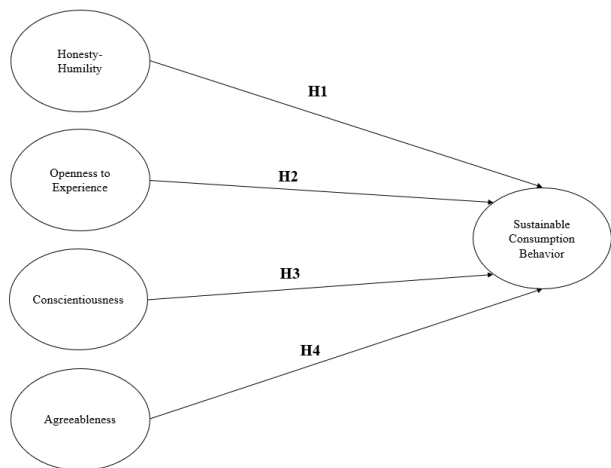Based on the hypotheses developed, a visualization of the theoretical model is presented in Figure 1.

Figure 1. Theoretical model

Source: H1 is based on the findings of Brick and Lewis (2014), Hilbig et al. (2012), and Soutter et al. (2020). H2 follows the findings of Markowitz et al. (2012), Brick and Lewis (2014), and Marcus and Roy (2017). H3 and H4 are in line with research of Milfont and Sibley (2012), and Soutter et al. (2020); own illustration.

3. METHODOLOGY

3.1 Sample

For this research, the data has been collected using an online distributed survey. The method employed is snowball sampling, which is an efficient and cost-effective convenience sampling method where existing study subjects recruit future study subjects (Naderifar et al., 2017). One of the limitations of the method is that sample diversity cannot be ensured (Kirchherr & Charles, 2018), as the dominant characteristic of the method is selection bias (Parker et al., 2020). The questionnaire has been distributed through three social media platforms: WhatsApp, Instagram, and Facebook. Furthermore, data collection has taken place between April 2024 and May 2024. Finally, participation in the survey was completely anonymous, and respondents could withdraw from the questionnaire at any time.

A total of 162 responses have been recorded. Responses from participants under the age of 18 and participants who were not students were excluded from the survey results. In 33 cases none of the measurement items were answered. Moreover, responses with a standard deviation below 0.25 have been removed, due to little to no variance among the answers. Ultimately, after data screening and cleaning the sample consists of 127 responses. Demographic data of the sample is presented in Table A.2.

3.2 Operationalization of the Measurement Models

Constructs of the theoretical model (Figure 1) have been measured through items presented in Table A.1. In this paper, all measurement models are formative (Hair et al., 2021). Constructs

of honesty-humility, openness to experience, agreeableness, and conscientiousness have been estimated based on the HEXACO-60 inventory (Ashton & Lee, 2009). Operationalization of these constructs using HEXACO-60 inventory follows the measurement approach applied by Abbasi et al. (2020), Jia et al. (2022), and Biderman et al. (2019). Initially, each personality construct consisted of six items. However, it is crucial to capture the entire domain of formative constructs as accurately as possible (Hair et al., 2019). Therefore, two items were removed from each construct, since each personality trait has four facets (e.g., openness to experience consists of inquisitiveness, aesthetic appreciation, creativity, and unconventionality). Items from the same facet group (e.g., three items measuring creativity for openness to experience) were considered for removal, and the ones with the lowest outer loadings were eliminated (Hair et al., 2021). Ultimately, as shown in Table A.1, each personality construct now includes four items, one from each facet.

The sustainable consumption behavior construct is based on the operationalization developed by Quoquab et al. (2019). The author defined sustainable consumption behavior using three facets: care for environmental well-being, quality of life, and care for future generations. Initially, the construct consisted of 6 items, 2 items per facet. However, in each facet, 1 item with lower outer loading has been removed applying the same reasoning as in the case of personality constructs. Thus, the sustainable consumption behavior construct consists of 3 items, 1 from each facet (Table A.1.).

