SUSTAINABILITY AWARENESS: *A Systematic Literature Review*

[1]Tanveer Singh

[1]Student
[1]Sciences,
[1]The Millennium School, Amritsar, India

Abstract: The present study aims to systematically review the sustainability awareness literature and comprehensively summarise the academic research in this field. The study examines the development of the research on sustainability awareness overtime in terms of year-wise publications, publication houses, countries, journals etc., thus contributing to the sustainability awareness literature and providing implications for policy makers in implementing strategies to enhance sustainability awareness.

Keywords: Sustainability, Sustainability awareness, Environmental, Economic and Social.

I. INTRODUCTION

The National Environmental Policy Act of 1969 obligated the United States (US) government to create and maintain circumstances where humans and environment can coexist equally and together, ensuring the social, economic, and other requirements of current and future generations are fulfilled. Additionally, sustainability development goals also known as SDGs have been adopted by UN leaders at the meeting of September, 2015. It consisted of 17 goals which helps in attaining sustainability. Some of the important goals were ending poverty and hunger, quality education and clean drinking water, sustainable cities and communities. Moreover, these also emphasized on thinking of new ideas and creative thoughts to attain sustainability, equal treatment of people without any prejudice, helping people and caring for nature, behaving properly and trying new things and being successful. Toth-Nagy et al. (2023) found that fair work and economic growth, no poverty, responsible consumption and production, justice and strong institutions were considered as macroeconomic attitudes towards sustainability, while highest attitudes were considered towards sustainable cities and communities.

Many advantages of sustainability have been seen as a whole. For instance, sustainability promotes green building which helps in cost savings, increased energy efficiency, improved indoor air quality, and reduced environmental impact. Sustainability governance practices increases operational efficiency and helps in reducing pollution, carbon footprints, health hazards, paper usage, consumption of raw materials, and thus, improve community investments, meet stakeholder expectations, and increase social productivity. However, like two sides of a coin, sustainability also has many disadvantages like cost inflation, fraud allegations to obtain financial benefits while implementing sustainability and failure of implementing SDGs. Lopes et al. (2018) viewed sustainability from social, economic and environmental aspects (as shown in the following figure).
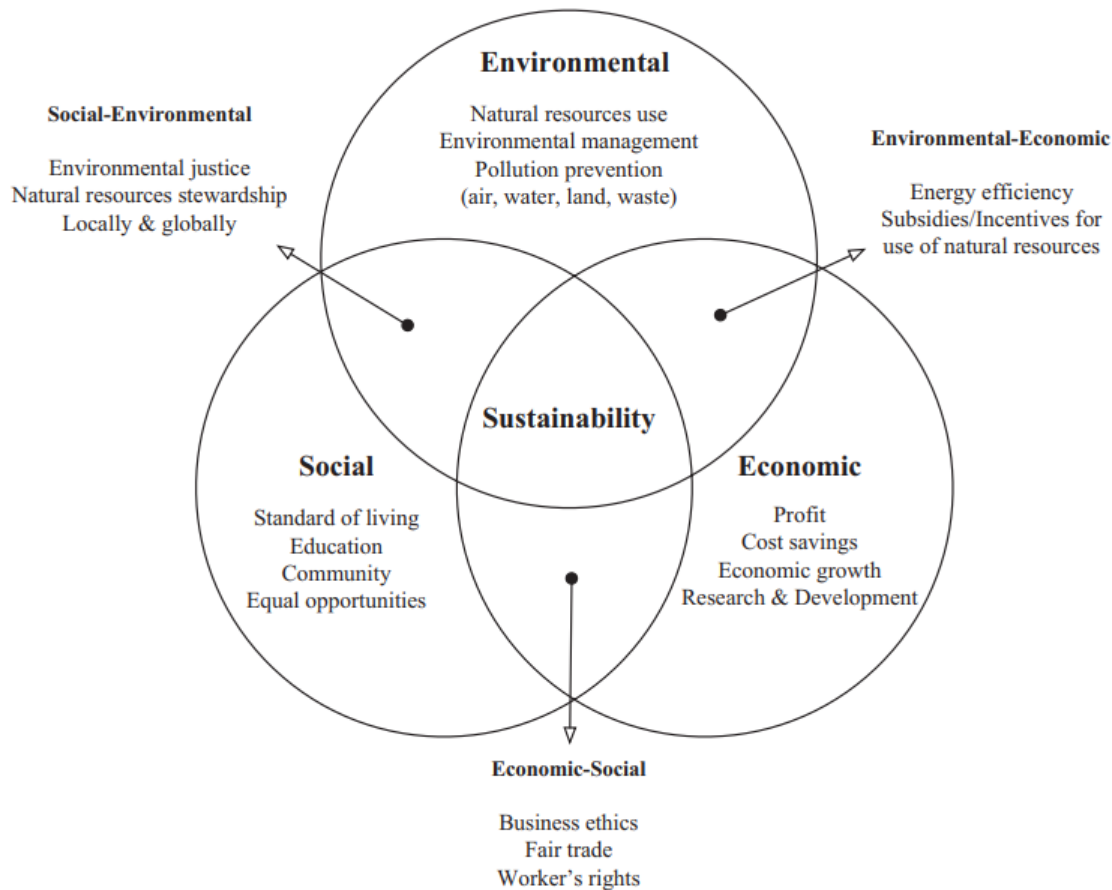
(Source: Lopes et al., 2018)

