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Article

Evaluation of sustainability awareness in Uzbekistan

Marketing i menedžment inovacij

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Reference: Veckalne, Regina/Us, Yana et. al. (2022). Evaluation of sustainability awareness in Uzbekistan. In: Marketing i menedžment inovacij 13 (3), S. 88 - 102.
https://armgpublishing.com/wp-content/uploads/2022/10/A637-2022-08_Veckalne-et-al-2.pdf.
doi:10.21272/mmi.2022.3-08.

This Version is available at:
<http://hdl.handle.net/11159/12839>

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EVALUATION OF SUSTAINABILITY AWARENESS IN UZBEKISTAN

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Type of manuscript: research paper

Abstract: *In the frame of this article, the authors maintained that natural resources and environmental conditions are the basis of material production and the life of the population. Systematization of the scientific sources on sustainable development indicated that the state of the environment and the quality level of resource use, protection, and reproduction largely determine the rates of economic growth and production efficiency. The relevance of this scientific problem decision is that at the present stage of economic development, consideration of the ecological and social factors when making decisions on sustainable development is becoming especially significant. One of the factors affecting social behaviors when it comes to sustainable decisions is awareness of the importance of sustainability. The primary purpose of this research is to measure sustainability awareness in Uzbekistan. A survey of 440 Uzbek citizens was conducted to fulfill the research aim. The survey results were analyzed using SmartPLS software. The paper presents the results of an empirical analysis, which showed that environmental awareness is positively and significantly connected with energy conservation. At the same time, the authors found that energy conservation is positively and significantly connected with sustainability issues. In line with the above findings, the obtained results allowed stating that sustainability issues are positively and significantly connected with sustainability awareness. The authors concluded that raising awareness among the population could positively effect the sustainability issues being solved in the region. The scientific novelty of this research could be described in the fact that, to the best of the authors' knowledge, no such research has been previously conducted.*

Keywords: sustainability awareness, Uzbekistan, environmental awareness, energy conservation.

JEL Classification: Q01, Q56.

Received: 20 May 2022

Accepted: 20 September 2022

Published: 30 September 2022

Funding: The research was funded by a grant from the Ministry of Education and Science of Ukraine, 0121U100468, «Green investing: cointegration model of transmission ESG effects in the chain «green brand» of Ukraine - social responsibility of business».

Publisher: Sumy State University

Cite as: Veckalne, R., Us, Y. & Gerulaitiene, N. (2022). Evaluation of Sustainability Awareness in Uzbekistan, *Marketing and Management of Innovations*, 3, 88-102.
<https://doi.org/10.21272/mmi.2022.3-08>



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Introduction. Natural resources and environmental conditions provide the foundation of material production and human existence. The quality of resource utilization, protection, and reproduction, as well as the state of the environment, heavily influence economic growth and production efficiency. Consideration of ecological and social issues while making decisions about sustainable development is becoming more crucial for social development.

According to proponents of the value-belief-norm theory, awareness of the adverse effects of the environment is closely related to one's intention to engage in pro-environmental behaviors (Hansla et al., 2008). From the same viewpoint, achieving sustainable development depends on people being aware of sustainability issues. Environmental Kuznets's curve asserts that environmental degradation is a natural byproduct of economic growth. Still, some academics contend that the degree to which that occurs is determined by the moral standards and legal frameworks of particular societies. Therefore, it could be supposed that social aspects operate similarly. It is only natural to wonder whether sustainability awareness could be described at the national or local level since the theory of needs is primarily used to predict behaviors. For example, wealthier countries and cities tend to show higher awareness levels regarding sustainability and sustainable development (Jun et al., 2018). However, the greater exposure of citizens to information linked to sustainability (education for sustainable development at education institutions, training at work, posts on social media, discussions on TV, etc.) can be used to explain the higher degree of awareness in these countries. The opposite is true in less developed nations when people do not exhibit sustainable behaviors as frequently as they otherwise might.

This study aims to assess the degree of sustainability consciousness among Uzbek individuals. This investigation concentrates on the analysis of sustainability consciousness among the urban population since urban regions serve as centers for economic and social advancements and function as models for rural habitats. The research involved several questionnaires with Uzbek individuals to gauge their sustainability awareness level, then analyzed the data using SmartPLS software.

Literature Review. According to Maslow's hierarchy of needs, people must first meet their basic needs before moving on to higher levels of the pyramid. As a result, sustainable development calls for providing for all basic needs, such as food, shelter, clothing, and employment, before extending people's aspirations for a sustainable life (Clarivate Analytics, 2018). According to this theoretical framework, it could be assumed that wealthy countries, compared to developing ones, have fewer people with unmet lower-level needs. As a result, they move up the pyramid, increasing their sustainability awareness and, ultimately, their capacity for sustainable development (Li et al., 2021). However, this does not imply that sustainable development should be the exclusive province of developed nations. Rather, it suggests more time and resources are devoted to educating and raising awareness of sustainability and the importance of sustainable development among those that would otherwise take decades to reach a higher level of Maslow's hierarchy.

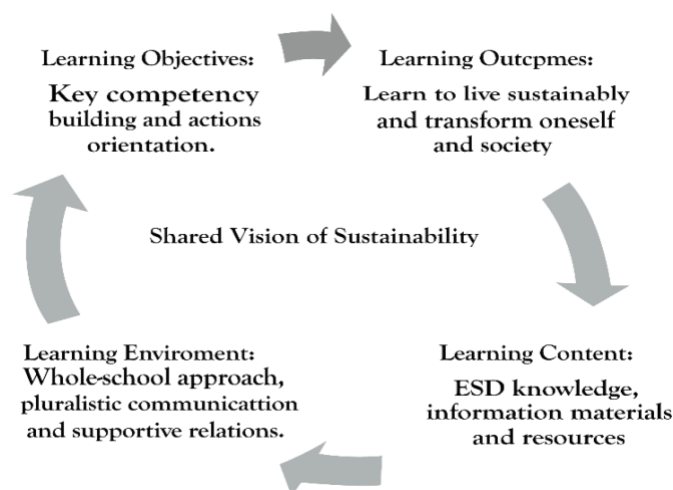


Figure 1. Education for sustainable development

Sources: developed by the authors based on (Cottafava et al., 2019).

To ensure the implementation of Sustainable Development Goals, societies have to make complex fundamental transformations (SDR, 2018). To achieve such transformations, people need to change their daily behaviors in order to lead more sustainable lifestyles (Rauschmayer et al., 2015). It, however, takes a

significant amount of time and is impacted by market, political and individual factors (Lubowiecki-Vikuk et al., 2021). Pavalache-Ilie and Cazan (2018) argued that the enhancement of responsible environmental behavior could be achieved through raising awareness. This idea is backed up by Guan et al. (2019), who claimed that raising public awareness of sustainability goals is one of the key factors of their successful implementation.