3.3 Method

In structural equation modeling (SEM) practice two main methods are covariance-based SEM (CB-SEM) and partial least squares SEM (PLS-SEM). CB-SEM is used to confirm or reject theories and their hypotheses based on the accuracy with which a proposed theoretical model can replicate the covariance matrix for an observed sample (Hair et al., 2022). PLS-SEM, however, focuses on explaining the variance in the model's dependent variables with a so-called "casual-predictive" approach (Hair et al., 2019). Moreover, PLS-SEM is well-suited for exploring complex relationships among latent variables (Hair et al., 2017). In this study, the PLS-SEM method (Lohmöller, 1989; Sarstedtet al., 2017; Wold, 1982) was employed to evaluate the theoretical model developed (Figure 1). The method allows for estimation of complex models with much flexibility when it comes to data requirements and relationship specification between constructs and indicators (Hair et al., 2021). The PLS-SEM approach is particularly suitable for this research since the analysis is concerned with testing a theoretical framework from a prediction perspective, and the path model includes formatively measured constructs (Hair et al., 2019). It is worth mentioning, that the authors emphasize that PLS-SEM should always be the preferred SEM method in case of the presence of formative constructs. Moreover, PLS-SEM has been wildly used in the social science disciplines (Hair et al., 2022), and in the field of sustainable consumption behavior research (e.g, Armutçu et al., 2023; Bhardwaj et al., 2023; Trí & Nguyen, 2024; De Morais et al., 2021; Hasan, 2023). The theoretical model was estimated using SmartPLS 4 software (Ringle et al., 2024). In the next section, the bootstrapping procedure is utilized to determine the statistical significance of the theoretical model (Hair et al., 2021). Bootstrapping is applied with 10,000 subsamples, a two-tailed test, and the percentile approach.

4. RESULTS AND ANALYSIS

4.1 Analysis

4.1.1 Assessment of the measurement models

In this section, the bootstrapping procedure is utilized to determine the statistical significance of the theoretical model (Hair et al., 2021). Bootstrapping is applied with 10,000 subsamples, a two-tailed test, and the percentile approach.

The assessment of the measurement models is based on Hair et al. (2019), and Hair et al. (2021). Formative measurement models are evaluated based on the convergent validity, indicator collinearity, statistical significance, and relevance of the indicator weights. Indicator weights, loadings, p-values, t-values, and VIF values are presented in the Table A.3.

In order to assess convergent validity, the redundancy analysis would have to be conducted. To execute this procedure, it must be planned already in the research design stage, where alternative reflectively measured indicators are included in the questionnaire. Since at the beginning of the research design process formative measures were not planned to be used, and therefore, additional indicators were not included in the questionnaire, convergent validity cannot be assessed. Decision about using formatively measured constructs was made after making initial observations of data gathered and PLS-SEM results.

In order to assess the collinearity of the formative indicators, the variance inflation factor (VIF) is used. VIF values of 5 and above indicate critical collinearity issues, and ideally all of the VIF values should be below 3. As presented in Table A.3, all VIF values are below 3, which means that there are no concerns about the common method bias (CMB). Common method bias arises when the data collected is impacted by the measurement method, leading to indicators sharing common variation as a result of influences such as questionnaire instructions or social desirability biases (Kock, 2015).

Subsequently, statistical significance and relevance of the indicator weights is assessed. Hair et al. (2021) suggest that indicators with significant weights (confidence interval does not include 0, or p-value is lower than 0.05) should be retained. However, indicators with non-significant weights should definitely be removed if the outer loading is not significant and below 0.50. If indicators have non-significant weights, but significant or above 0.50 loading, they should be considered for removal. Following that reasoning, indicators A2, A3, A5, C1, C2, HH2, and O1 (Table A.3) should definitely be removed, since weights and loadings of these indicators are not significant, and loadings are below 0.5. Nevertheless, authors identify some reasons due to which a researcher should be careful when removing formative indicators. Following Hair et al. (2019), formative measurement models are limited in the number of indicator weights that can be statistically significant. Moreover, in formative constructs indicators must be able to capture the entire domain of a construct, in a way specified by the research in conceptualization stage. Lastly, since formative indicators are not interchangeable, removing even one indicator can lower measurement model's content validity. In order to capture the entire domain of all of the constructs present in the model, each facet must be represented by at least one item. Therefore, on the basis of discussed reasoning and the nature of constructs, which was specified in previous sections, none of the items can be removed.