Sustainability principles have been implemented in various sectors ranging from industry to universities, from tech world to medical world. However, the lack of its awareness has been seen as a hindrance by environmentalists and government authorities. Many are not aware of the interpretation of the term 'sustainability' and how it will affect our common day to day life. Though many research articles or reports on sustainability have been published but only few articles talked about the awareness level of sustainability. Thus, the present study attempts to conduct the review of research articles based on sustainability awareness systematically.

II. RESEARCH METHODOLOGY

In this research paper we have used structured review to combine all existing sustainability awareness articles. A structured review provides an unbiased and transparent blend of the the-ories, contexts, constructs and methods used in the literature and suggest future research approach (Paul & Feliciano-Cestero, 2021). Thus, it is the best method to combine the existing literature.

The existing SLR follows Talwar et al.'s (2020) keyword selection method. The selection process begins by entering the term ''Sustainability'' in Google Scholar. The tons of results that appeared in Google Scholar were arranged on the basis of their importance and citations. Keywords that emerged in the title, abstract and the keyword list of these research papers were grouped, duplicate keywords were eliminated, and a joined group of keywords was formed. Out of which, the keyword "Sustainability Awareness" was selected. We selected eight databases including Google Scholar, ELSEVIER, Taylor and Francis, Springer, Wiley and Emerald.

196 articles were downloaded using the defined keyword and journal. Of these papers, 53 articles were excluded because they were downloaded again and again. Thereafter, the inclusion and exclusion criteria was employed. Around 75 articles which have title as sustainability awareness but the content does not provide any relevant information about it were removed. Finally, the 74 articles were used in creating a literature review on the theme of sustainability awareness.

III. RESULTS AND DISCUSSION

Year-Wise Publications on Sustainability Awareness

Year	No. of Papers
2002-2011	4
2012	2
2013	2
2014	5
2015	2
2016	3
2017	13
2018	5
2019	9
2020	5
2021	6
2022	6
2023	10
2024	2
Total	74

This table shows that the highest number of sustainability awareness papers are from the year 2017 and 2023.It can be said that academic institutions or research organisations preferred sustainability research in 2017 especially the Journal of Green energy and technology, leading to a higher number of publications on the topic during these two years. Moreover, increase in funding initiatives or academic growth may have encouraged scholars to explore sustainability-related themes during these years.

Publication Houses and Research on Sustainability Awareness

Site	No of Papers
Elsevier	18
Emerald	12
Springer	28
Taylor and Francis	8
Wiley	8

This table shows that maximum articles on sustainability awareness are published by Springer. It can be because of its reputation for quality and credibility because of which researchers have chosen Springer to publish their article.