Moreover, businesses should be anticipated to take a more active role in implementing sustainable practices. That could be done by raising awareness among both corporations and individuals (Scott and McGill, 2018). Companies can support sustainable development in a variety of ways, for as by engaging in Corporate Social Responsibility (CSR) activities (Ye et al., 2020). Private corporations may find the Sustainable Development Goals intriguing, given the potential return on investment. Still, they may also add value through corporate social responsibility initiatives because CSR projects are rewarded by different stakeholders (Buerke et al., 2017).

Another way to raise citizens' awareness of sustainable development is education. In the past few decades, more and more people have been enrolling at education institutions at all levels (UN, 2021). Education is expected to improve social and economic indicators (UN, 2021) and eliminate poverty (UNESCO, 2019), which consequently leads to a reduction in inequality levels. Additionally, education leads people to healthier and more environmentally friendly lives (Ma et al., 2019). Last but not least, education is essential for encouraging tolerance and creating a more harmonious society (UN, 2021). Today, many institutions include education for sustainable development (ESD) in their curriculum to accomplish all the aforementioned educational benefits.

The focus on ESD has grown in the daily practices of many educational institutions across the globe (Pauw et al., 2015). Such education is transformative and learning-oriented (Cottafava et al., 2019). ESD has a great deal of potential for increasing student awareness. Figure 1 shows the implementation framework for ESD. Today, it is abundantly obvious that creating awareness is crucial to achieving sustainable development. Thus, it is essential to do that on each level of personal development – from schools to continuous training at the workplace. People will change their daily behaviors to lead more sustainable lifestyles as they become more aware of their role in environmental and societal degradation.

Methodology and research methods. Research design describes the methodological approach of research while serving as a framework for capturing and evaluating sets of data (Cohen et al., 2018; Bryman and Bell, 2015). Below, you can see the table demonstrating the research design of this paper.

Table 1. Research methodology

Methodological approach	Research design
Research method	Mixed method
Type of Study	Empirical
Data collection	Primary data from the survey
Type and scope of research	Explanatory research
Survey approach	Sample study

Sources: developed by the authors.

Empirical research requires a detailed analysis of part-taking individuals representing the studied population (Babbie, 2021). The sample of this empirical research represents citizens of Uzbekistan that are allowed to participate in the labor market, thus contributing to the country's budget, which is then used for various sustainability projects. The pension age in Uzbekistan starts at 55 years for women and 60 years for men. This study took 45-55 years as the last age group because it would include both males and females participating in the study.

Table 2. Survey description

Level of analysis	Survey development and evaluation
Degree of structuring	High
Scale	Dichotomous, Likert, checkbox, ranking
Survey method	Online survey via SurveyMonkey
Data evaluation	SmartPLS

Sources: developed by the authors.

According to some academics, structured surveys are the most common type of research survey (Bryman and Bell, 2015). These surveys are designed to give each participant the exact same set of questions. These

surveys, which include specific questions and answer options, are particularly common in the social sciences. The simplicity of reaching out to many participants and their comparability are two benefits of structured surveys. Such surveys also enable statistical analysis, which provides rich insights into difficult study fields. Since they require less time to complete and are simpler for respondents to understand, In this study, we conducted questionnaires with Uzbek residents to learn more about their understanding of sustainability.

The survey opens with an introduction that outlines the study's goal. Also mentioned is the fact that the results would be handled anonymously. There are 20 questions in the survey, and different types of responses are possible, including checkboxes, Likert scales, dichotomous scales, and ranking responses. Online distribution methods for the poll included posts in various Facebook groups and direct messages to possible respondents via personal accounts on Instagram and Facebook. We received 440 answers in total. The participation rate equaled 100%, which could be explained by the fact that only people interested in participating followed the survey link. However, some participants refused to answer some questions within the survey.

Reinartz et al. (2009) stated that 100 responses are sufficient for statistical analysis. However, this study used a sample calculating formula to find an adequate sample size. The sample size represents a part of the researched group, also known as the target population. Random sampling, meaning that respondents were chosen entirely by chance from the population at large, was used. First, one needs to know the size of the Uzbekistan population to calculate the appropriate sample size. In 2020 Uzbekistan's population was slightly above 34 million people, with approximately 23 million people between 18 and 55 years of age (UZStat, 2021). The next step would be choosing the margin error, which is a percentage that shows how much survey results reflect the views of the overall population. The smaller the margin error, the more accurate the results are. A margin error of 5 percent, which is the most common for such research, was chosen. Then, the study selected a sampling confidence level that reveals the confidence of the population's answers within a specific range. Therefore, a 95 percent confidence level was chosen. It means 95 percent certain that the results lie between x and y . Finally, the necessary size of the sample was calculated using the following formula:

$$\text{Sample size} = \frac{\frac{z^2 \cdot p(1-p)}{e^2}}{1 + \frac{z^2 \cdot p(1-p)}{e^2 N}} \quad (1)$$

where n – population size, e – margin of error, z – z-score.

The z-score is the number of standard deviations a given proportion is away from the mean. The table below demonstrates z-score results at various confidence levels.

Table 3. Confidence and z-score measures

Confidence level	z-score
85%	1.44
90%	1.65
95%	1.96
99%	2.58

Sources: developed by the authors.

Following the formula above, the sample size was calculated at 385 desired respondents. After the distribution of surveys, we received 440 responses that can be considered sufficient for this research.

Then we analyzed the results of the conducted survey using SmartPLS software. Such analysis depends greatly on the correctness and validity of the study's dataset. Thus, data screening is key to ensuring that existing data is entered correctly (Kristensen and Eskildsen, 2010). It is quite common in surveys to have missing data. It could occur for many reasons, including failure to understand questions (Sekaran and Bougie, 2010). In this case, there are some missing answers on the questions with the Likert scale, namely on the questions that asked respondents to rank their knowledge about sustainability goals. While Tabachnick et al. (2007) suggested skipping the missing data analysis, this study analyzes it by allocating the lowest possible point (in this case – 1) to each of the missing answers. If a person fails to rank their knowledge on a 1 to 5 scale while answering all the other questions, it could be assumed that the person is so unaware that they decide to skip it. Thus, allocating the lowest possible point seems logical. The analysis of the collected data (despite some of the missing data) is advocated by Hair Jr et al. (2017). It is argued that some of the missing values could be changed as long as the remaining number of responses is sufficient for the statistical analysis

(Hair et al., 2010). Because 19 out of 20 questions were answered fully and the number of missing responses in one of the questions was still relatively small, our approach to handling this dataset is justified.

Results. First, regarding the demographics of the survey participants, Figure 2 demonstrates the age distribution of the participants in the survey. As is seen on the chart, the major group of participants consists of people 25-34 years of age (53.31%). It fully corresponds with the actual population metrics, as the average age of Uzbek citizens equals 29.1 (UZStat, 2022). It is followed by 35-44 years old age group (21.59 %), 18-24 (13.64 %), and finally, 45 and 55 (11.36 %).