Lastly, statistical relevance of indicator weights is assessed. Indicator weight close to 1 (or -1) indicates a strong (or weak) relationship. However, indicator weight close to 0 indicates a weak relationship. The most relevant indicators in each construct

are A4 (0.915), C4 (0.811), HH3 (0.663), O2 (0.776), and SB1 (0.715) (Table A.2). Whereas the indicators with the weakest relationships in each construct are A5 (-0.250), C1 (0.117), HH2 (0.052), O3 (0.141), and SB3 (0.287) (Table A.2).

4.1.2 Assessment of the structural model

Following Hair et al. (2019), and Hair et al. (2021), the assessment of the structural model is executed. The assessment will consist of an inspection of potential collinearity issues between constructs, an evaluation of the significance and relevance of the structural model relationships, and an examination of model's explanatory power.

Potential collinearity issues are assessed through the VIF values (see Table A.4), similarly as in the formative measurement models (Hair et al., 2019). All of the VIF values for the structural model are below 3, which means that there are no concerns about CMB.

Furthermore, the significance and relevance of the path coefficients is assessed (Hair et al., 2021). Path coefficients of conscientiousness and openness to experience are significant since the p-value in both cases is lower than 0.05 (see Table A.4). On the contrary, path coefficients of agreeableness and honesty-humility are not significant, therefore there may not be a reliable relationship between these two independent variables and the dependent variable. As shown in Figure 2, the path between conscientiousness and the target construct, which is sustainable consumption behavior, indicates the strongest relationship in comparison to other path coefficients ($\beta = 0.285$). It also shows that higher levels of consciousness lead to higher levels of the target construct. Similarly, results indicate that higher levels of openness to experience lead to higher levels of the sustainable consumption behavior ($\beta = 0.272$). Usually, the larger the sample size, the more likely a study will find a significant relationship if it exists (Thiese et al., 2016). The sample gathered for this research can be considered small (N=127), therefore path coefficients labelled as non-significant based on p-values will also be briefly discussed. The non-confirmatory relationship of honesty-humility with sustainable consumption behavior shows that higher levels of the former may lead to higher levels of the latter ($\beta = 0.165$). Whereas the non-significant relationship between agreeableness and the target construct shows that higher levels of agreeableness may lead to lower levels of the target construct ($\beta = -0.233$).

The explanatory power is assessed through the coefficient of determination (R^2) of the endogenous construct (Figure 2) (Hair et al., 2021). As shown in the model, exogenous constructs (honesty-humility, openness to experience, agreeableness, and conscientiousness) explain the sustainable consumption behavior construct ($R^2 = 0.244$). Which means that agreeableness, conscientiousness, honesty-humility, and openness to experience explained 24% of the variance in the sustainable consumption behavior construct. Conversely, in a similar study of Markowitz et al. (2012), where all HEXACO personality traits, connectedness to nature scale (CNS), and new ecological paradigm (NEP) were predictors of student environmental behavior, the target construct's variance was explained by its predictors in 39%. The structural model with path coefficients and R^2 is presented in the figure below.
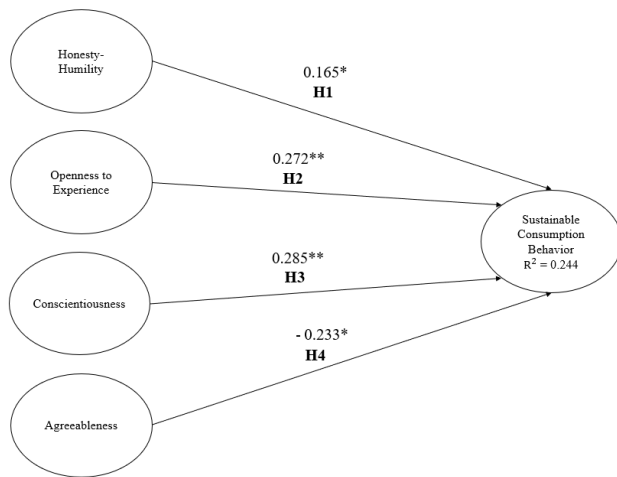
Figure 2. Theoretical model with results

Note. * = p >0.05, ** = p < 0.01

Source: SmartPLS 4; own illustration.