Countries and Publications on Sustainability Awareness

Countries	No of Papers
Australia	3
Brazil	5
Canada	4
China	1
Cyprus	1
Germany	3
India	2
Indonesia	3
Italy	2
Jordan	1
Kyrgyzstan	1
Malaysia	2
Netherlands	1
New Zealand	1
Nigeria	1
Norway	2
Oman	1
Pakistan	2
Portugal	3
Saudi Arabia	2
Slovakia	1
Spain	6
Sri-Lanka	1
Taiwan	1
Thailand	1
UAE	2
UK	5
USA	9
Vietnam	2
8 Eastern European Countries	1
Greece, Italy and Sweden	1
Spain and Latin America	1
UK and Germany	1
Nigeria and Ghana	1

This table shows that maximum articles are from the USA followed by Spain. It may be possible that because of government initiatives towards it, higher research institutes focusing on sustainability and the number of conferences held in these countries act as a catalyst in increasing the articles on sustainability.

Continents and Publications on Sustainability Awareness

Continents	No of papers
Asia	22
North America	13
South America	5
Africa	2
Europe	28
Oceania	4

From the table, it has been found that the maximum articles according to the continent is from Asia and Europe. From seeing the country vice three top countries are from north and South America and only one

from Europe. So we can say that the main factor influencing the increasing number of articles in Asia and Europe is because of its large number of countries and area because of it many countries are contributing to sustainability awareness. Furthermore, higher research institutes and biodiversity of these two continents also acts as an influential factor.

Journals and Publications on Sustainability Awareness

Journal	No of papers
Business Strategy and the Environment	2
Corporate Social Responsibility and Environmental Management	2
Environmental Education Research	2
Green Energy and Technology	9
International Journal of Sustainability in Higher Education	3
Journal of Cleaner Production	4

The above table tells the number of articles from each journal by taking the range of at least two. The journal having only one article for instance,' Asia Pacific Journal of Marketing and Logistics', 'International Journal of Agricultural Sustainability', 'British Food Journal', 'International Journal of Child-Computer Interaction' and many more, has been excluded from the table in order to shorten the table. Furthermore, it has been seen that Journal of Green Energy and Technology has the highest number of journals and from data it has also been observed that the highest number of articles in the year 2017 on the topic sustainability awareness has been published by it. Concluding that this Journal has played a pivot role in increasing sustainability from the year 2017 thereby withstanding the further research in it.

Themes and Publications on Sustainability Awareness

Themes	No of Papers
Education	9
Climate	2
Environment	16
Food and Wine	4
Business and Banking	4
Engineering	2
Nursing	2
Stakeholders	3
Library	2

The above table shows that maximum papers of sustainability awareness are from the theme Environment followed by Education. Thereby stating that the effect of sustainability is higher in these two areas than the other. Leading to the increase in studies and aiming to implement sustainability in these two fields and then moving further. Furthermore, we have collected the theme from the data in which there are at least two, the articles having single themes like sustainability in aquatic life, coffee farming, construction, augmented reality and many more have been excluded in order to shorten the table content.

Major findings of the research articles studied on the sustainability awareness have been compiled in the following table:

Table: Studies Reviewed on Sustainability Awareness

Authors	Major finding
Herremans et al. 2002	To educate students about sustainability, educators could develop content that would motivate people to do sustainability, to implement a course for environmental sustainability in schools.
Pelletier 2008	LCA research illuminated material and energy flows in alternative seafood production, aiding in comparing environmental impacts and identifying critical areas for ecolabeling. Using energy intensity as a proxy helped generalize favored and penalized seafood products based on macroscale biophysical impacts.
Rezgui et al. 2010	There was a lack of sharing, exploitation, and reuse of sustainable practices. Links needed to be built between sustainability principles and current construction regulations and standards, and there was uncertainty about the cost of sustainable solutions.
Sacomano et al. 2011	Lawyers had less awareness of sustainability issues than other professionals. The reason might have been that lawyers were more attached to constitutional laws, which prevented them from being concerned with environmental sustainability. .
Bryant et al. 2012	The real estate industry was found to be extremely compliant with the new legislation. The sustainability declaration policy had little impact on homebuyer decision-making, and a lack of awareness was seen among buyers about this policy.
R.Galbreth et al. 2012	An increase in awareness increased equilibrium profits for both firms (including the less sustainable one). Moreover, initiatives like firm labelling and advertising helped increase consumer awareness about sustainability and aided in gaining profit.
Birdsall et al. 2013	Many students and teachers lacked awareness of sustainability. There was a need for sustainability education in initial teacher training programs, which might have assisted in sustainability education program design.
Loura 2013	Integrating sustainability concepts and tools throughout the undergraduate training of business management students was considered essential to ensure the ethical and responsible approach of future business practitioners at the managerial or operational level.
Dach et al. 2014	Both H&M and Primark needed to improve their web-based corporate sustainability communications. Primark's web-based corporate sustainability communications were perceived as more credible than H&M's web-based corporate sustainability communications.

Kopnina 2014	Environmental awareness of sustainable attitudes and practices did not correspond to the level of the country's material development. There was a need for 'ecological enlightenment' of Dutch citizen-consumers, which could have been achieved through co-creation and new business models like collaborative consumption, the sharing economy, secondary markets, pay-per-use, leasing models, and dematerialization.
Shadymanova et al. 2014	Despite having programs to reduce environmental problems and achieve sustainable development, inefficient relations between official institutions and local communities acted as a hindrance. People had little knowledge about sustainability and associated it more with health effects rather than environmental, natural, and local food consumption.
Sweet et al. 2014	Sustainability within complex systems required continuous adaptation and resilience, and sustainability awareness assessed sustainability, uncertainty, challenges, and values, reflecting a system's pathway towards increasing or decreasing sustainability over time.
Weber et al. 2014	Students lacked awareness relating to several aspects such as environmental legislation and policy issues, environmental tools, technologies, and approaches, as well as sustainable development.
Garbie et al. 2015	Sustainability still needed more attention from all stakeholders, especially in public and academic sectors, which focused more on environmental and social awareness. The study also found that sustainability was of highest importance in governmental departments.
Johnson 2015	Low awareness and implementation were found for the majority of surveyed tools. A properly executed quality management system could have been beneficial in reducing waste, thus lowering the negative environmental impacts and unwanted financial burden.
Townsend 2016	Loaning energy meters, pedometers, bike locks, etc., was initiated to educate the community about the benefits and responsibility of participating in energy conservation and other sustainable initiatives.
Chen at al. 2016	Students displayed a positive attitude toward the marine environment with moderate knowledge but lacked participation in sustainability activities. Encouraging marine education, conservation initiatives, and legal awareness could have minimized their impact and fostered marine environmental protection.
Morris et al. 2016	Intervention helped in increasing environmental sustainability by increasing compostable or recyclable answers from the students. In order to increase environmental sustainability, it was necessary to reduce sugary drink consumption and increase vegetable intake.

Buerke et al. 2017	Sustainability values positively influenced responsible consumer behavior, shaped by societal and personal awareness. Consumer susceptibility impacted personal behavior more than societal actions. Overall, sustainability values and awareness played crucial roles in shaping responsible consumer choices and attitudes towards materialism.
Restrepo 2017	Sustainability awareness drove cost reduction, resource efficiency, and customer satisfaction, yet implementation risks included cost inflation, fraud allegations, and potential setbacks in SDG achievement.
M Rich et al. 2017	Consumers recognized certified products' positive environmental attributes, but the connection to people was lacking. Promoting conservation practices in sustainable places like Coorg enhanced sustainability and simplified certification issues. This approach ensured long-term environmental viability.
Dhanushka 2017	Sustainability promotion through education, training, and social networking reduced pollution, health risks, and carbon footprints while boosting efficiency. However, implementation could cause supply chain crises, insurance issues, fraud, and governance failures.
Francis 2017	Sustainability reduced pollution, carbon footprints, and health hazards, boosting efficiency and creating jobs. However, it increased fraud, governance failures, supply chain crises, and raw material costs.
hamid et al. 2017	Environmental sustainability improved quality of life and awareness, requiring inclusion in university curricula for comprehensive education and planning. Social media platforms like Twitter and Facebook efficiently aided in creating awareness.
Hoang 2017	Sustainability enhanced efficiency, reduced resource usage, met investor expectations, and lowered environmental impacts, but caused regulatory breaches and compliance issues. Educators in Vietnam were encouraged to integrate sustainability into their courses to raise student awareness.