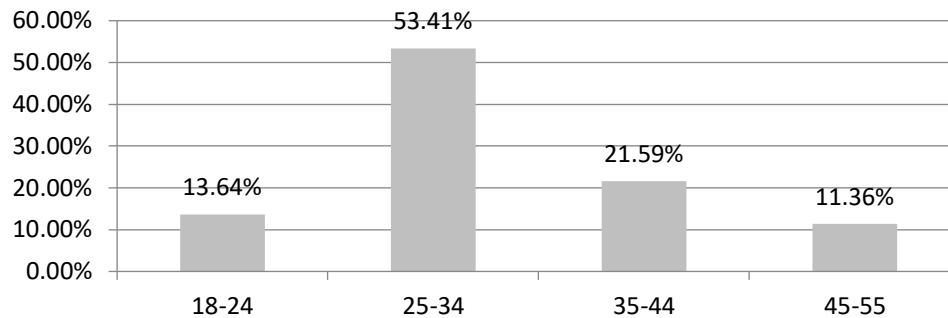


Figure 2. The age span of survey participants

Sources: developed by the authors.

Figure 3 shows the gender distribution among participants. There were 67.27 percent of female respondents and 32.73 percent of male respondents. None of the respondents identify as the other gender.

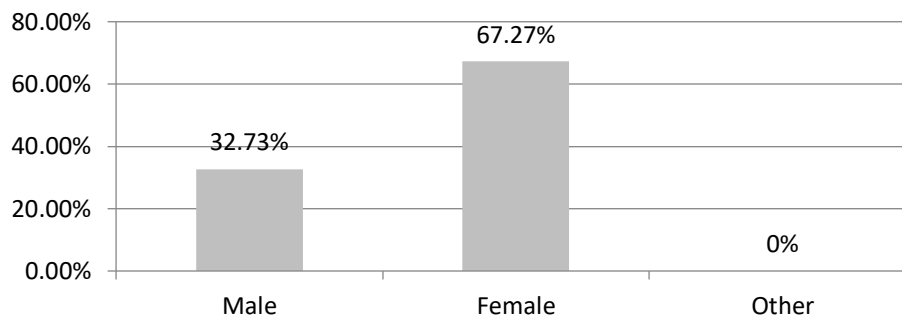


Figure 3. Gender distribution of survey participants

Sources: developed by the authors.

Figure 4 shows that only 7.95 percent of people taking part in the survey lived outside of the city, while 92.05 percent lived in cities. Although, in reality, the urban population in Uzbekistan slightly exceeds 50 percent, it is essential to gather the majority of responses from urban dwellers since this study aims to evaluate sustainability awareness among the urban population.



Figure 4. Area of survey participants

Sources: developed by the authors.

To determine the respondents' level of understanding of sustainability and sustainable development, they were asked what they believed made up sustainable development. They were offered a checkbox scale with the three pillars of sustainability and the «I do not know» option. Surprisingly, the majority considered the social aspect as the one responsible for sustainable development. 61.36 percent of people chose this option. It contradicts findings from a bibliometric analysis study, showing that people mostly associate sustainability with environmental concerns (Veckalne and Tambovceva, 2021). 48.86 percent of survey participants associate sustainable development with economic growth and 27.27 percent with environmental aspects. 6.82 percent did not know what aspects make up sustainable development.

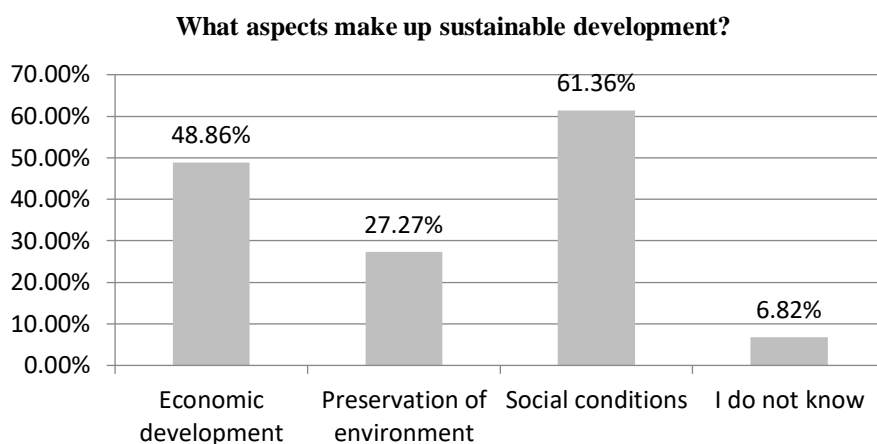


Figure 5. Understanding of sustainable development concept

Sources: developed by the authors.

The following question that is discussed here was presented in the Likert scale format. The participants were asked to mark how often they did some of the past year's actions commonly related to sustainability.

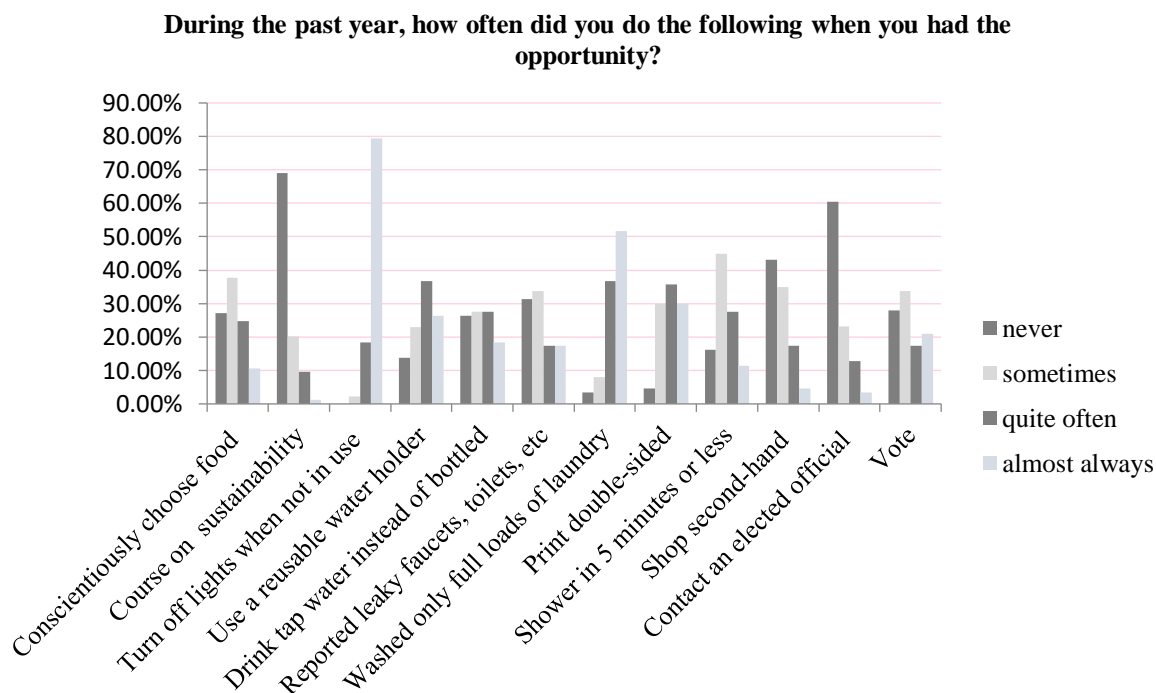


Figure 6. Sustainability actions performed by participants

Sources: developed by the authors.