5. DISCUSSION AND IMPLICATIONS

5.1 Hypotheses testing

Hypothesis testing is a crucial part of this study as it aims to determine whether developed alternative hypotheses are confirmed. Hypotheses H1 and H4 are rejected since p-values are higher than significance level of 0.05 and the results demonstrated that agreeableness negatively influences sustainable consumption behavior (Figure 2). Conversely, H2 and H3 are supported, as p-values are lower than 0.05.

Therefore, the results indicate that honesty-humility and agreeableness do not positively influence sustainable consumption behavior. The reason behind negative path coefficient between agreeableness and sustainable consumption behavior might be connected to the fact that people who score high on this personality trait often prioritize compliance and maintaining relationships over making personal lifestyle changes (Wilmot & Ones, 2022). Following Wilmot and Ones (2022), and Ashton and Lee (2007; 2008) agreeable people tend to change their opinions or habits depending on their social surroundings, which may negatively affect their sustainable consumption practices. For instance, one tends to be more sustainable around their friends rather than their family, since their behavior matches the people around them. Additionally, agreeable people might steer away from sustainable consumption practices, so they avoid being perceived as judgmental of others' consumption choices. Furthermore, high p-values of honesty-humility and agreeableness constructs might have been the case due to low sample size or poor operationalization of constructs, and items' selection (Hair et al., 2021).

The results demonstrate that conscientiousness and openness to experience positively influence sustainable consumption behavior. Conscientious people value order, responsibility, and long-term benefits (Roberts et al., 2014), thus, they are more prone to practice sustainable consumption. In addition, results for openness to experience construct are in line with the characteristics of people that score high on this personality trait. People that are more open to experience enjoy and engage with innovative ideas, and appreciate nature (Ashton et al., 2014), which may further influence their inclination to engage in sustainable practices.

5.2 Theoretical implications

The research conducted contributes to the theoretical understanding of the relationship between personality traits and sustainable consumption behavior. On top of that, the paper contributes to the current research through the development of a new theoretical model (Figure 1).

The significant relationships between conscientiousness, openness to experience, and sustainable consumption behavior support the idea that individuals with higher levels of these traits are more likely to engage in sustainable consumption. Unexpectedly, conscientiousness seems to have the strongest influence on the target construct, which was not the case in the previous research. For instance, in the research done by De Almeida Ribeiro et al. (2016) Big Five's agreeableness, conscientiousness and openness, had a significant direct effect on constructs connected to sustainable consumption, however, conscientiousness was not the one with the strongest influence. Furthermore, higher levels of openness to experience lead to higher levels of sustainable consumption behavior, which is in line with the research of De Almeida Ribeiro et al. (2016) and Soutter et al. (2020).

On the other hand, the non-significant relationships for agreeableness and honesty-humility provide different insights. Despite being theoretically associated with prosocial behavior (Hilbig et al., 2014; Ashton & Lee, 2007), these traits may not directly influence sustainable consumption. This could be the case since the relationship between personality and sustainable consumption behavior is more complex and mediated by other factors such as age or income levels, which were not considered in this research.

PLS-SEM method is not a popularized approach in research that explores the relationship between HEXACO personality traits and sustainable consumption behavior. The methodology chosen in this paper highlights the uniqueness of the research, offering fresh insights and a novel analytical perspective. PLS-SEM's capacity to manage complex models and formative constructs provides a distinct framework for this investigation, which needs to be further explored involving better professional levels and resources.

5.3 Practical implications

Importance performance-map analysis (IPMA) is a useful PLS-SEM tool that compares the total effects (which represent construct's importance) with their average latent variable scores (showing the performance of a certain construct) (Ringle & Sarstedt, 2016). As the main objective of IPMA is to identify predecessors that show relatively high importance, but also relatively low performance, it was included in this research. This method is particularly important for managerial decision-making since it identifies critical areas for improvement (Ringle & Sarstedt, 2016).