Issa 2017	Sustainability met expectations, reduced resource usage and emissions, and enhanced human rights accountability, but led to increased failures and regulatory issues. Universities needed to raise student awareness and guide them toward sustainability.
Inmpey 2017	Sustainability boosted productivity, brand image, compliance, innovation, and cost reduction, but increased risks of management failure, poor commitment, and regulatory costs. It also highlighted the need for better information sharing, resources, and awareness of environmental impacts.
Javed et al. 2017	Sustainability positively impacted stakeholder needs, human rights, and productivity while reducing environmental harm. However, it brought compliance challenges, fraud, governance failures, and economic burdens like cost inflation and higher interest rates.
Kuroda 2017	Sustainability benefitted by reducing raw materials and improving business operations, emphasizing the 4Rs. Yet, it incurred higher costs, compliance burdens, and management challenges, particularly in regions with low awareness like Brazil.
Phoorisart 2017	Sustainability enhanced productivity, attracted opportunities, and met stakeholder expectations while mitigating environmental impacts. However, it posed risks such as supply chain crises, marketing failures, regulatory challenges, and fraud, especially in environmental contexts.
Richardson et al. 2017	Nursing curriculum changes fostered positive attitudes toward climate change and sustainability, enhancing participants' understanding of resource management and waste disposal costs through interactive sessions, valued for their realism and effectiveness.

Dávideková et al. 2018	Raising awareness on CO2 pollution, transportation emissions, plastic usage, and ingredient sourcing promoted sustainability. Developing research skills for finding reliable sources was crucial for informed decision-making.
Alves et al. 2018	The mining sector struggled with sustainability due to insufficient community engagement, stakeholder involvement, and mitigation of environmental impacts. Larger companies led efforts, while smaller ones faced barriers like limited information access and regulatory challenges.
Cuong et al. 2018	Limited awareness of the Biosphere Reserve concept in Kien Giang hampered understanding of Protected Area management goals, potentially hindering conservation efforts and local economic development opportunities due to misconceptions about resource use restrictions.
Idrus et al. 2018	The model highlighted four phases: knowledge, understanding, obligation, and implementation. Malaysian urban areas exhibited heightened environmental awareness from government campaigns, yet insufficient action undermined sustainability despite policy support.
Lopes et al. 2018	Teaching curriculum and research contributed to sustainability awareness and generated ideas for improving well-being and the environment. Infrastructure improvements, like energy efficiency and community engagement, also enhanced sustainability.
Kusumawati et al. 2019	Sustainability positively influenced the number of foreign tourists visiting the country, and the main indicator that needed correction was pollution. Furthermore, environmental awareness also strengthened sustainability.

Cogut et al. 2019	Heightened operational awareness fostered waste prevention behaviors, while educational efforts had limited impact on behavior change, suggesting a need for prioritizing sustainability infrastructure in universities.
Alahmari et al. 2019	Augmented Reality (AR) could reduce energy, raw materials, ICT equipment, resource consumption, waste, air pollution, global climate warming, and carbon footprint. It also raised awareness about sustainability.
Raymundo et al. 2019	Achieving sustainability entailed reducing global warming, greenhouse gas emissions, pollution, and protecting natural habitats and biodiversity. Efforts should have prioritized minimizing fossil fuel use, preserving water sources, topsoil, and energy conservation.
Hörisch et al. 2019	Corporate sustainability actions boosted awareness of sustainability consequences, especially when accompanied by feedback. This heightened awareness mediated the link between sustainability actions and overall sustainability outcomes.
Garcia et al. 2019	Awareness of ecological footprint was often lacking, influenced by lifestyle, habits, and consumption choices. Factors like dwelling location, family size, and transportation played key roles, while reusing textiles promoted sustainability.
Gong et al. 2019	Customer awareness positively impacted suppliers' sustainability performance and upstream supply chain dissemination through SSCM, mediated by the firm's sustainability capability. Stakeholder engagement further enhanced sustainability performance between firms and supply chain partners.