The most common answer was that people almost always turned off lights when those were not in use. On the opposite, the least chosen answer was that people never took a course on sustainability. When it comes to

consciously choosing food, for instance, buying eco-labels or opting for non-meat options, most people do it sometimes, and the minority – almost always. Most people tend to wash their clothes by fully loading the washing machine. Additionally, the majority replied that they never contacted the elected official or other representatives to discuss sustainability-related issues they cared about.

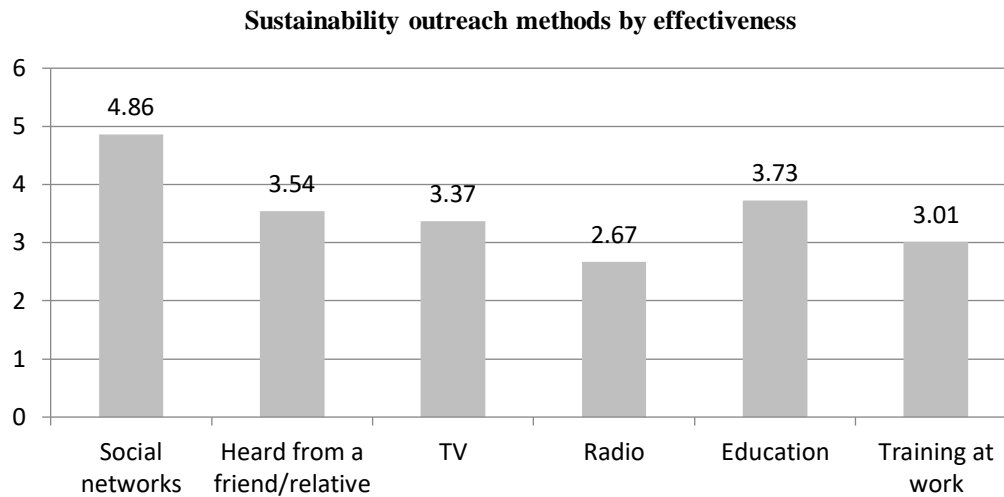


Figure 7. Sustainability outreach methods by effectiveness

Sources: developed by the authors.

In another question, participants were asked to rank the outreach method on sustainability based on its effectiveness. The best method to educate citizens of Uzbekistan on the subject of sustainability is via social network platforms. It is followed by information from educational institutions – schools, universities, etc. Then comes word-of-mouth or obtaining information from friends, relatives, and acquaintances. The TV comes next with a score of 3.37, followed by learning about sustainability at training at work (3.01), and finally, the least effective method of sustainability outreach was voted radio.

Another set of questions was introduced to measure people's perception of the importance of their personal contribution to sustainable development in the country. Personal responsibility is a great metric for a person's awareness of the matter.

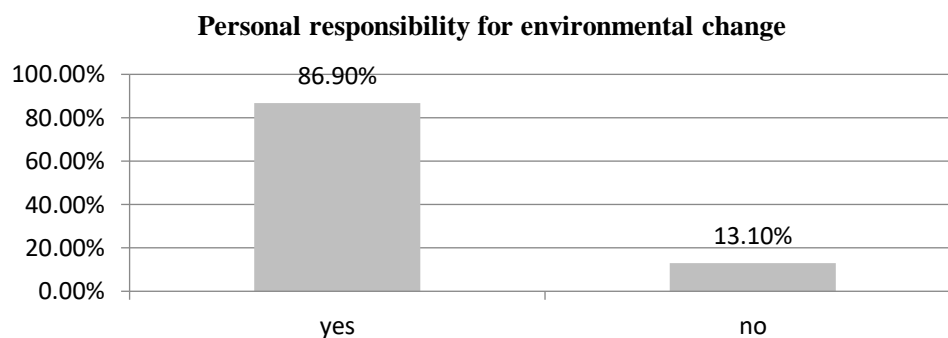


Figure 8. Perception of personal responsibility for environmental change

Sources: developed by the authors.

Figure 8 presents that almost 87 percent of all the respondents believe that they hold personal responsibility in making a difference on environmental issues like waste minimization, resource consumption, and the use of water and energy. 13 percent believe that they hold no such responsibility.

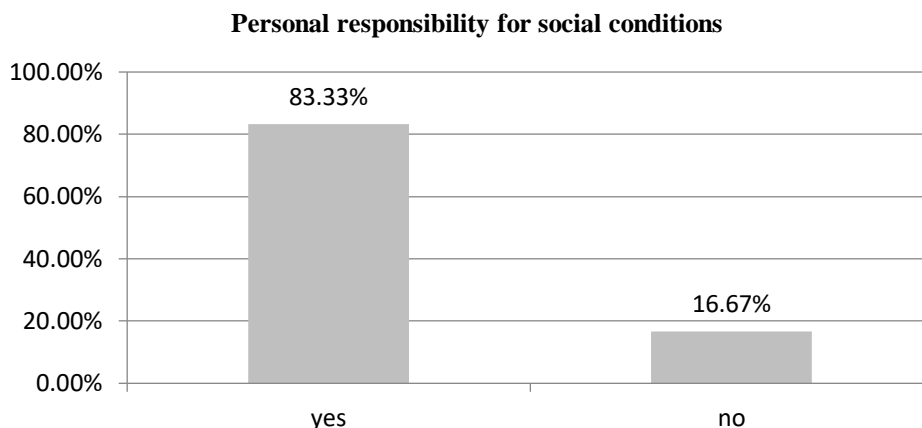


Figure 9. Perception of personal responsibility for environmental change

Sources: developed by the authors.

When it comes to the perception of personal responsibility for making a difference on social issues, such as ensuring equality and inclusion, the spread of environmental education, and support for activities promoting human health and wellness, the percentage of those who consider themselves responsible is slightly decreased. Thus, 83.33 percent of respondents consider themselves accountable for social issues, while 16.67 percent answered «no» to this question.

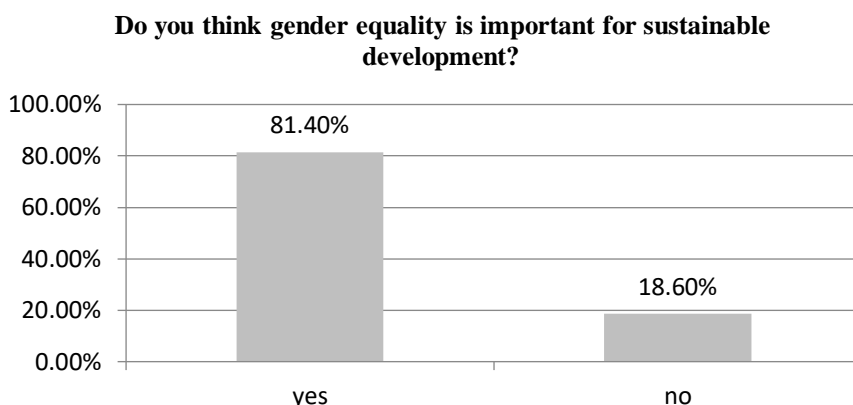


Figure 10. Importance of gender equality for sustainable development

Sources: developed by the authors.