In this research, IPMA results illustrate that interventions aimed at improving society's sustainable consumption behavior, such as marketing campaigns or educational programs, could benefit from targeting specific personality traits. As presented in Figure 3 and Table A.5, openness to experience (0.272) and conscientiousness (0.285) are the most important in explaining sustainable consumption behavior. Moreover, these two traits have the highest performance out of all predecessors (openness to experience: 75.131; conscientiousness: 66.378). Conversely, honesty-humility demonstrates lower importance (0.165) but also maintains considerable performance (63.542). Lastly, agreeableness shows small importance (-0.233) and performance (37.884) in comparison to other variables. Which might be the case due to poor measurement results of that construct discussed in section 5.1.
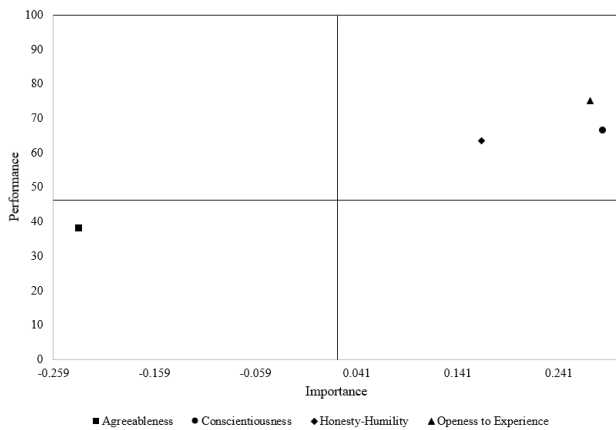
6

Figure 3. Importance-performance map

Source: SmartPLS 4; own illustration.

According to the IPMA results, marketers, policymakers, and other decision-makers should maintain their efforts in emphasizing elements that would appeal to individuals with high levels of conscientiousness and openness to experience, since both traits have high importance and performance in predicting sustainable consumption behavior.

Nevertheless, there is a small area for improvement for decision-makers in the honesty-humility trait dimension, thus the focus should be on including elements in the initiatives that would appeal to people who score high on that personality trait. Although honesty-humility presents much lower importance than previously mentioned personality traits, it still plays a role in sustainable consumption behavior. Therefore, educational programs and marketing campaigns should be reframed in a way that highlights ethical and moral dimensions (Soutter et al., 2020), incorporating values such as integrity and honesty associated with sustainable practices and honesty-humility construct.

Finally, agreeableness being in a lower left quadrant is not surprising, as structural model assessment results and hypotheses testing indicated that agreeableness does not have high importance. Potential reasons behind this result were explained in section 5.1. Thus, as agreeableness presents low importance, the low performance of that construct is irrelevant.

Approaching the problem of unsustainable consumption of society by focusing on specific personality traits may lead to more targeted and effective interventions. This personalized approach can improve the effectiveness of educational programs, marketing campaigns, and policy initiatives, ultimately leading to minimization of unsustainable consumption pattern of the population (Duong, 2021).

6. CONCLUSIONS

The main question this research aimed at answering was: *How do personality traits, namely openness, honesty-humility, agreeableness, and conscientiousness influence the sustainable consumption behavior of university students?* Moreover, one of the central goals of this research was to develop and investigate a new model, that includes the most important personality traits from the HEXACO framework. The results of this study show that both conscientiousness and openness to experience have significant and important impact on sustainable consumption behavior. On the other hand, honesty-humility and agreeableness turned out to be insignificant constructs. The results show that marketing or educational initiatives should be designed with an inclusion of elements that would reach and appeal to people with high levels of conscientiousness and openness to experience.

This research's significance is due to its contribution to the area of knowledge. It is one of the first studies to use the PLS-SEM methodology to explore the relationship between personality traits and sustainable consumption behavior. This approach allows for a novel perspective on the casual dynamic between the variables examined. On top of that, it expands the limited literature concerned with the HEXACO model and sustainable consumption, granting new insights into how personality traits act as drivers of sustainable consumption behavior. Furthermore, this study uses primary data, ensuring the original nature and relevance of the findings. It focuses on a specific and highly influential demographic group as it is based on university students. Thus, this paper adds on to the literature from the area of research on sustainable consumption and personality providing better overview of the young adults' and university students' demographics.

The study has some limitations that have to be acknowledged. For this paper, only 6 out of 10 questions per personality trait from the HEXACO-60 inventory (Ashton & Lee, 2009) have been used in the survey, due to the need to maintain participant engagement. This may have caused issues with the measurement model and its assessment, which further negatively affected the structural model. Therefore, formative constructs' content was not fully captured. Furthermore, another limitation of this research is the small sample size which has reduced the statistical power of the analysis (Thiese et al., 2016). In addition, another limitation associated with the sample is the uneven geographical distribution. Although the sample represents a considerable number of nationalities, most of participants are from Poland, Germany, and the Netherlands. Hence, the findings may be applicable mostly to individuals from these countries, which limits the generalizability of the results. On top of that, convergent validity was excluded from the measurement model assessment. In order to assess convergent validity, redundancy analysis is needed (Hair et al., 2019). This step requires a proper research design, with inclusion of reflective items in the questionnaire. Unfortunately, in this study, the necessary reflective items were not included, preventing the execution of redundancy analysis.

In conclusion, the research done could not fully encompass the extent of influence the investigated personality traits have on sustainable consumption behavior. Therefore, there is a considerate need for further investigation of the relationship between HEXACO personality traits and sustainable consumption behavior.

In future research a similar study could be conducted with larger and more diverse samples, in order to compare the results to the previous ones and substantiate the findings. Additionally, it is recommended to include all questions from HEXACO-60 inventory for operationalization of personality constructs, in order to fully encompass each trait domain. It is highly advised to do so in case of formative constructs (Hair et al., 2019). Similarly, inclusion of higher number of items in the sustainable consumption behavior construct may yield better results, since the construct would be captured in more depth. Future research should also focus on testing the model's predictive power and include convergent validity. On top of that, the model developed in this study could benefit from inclusion of mediating and moderating constructs (Hair et al., 2021).

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9. APPENDIX

APPENDIX A

Table A.1. Measurement items.

Construct	Measurement items	Source
Sustainable consumption behavior	*Quality of life being* SB1: I use my things wisely to avoid wastage. *Care for the environmental wellbeing* SB3: I try to avoid using plastic bags since it is not environmentally friendly. *Care for the future generations* SB6: It is my responsibility to control desire of excessive purchase for the sake of future generation.	Quoquab et al. (2019)
Honesty-Humility	*Sincerity* HH1: I wouldn't use flattery to get a raise or promotion at work, even if I thought it would succeed. *Greed avoidance* HH2: Having a lot of money is not especially important to me. *Modesty* HH3: I think that I am entitled to more respect than the average person is. *Fairness* HH4 I would never accept a bribe, even if it were very large.	Ashton & Lee (2009)
Openness to Experience	*Inquisitiveness* O1: I'm interested in learning about the history and politics of other countries. *Creativity* O2: I would enjoy creating a work of art, such as a novel, a song, or a painting. *Aesthetic Appreciation* O3: If I had the opportunity, I would like to attend a classical music concert. *Unconventionality* O5: I like people who have unconventional views.	
Agreeableness	*Forgiveness* A2: My attitude toward people who have treated me badly is "forgive and forget". *Gentleness* A3: I tend to be lenient in judging other people. *Flexibility* A4: I am usually quite flexible in my opinions when people disagree with me. *Patience* A5: Most people tend to get angry more quickly than I do.	
Conscientiousness	*Organization* C1: I plan ahead and organize things, to avoid scrambling at the last minute. *Diligence* C2: I often push myself very hard when trying to achieve a goal. *Perfectionism* C3: I always try to be accurate in my work, even at the expense of time. *Prudence* C4: I make a lot of mistakes because I don't think before I act.	

Note. All items were measured on a 5-point Likert scale. Items HH3, HH6, O6, C4, and C6 were reverse-coded following Ashton & Lee (2009).