Since gender equality is one of the factors impacting sustainability (Bonewit and Shreeves, 2015; Ben-Amar et al., 2017; UN Women, 2018), this study found the perception of the importance of gender equality among our respondents. Even though most people participating in this survey are women, nearly 20 percent believe that gender equality is not essential for sustainable development. That clearly shows the lack of awareness of Uzbek citizens when it comes to sustainability and sustainable development.

Finally, the study found whether people in Uzbekistan believed that women have similar rights in reality, not just on paper, and are being empowered. While those who answered «yes» make up the minority of the sample (43.68 %), these findings could be seen as an indirect indicator of lack of awareness. That is because Uzbekistan is considered to be a highly patriarchal society with a lack of female rights and voice (Ibrahim, 2013); only 32 percent of women in parliament (before 2020, it was held at 16% for five consecutive years) (The World Bank, 2020), gross enrolment rate in tertiary education only 6.33 percent (Philipp, 2018), child marriage rate of 7% (Girls not Brides Project, 2015; Thelwell, 2021), domestic violence not being a crime (Thelwell, 2021), and many other factors. The idea that almost half of the respondents consider women to be empowered and have equal rights in Uzbekistan. However, in reality, this is far from being the truth and demonstrates a lack of understanding of the concepts of equal rights and empowerment, and since gender equality is a big part of sustainability – lack of sustainability awareness.

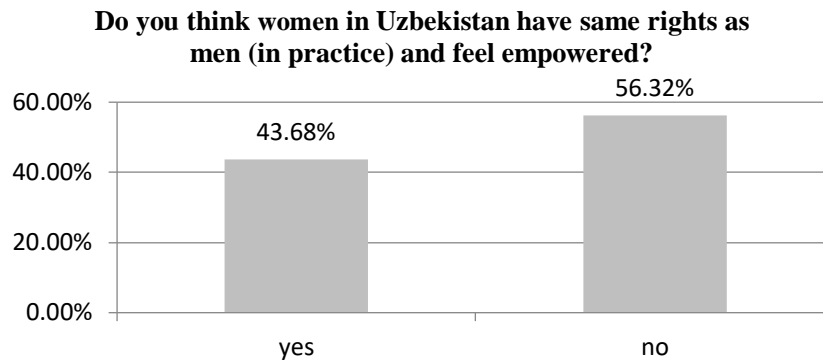


Figure 11. Respondent's perception of gender equality and female empowerment in Uzbekistan
Sources: developed by the authors.

While the survey consists of ten more questions, they are not very exponential for the above descriptive analysis. Thus, this study will not discuss them here. They are, however, used in the statistical analysis of the survey results to measure the level of sustainability awareness of Uzbek citizens. At this stage, the study discusses the findings from the SmartPLS analysis of the collected results.

One of the essential aspects of data analysis is finding the point of view of the survey respondents on each of the variables/dimensions considered in the research. It could be measured by the amplitude of the statistical data, such as standard deviation, variation, etc. Sekaran and Bougie (2019) state that presenting a general concept of survey participants' responses is necessary.

Table 4. Descriptive statistics of variables

Construct	N	Mean	Std. Deviation
Environmental awareness	440	2.880	0.935
Energy conservation	440	3.273	1.069
Outreach Method	440	3.373	1.095
Environmental Issues	440	2.626	1.177
Awareness	440	3.153	1.155
Sustainability issues	440	3.196	1.136

Sources: developed by the authors.

For the survey analysis, the questions were divided into five groups, creating study variables. These variables are Environmental awareness, Energy Conservation, Outreach Method, Knowledge of environmental Issues, and Overall Sustainability Awareness. The outcomes of the descriptive statistics are presented in Table 3.13. The variables and their dimensions are in the range of 2.6 to 3.4. The standard deviations of all dimensions are from 0.9 to 1.2, which is considered acceptable in statistical analysis. Therefore, based on this, it is established that the respondents' views are satisfactory.

Further, this study applied structural equation modeling (SEM) to test the hypotheses developed from the theoretical analysis. Two of the most common SEM approaches are covariance-based (AMOS, LISREL) and variance-based (Partial Least Squares). In this study, SmartPLS 3.3 software is used to explain the relationship between dimensions of independent variables for SEM and dependant variables, mediated variables, and demographic variables. Modeling has two parts: 1) measurement model; 2) structural model. Furthermore, in terms of operation, the PLS algorithm's study attempts to generate loading between reflective constructs and their corresponding indicators consisting only of all reflective constructs. Overall, PLS always tries to maximize the variability of dependent variables through independent variables (Chin et al., 2003).

Using SmartPLS, the measurement model (outer model) is used to theoretically verify the suitability of loading indicators (items) in the initial phase. Outer models are tested to verify these objects to measure the constructs they were made up to measure, resulting in the instrument's reliability. Additionally, the outer model evaluates the interplay between observable and fundamental constructions (Shiau et al., 2019). The validity that is justified in the SEM through content validity, convergent validity, and discriminant validity requires distinct construct estimations. Therefore, in to ensure the proper operation of a particular construct, it is required to trace the relevant indicators (Hair et al., 2010).

The content validity reflects the suitability and potential of the product to be produced in the measurement of the central study concept (Hair Jr et al., 2017). Furthermore, it is suggested to use the Principal Component

Analysis (PCA) - a structural method to estimate the essential element of the indicators. This analysis is based on PCA methodology, and factor loading is created for all indicators in SmartPLS. According to Chen and Bozeman (2013), item loading could be defective if its value is less than 0.30. In this case, each loading in this study is more significant than 0.6, indicating moderate or extreme loading for each indicator considered.

To ensure the accuracy of variables, the researchers checked that construct measures that are theoretically related to each other are really related after analysis. Three types of estimates, such as factor loading, composite reliability (CR), and average variance extracted (AVE), are commonly employed to find convergent validity (Hair et al., 2010). First, the loading of all items is checked to be 0.50 or higher (Fornell and Larcker, 1981). In this study, all items contain a loading greater than 0.50. Second, a CR test was performed, showing the degree to which objects indicate latent constructs (Hair et al., 2010). The recommended outstanding value for CR is 0.70 (Fornell and Larcker, 1981; Hair et al., 2010; Hair Jr et al., 2017). Moreover, the CR values for all constructs range from 0.771 to 0.926. It is much higher than the prescribed values. Third, it is necessary to look at the AVE – the limit of the lesser variances in the study's latency tested the constructs indicators, which value should ideally be higher than 0.50 (Fornell and Larcker, 1981; Hair et al., 2010). Besides, this condition is fulfilled in this study, with values being between 0.505 and 0.675. Thus, the results indicated that there is convergent validity.