Table A.2. Demographic data.

	Frequency	Percentage
Age		
Under 18	0	0
18 – 24	116	91.3
25 – 34	10	7.9
35 – 44	0	0
45 – 54	1	0

Over 55	1	0.8				
Nationality						
American	3	2.3				
Argentinian	1	0.8				
Belarusian	1	0.8				
Belgian	1	0.8				
Brazilian	1	0.8				
British	1	0.8				
Chinese	2	1.6				
Czech	1	0.8				
Dutch	18	14				
Estonian	1	0.8				
Ethiopian	1	0.8				
Finnish	1	0.8				
German	14	10.9				
Greek	7	5.4				
Indian	1	0.8				
Irish	1	0.8				
Italian	5	3.9				
Lithuanian	1	0.8				
Mexican	4	3.1				
Norwegian	1	0.8				
Palestinian	1	0.8				
Polish	46	35.7				
Portuguese	2	1.6				
Romanian	2	1.6				
Russian	1	0.8				
Slovak	2	1.6				
South Korean	2	1.6				
Spanish	3	2.3				
Swiss	1	0.8				
Syrian	1	0.8				
Ukrainian	2	1.6				

Source: SmartPLS 4; own tabulation.

Table A.3. Measurement models results.

Construct	Item	Facet	Outer weight	T statistics	P value of weight	Outer loading	P value of loading	VIF
Agreeableness	A2	Forgiveness	-0.367	0.751	0.453	-0.461	0.329	1.195
	A3	Gentleness	-0.342	0.771	0.441	-0.353	0.404	1.154
	A4	Flexibility	0.915	1.329	0.184	0.731	0.188	1.138
	A5	Patience	-0.25	0.494	0.621	-0.164	0.69	1.289
Conscientiousness	C1	Organization	0.117	0.305	0.76	0.404	0.318	1.185
	C2	Diligence	0.238	0.58	0.562	0.454	0.236	1.313
	C3	Perfectionism	0.192	0.5	0.617	0.504	0.135	1.267
	C4	Prudence	0.811	2.504	0.012	0.921	0.002	1.143
Honesty-Humility	HH1	Sincerity	0.505	1.206	0.228	0.579	0.124	1.227
	HH2	Greed avoidance	0.052	0.114	0.909	0.322	0.407	1.241

	HH3	Modesty	0.663	1.83	0.067	0.747	0.035	1.024
	HH4	Fairness	0.389	0.794	0.427	0.504	0.277	1.037
Openness to Experience	O1	Inquisitiveness	0.321	0.895	0.371	0.415	0.208	1.075
	O2	Creativity	0.776	1.723	0.085	0.909	0.011	1.406
	O3	Aesthetic appreciation	0.141	0.355	0.723	0.61	0.067	1.354
	O5	Unconventionality	0.15	0.349	0.727	0.501	0.155	1.166
Sustainable Consumption Behavior	SB1	Quality of life being	0.715	1.64	0.101	0.898	0.012	1.193
	SB3	Care for the environmental wellbeing	0.287	0.839	0.401	0.667	0.025	1.287
	SB6	Care for the future generations	0.29	0.759	0.448	0.571	0.106	1.169

Source: SmartPLS 4; own tabulation.

Table A.4. Structural model results.

	ß	T values	P values	Significance?	VIF
Agreeableness → Sustainable Consumption Behavior	-0.233	0.847	0.397	No	1.013
Conscientiousness → Sustainable Consumption Behavior	0.285	2.880	0.004	Yes	1.005
Honesty-Humility → Sustainable Consumption Behavior	0.165	1.663	0.096	No	1.013
Openness to Experience → Sustainable Consumption Behavior	0.272	2.654	0.008	Yes	1.006

Source: SmartPLS 4; own tabulation.

Table A.5. Importance-performance map analysis (IPMA) results.

IPMA on Sustainable Consumption Behavior	Total effects	Performance
Agreeableness	-0.233	37.884
Conscientiousness	0.285	66.378
Honesty-Humility	0.165	63.542
Openness to Experience	0.272	75.131

Source: SmartPLS 4; own tabulation.