The purpose of discriminant validity is to verify the validity of the constructs of an external model that seeks to ensure that irrelevant actions are not found to be relevant after analysis. Thus, each step is more relevant to their constructs compared to the other. The average variable (AVE) square roots are examined (Fornell and Larcker, 1981).

Table 5. Discriminant Validity Analysis

Variable	A	EA	EC	EI	OM	SI
A	0.667					
EA	0.751	0.613				
EC	0.917	0.730	0.654			
EI	0.247	0.338	0.228	0.636		
OM	0.653	0.701	0.580	0.294	0.692	
SI	0.858	0.825	0.837	0.287	0.670	0.719

Sources: developed by the authors.

The square root of AVE must be higher than 0.50 since 50 or more variations of the indicators are expected to be calculated. Table 5 demonstrates the diagonal values are higher than the other values in the column and row in which they are placed. It confirms the discriminant validity of the outer model. Thus, the outer model's construct validity is confirmed. Further, it was speculated that the results were accurate and reliable.

Then, there is a need to look at Heterotrait – Monotrait Ratio (Tab. 6). HTMT values are to be lower than 0.90, which shows that the relationship between the two constructs is established.

Table 6. Heterotrait – Monotrait Ratio

Variable	A	EA	EC	EI	OM
EA	0.808				
EC	0.514	0.850			
EI	0.304	0.572	0.689		
OM	0.762	0.948	0.650	0.940	
SI	0.966	1.028	0.897	0.364	0.773

Sources: developed by the authors.

The Standardized Root Mean Square Residual (SRMR) indicates that the model is a good fit with a value less than 0.10. Table 7 demonstrates that the SRMR value is 0.071 used for the saturated model and 0.080 used for the estimated model, showing that the model is a good fit.

Table 7. Standardized Root Mean Square Residual

	Saturated Model	Estimated Model
SRMR	0.071	0.080

Sources: developed by the authors.

Additionally, the bootstrapping technique was employed to measure the structural model based on 5,000 samples with a 95% reliability level. Bootstrapping technique uses many samples to replace the original sample data (440).

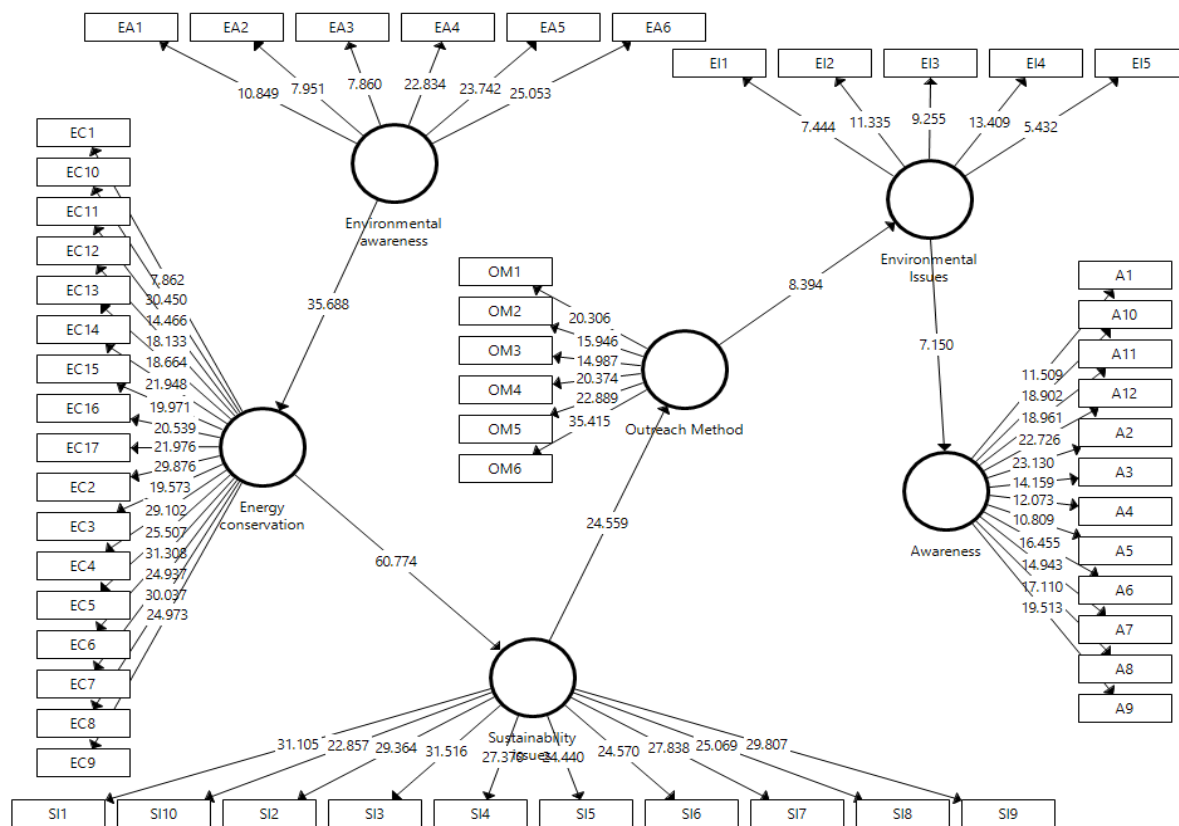


Figure 12. Bootstrapping of Structural Model

Sources: developed by the authors.

A structural model was used to work out the collinearity assessment, coefficient of determination, and cross-validated redundancy of endogenous variables. Variable Inflation Factors (VIFs) values are used to observe Collinearity issues. In this study, the values of endogenous variants of VIFs ranged from 1.257 to 2.75, which ensured that relevant issues were not found in the relevant results as they are all less than 0.5 (Hair Jr et al., 2017).

The pathway/path coefficients represent the relationship between investigated constructs. The path coefficients are between the traditional values -1 (small) and +1 (large). In turn, the path coefficient near +1 displays a significant and robust relationship between the estimated value variables. The estimated value of the path coefficients close to 0 does not show either a weak or significant relationship between the variables (Hair Jr et al., 2021). The following Table 8 presents the coefficient of the model's path and its relation between the variables.

Table 8. Path coefficients

Variable	A	EC	EI	OM	SI
EA		0.730			
EC					0.837
EI	0.247				
OM			0.294		
SI				0.670	

Sources: developed by the authors.

The R^2 value is utilized to evaluate the structural model and model prediction correctness. The R^2 range of all endogenous variables refers to the degree defined in all endogenous variables. The R^2 ranges of 0.75, 0.50,

and 0.25, that is sufficient, moderate, and weak, respectively (Sarstedt et al., 2014). Table 9 presents the dependent variables' R² or the adjusted R square.

Table 9. The R² value of Model

Variable	R Square	R Square Adjusted
A	0.061	0.059
EC	0.532	0.531
EI	0.086	0.084
OM	0.448	0.447
SI	0.701	0.700

Sources: developed by the authors.

Effect size f^2 estimates all independent variables. The change in the value of R² when the independent variables are excluded from the model can be a measure of whether the excluded independent variables have a significant effect on the constructs.

Table 10. The effect size of f^2

Variable	A	EC	EI	OM	SI
EA		1.138			
EC					2.342
EI	0.065				
OM			0.094		
SI				0.813	

Sources: developed by the authors.

That refers to how much f^2 contributes to the R² value of f^2 created on the value of R². The Effect size f^2 , the value of 0.02, offers a small Effect, 0.15 medium, and 0.35 significant Effect. The value of f^2 soft tan 0.02 indicates no effect between the variables(Hair Jr et al., 2016).

This study applied the Bootstrap technique to test the hypotheses. First, we review the hypothetical direct relationship. Table 11 displays the direct relationship between Environmental awareness, Energy conservation, Outreach Method, Knowledge of Environmental Issues, and Awareness. It clarifies the direct association between independent and dependent variables.

Table 11. Path model results: direct hypotheses

Structural paths	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (O/STDEV)	P Values
EA → EC	0.730	0.733	0.020	36.699	0.000
EC → SI	0.837	0.838	0.013	64.022	0.000
EI → A	0.247	0.265	0.035	7.082	0.000
OM → EI	0.294	0.299	0.037	8.029	0.000
SI → OM	0.670	0.671	0.029	23.377	0.000

Sources: developed by the authors.

Hypothesis 1: The findings indicate that Environmental awareness (EI) is positively and significantly connected with Energy conservation (EC). It could mean that people with higher environmental awareness choose to use energy more wisely. P value, in this case, is lower than 0.05, which makes the hypothesis acceptable.

Hypothesis 2: The findings indicate that Energy conservation (EC) is positively and significantly connected with Knowledge of Sustainability issues (SI); with a p-value <0.05, this hypothesis is also acceptable.

Hypothesis 3: The findings indicate that the Sustainability issues (SI) are positively and significantly connected with Awareness (A) (p-value<0.05). Again, this means that raising awareness among the population can positively affect the number of sustainability issues in the region.

The presented results demonstrate the statistical significance of the conducted survey. The results show a strong connection between environmental and overall sustainability awareness, energy conservation practices, and sustainability issues. These results correspond with the findings from theoretical analysis and prove the importance of considering sustainability awareness as an important factor in sustainable development.

Conclusions. Both theoretical and empirical analyses display the crucial role of sustainability awareness in promoting sustainable behaviors and consequently reaching a higher level of sustainability in the area. Spreading awareness regarding the importance of gender equality and female empowerment is also very important in achieving sustainability, especially in Uzbekistan, where cultural norms advocate female discrimination. That not only drawbacks to social injustice but significantly negatively impacts the country's economic development. More actions should be undertaken in order to promote sustainability awareness among Uzbek citizens. Education for Sustainable Development should be introduced in all educational institutions and offered as compulsory training at work. For such training, we advise using Atkisson Sustainability Pyramid, as it is designed for sustainability learning purposes. Additionally, it could be suggested to launch an online sustainability awareness campaign, as the most effective outreach method was through social networks.

The scientific novelty of this research could be described in the fact that, to our knowledge, no such research has been previously conducted. This study is limited to Uzbekistan. However, the proposed methodology could be tested in other countries. Additionally, this methodology is based on evaluating sustainability awareness via surveys. Since people tend to portray themselves better when answering survey questions – another limitation of this research could be seen in answers not being fully reliable.

Author Contributions: conceptualization, R. V.; methodology, R. V. and Y. U.; software, R. V. and Y. U.; validation, Y. U. and N.G.; formal analysis, R. V.; investigation, R. V.; resources, R. V.; data curation, R. V.; writing-original draft preparation, R. V.; writing-review and editing, Y. U. and N.G.; visualization, R. V.; supervision, Y. U. and N.G.; project administration, R. V.; funding acquisition, Y. U.

Conflicts of Interest: Authors declare no conflict of interest.

Data Availability Statement: Not applicable.

Informed Consent Statement: Informed consent was obtained from all subjects involved in the study.

References

- Babbie, E. R. (1989). *The practice of social research*. Wadsworth Publishing Company. [\[Google Scholar\]](#)
- Ben-Amar, W., Chang, M., & McIlkenny, P. (2017). Board gender diversity and corporate response to sustainability initiatives: Evidence from the carbon disclosure project. *Journal of business ethics*, 142(2), 369-383. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Bonewit, A., & Shreeves, R. (2015). The Gender Dimension of Climate Justice: In-depth Analysis for FEMM Committees. [\[Google Scholar\]](#)
- Bryman, A., & Bell, E. (2015). *Business research methods* (Vol. 4th). Glasgow: Bell & Bain Ltd. [\[Google Scholar\]](#)
- Buerke, A., Straatmann, T., Lin-Hi, N., & Müller, K. (2017). Consumer awareness and sustainability-focused value orientation as motivating factors of responsible consumer behavior. *Review of Managerial Science*, 11(4), 959-991. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Cargan, L. (2007). *Doing social research*. Rowman & Littlefield Publishers. [\[Google Scholar\]](#)
- Chen, C. A., & Bozeman, B. (2013). Understanding public and nonprofit managers' motivation through the lens of self-determination theory. *Public Management Review*, 15(4), 584-607. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Chin, W. W., Marcolin, B. L., & Newsted, P. R. (2003). A partial least squares latent variable modeling approach for measuring interaction effects: Results from a Monte Carlo simulation study and an electronic-mail emotion/adoption study. *Information systems research*, 14(2), 189-217. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Clarivate Analytics. (2018). Web of Science Core Collection; Clarivate Analytics: Boston, MA, USA. Retrieved from [\[Link\]](#)
- Cohen, L., Manion, L., & Morrison, K. (2002). *Research methods in education*. routledge. [\[Google Scholar\]](#)
- Cottafava, D., Cavaglià, G., & Corazza, L. (2019). Education of sustainable development goals through students' active engagement: A transformative learning experience. *Sustainability Accounting, Management and Policy Journal*. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Fornell, C., & Larcker, D. F. (1981). *Structural equation models with unobservable variables and measurement error: Algebra and statistics*. Sage Publications Sage CA: Los Angeles, CA. [\[Google Scholar\]](#)
- Girls Not Brides Project. (2015). Child Marriage in Uzbekistan. Retrieved from [\[Link\]](#)

- Guan, T., Meng, K., Liu, W., & Xue, L. (2019). Public attitudes toward sustainable development goals: Evidence from five Chinese cities. *Sustainability*, 11(20), 5793. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Hair Jr, J. F., Matthews, L. M., Matthews, R. L., & Sarstedt, M. (2017). PLS-SEM or CB-SEM: updated guidelines on which method to use. *International Journal of Multivariate Data Analysis*, 1(2), 107-123. [\[Google Scholar\]](#)
- Hair, J. F., Anderson, R. E., Babin, B. J., & Black, W. C. (2010). Multivariate data analysis: A global perspective (Vol. 7). [\[Google Scholar\]](#)
- Hansla, A., Gamble, A., Juliusson, A., & Gärling, T. (2008). The relationships between awareness of consequences, environmental concern, and value orientations. *Journal of environmental psychology*, 28(1), 1-9. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Ibrahim, S. (2013). Status of Women in Uzbekistan. *IOSR Journal Of Humanities And Social Science*, 10(3), 47-55. [\[Google Scholar\]](#)
- Jun, S. P., Yoo, H. S., & Choi, S. (2018). Ten years of research change using Google Trends: From the perspective of big data utilizations and applications. *Technological forecasting and social change*, 130, 69-87. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Kristensen, K., & Eskildsen, J. (2010). Design of PLS-based satisfaction studies. In *Handbook of partial least squares* (pp. 247-277). Springer, Berlin, Heidelberg. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Li, R. Y. M. (2018). An economic analysis on automated construction safety. *An Economic Analysis on Automated Construction Safety*. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Lubowiecki-Vikuk, A., Dąbrowska, A., & Machnik, A. (2021). Responsible consumer and lifestyle: Sustainability insights. *Sustainable production and consumption*, 25, 91-101. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Ma, J., Pender, M., & Welch, M. (2019). Education Pays 2019; College Board: New York, NY, USA.
- Pauw, J., Gericke, N., Olsson, D., & Berglund, T. (2015). The effectiveness of education for sustainable development. *Sustainability*, 7(11), 15693-15717. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Pavalache-Ilie, M., & Cazan, A. M. (2018). Personality correlates of pro-environmental attitudes. *International journal of environmental health research*, 28(1), 71-78. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Philipp, J. (2018). Girls' Education in Uzbekistan - The Borgen Project. Retrieved from [\[Link\]](#)
- Rauschmayer, F., Bauler, T., & Schöpke, N. (2015). Towards a thick understanding of sustainability transitions—Linking transition management, capabilities and social practices. *Ecological economics*, 109, 211-221. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Reinartz, W., Haenlein, M., & Henseler, J. (2009). An empirical comparison of the efficacy of covariance-based and variance-based SEM. *International Journal of research in Marketing*, 26(4), 332-344. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Sarstedt, M., Ringle, C. M., Smith, D., Reams, R., & Hair Jr, J. F. (2014). Partial least squares structural equation modeling (PLS-SEM): A useful tool for family business researchers. *Journal of family business strategy*, 5(1), 105-115. [\[Google Scholar\]](#) [\[CrossRef\]](#)
- Scott, L., & McGill, A. (2018). From promise to reality: Does business really care about the SDGs. *PriceWaterhouseCoopers: London, UK*.
- SDR. (2018). The Bertelsmann Stiftung, Sustainable Development Solutions Network, 2018. SDG Index and Dashboards Report 2018 Implementing the Goals Global Responsibilities. Retrieved from [\[Link\]](#)
- Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach*. John Wiley & sons. [\[Google Scholar\]](#)
- Shiau, W. L., Sarstedt, M., & Hair, J. F. (2019). Internet research using partial least squares structural equation modeling (PLS-SEM). *Internet Research*. [\[Google Scholar\]](#)
- Tabachnick, B. G., Fidell, L. S., & Ullman, J. B. (2007). Using multivariate statistics (Vol. 5). Pearson Boston, MA. [\[Google Scholar\]](#)
- The World Bank. (2022). Proportion of seats held by women in national parliaments (%) - Uzbekistan. Retrieved from [\[Link\]](#)
- Thelwell, K. (2021). The Truth about Women's Rights in Uzbekistan - The Borgen Project. Retrieved from [\[Link\]](#)
- UN Women. (2018). «Women, Gender Equality and Climate Change». The UN Internet Gateway on Gender Equality and Empowerment of Women. Retrieved from [\[Google Scholar\]](#)
- UNESCO (2019) The right to education. Retrieved from [\[Link\]](#)
- United Nations. (2021). Sustainable Development Goals; United Nations: New York, NY, USA. Retrieved from [\[Link\]](#)
- UZStat. (2021). State Committee of the Republic of Uzbekistan on Statistics. Retrieved from [\[Link\]](#)

UZStat. (2022). State Committee of the Republic of Uzbekistan on Statistics. Retrieved from [\[Link\]](#)

Veckalne, R., & Tambovceva, T. (2021). Innovations in circular economy for sustainable urban development. *Marketing And Management Of Innovations*, 5(4), 196-209. [\[Google Scholar\]](#)

Ye, N., Kueh, T. B., Hou, L., Liu, Y., & Yu, H. (2020). A bibliometric analysis of corporate social responsibility in sustainable development. *Journal of Cleaner Production*, 272, 122679. [\[Google Scholar\]](#) [\[CrossRef\]](#)

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Оцінка рівня обізнаності у питаннях сталого розвитку: на прикладі Узбекистану

Природні ресурси та умови навколишнього природного середовища є основою матеріального виробництва та благоустрою населення. Стан навколишнього природного середовища, особливості та якість споживання, охорони та відтворення природних ресурсів значною мірою визначають темпи економічного росту та ефективності виробництва. У рамках даної статті авторами зазначено, що врахування екологічних та соціальних факторів при прийнятті рішень зі сталого розвитку є особливо актуальним на сучасному етапі розвитку суспільства. Зазначено, що обізнаність у питаннях сталого розвитку є одним із факторів, які впливають на поведінку соціуму при прийнятті рішень, пов'язаних зі сталим розвитком. Метою дослідження є оцінка рівня обізнаності населення Узбекистану в питаннях сталого розвитку. Для досягнення поставленої мети у ході дослідження було проведено опитування 440 респондентів, які є громадянами Узбекистану. Авторами застосовано програмне забезпечення SmartPLS для опрацювання даних. За отриманими результатами дослідження встановлено позитивний та суттєвий взаємозв'язок між екологічною обізнаністю та енергоощадження. При цьому енергоощадження має суттєвий позитивний вплив на питання сталого розвитку. На основі отриманих результатів дослідження автори дійшли висновку, що питання сталого розвитку мають позитивний та суттєвий взаємозв'язок з обізнаністю у питаннях сталого розвитку. Таким чином, підвищення рівня обізнаності населення у питаннях сталого розвитку може мати значний вплив на вирішення низки проблем, пов'язаних зі сталим розвитком у досліджуваному регіоні. Автори відмітили, що за результатами систематизації наукових напрацювань з дослідженої тематики, не було виявлено досліджень, подібних проведеному, що свідчить про наукову новизну даної роботи.

Ключові слова: обізнаність у питаннях сталого розвитку, Узбекистан, екологічна обізнаність, енергоощадження.