Mastroberardino et al. 2019	Lack of consumer awareness about sustainability's meaning and its impact on wine choice existed among Italian consumers, with terms like organic, biodynamic, and natural causing confusion. Clear consumer education was needed to differentiate and clarify sustainability in wine production.
Petersen et al. 2019	Smiling Earth had the potential to raise user awareness and motivate them to understand their environmental impact, fostering sustainable behavior change. Its engaging approach made environmental concepts understandable and inspired action.
Abd-Elwahed et al. 2020	Addressing the lack of awareness and motivation, education needed to integrate sustainability into learning objectives and student culture rather than force it. Collaboration among government, industry, academia, and the public was essential to drive sustainable development in developing countries.
Schniederjans et al. 2020	Focal firm's awareness and capability inversely affected its environmental and social competitiveness but positively impacted gross margin. Additionally, major customers' awareness positively influenced the firm's social and environmental competitiveness.
Talbot et al. 2020	Sustainability awareness, reporting, and policy implementation correlated positively with stakeholder consultation. Training activities were crucial to bridge the awareness gap between managers and owners and foster sustainable development.
Loste et al. 2020	Training enhanced students' appreciation of Green Chemistry's usefulness, urging broader education beyond the chemical field. Strengthening its integration with other environmental disciplines fostered sustainability advancement.
Rustam et al. 2020	Environmental sustainability positively influenced green consumerism and impacted various sociodemographic, behavioral, and psychological characteristics of green consumer behavior. Increased green consumption behavior reinforced the importance of environmental sustainability and awareness.

Martin et al. 2021	Lack of awareness, education, and economic feasibility impeded CO2 emissions, plastic waste, and pollution reduction efforts. Understanding the role of dental materials in waste generation was crucial for sustainable implementation.
Cachón-Rodríguez et al. 2021	Sustainability actions might not have consistently impacted employee loyalty, while organizational legitimacy positively affected it. Employees trusted sustainability efforts from legitimate companies, and organizational sustainability shaped legitimacy.
Caronna et al. 2021	Implementing awareness campaigns on migraine disease enhanced company sustainability. Promoting strategies for migraine diagnosis, treatment, and prevention in workplaces fostered economic sustainability and employee well-being.
Prandi et al. 2021	VITflow enhanced sustainability awareness for tourists with its simplicity. While tourism had less impact on sustainability compared to energy and mobility, diverse interpretations of sustainability emphasized its future-oriented significance.
Oriade et al. 2021	Hotel workers were aware of sustainability principles but underutilized practices like towel reuse and noise pollution reduction. Management practice and sustainability awareness correlated positively with organizational culture, though not mediating employee awareness.
Polas et al. 2021	Knowledge acquisition, dissemination, and responsiveness positively affected green innovation in SMEs, with environmental awareness mediating the relationship between acquisition/dissemination but not responsiveness and innovation.

Dazzi et al. 2022	Soil sustainability ensured soil management met current needs without compromising future generations' ability. This was achieved by minimizing erosion, enhancing organic matter, fostering nutrient balance, preventing contamination, preserving biodiversity, and managing water effectively.
Álvarez-Nieto et al. 2022	Scenario-based learning and augmented reality enhanced nursing students' environmental awareness and climate change attitudes, aiding in connecting sustainability principles to healthcare practices.
Duboc et al. 2022	The SuSAF framework, which facilitated discussions with stakeholders through interviews or workshops, boosted sustainability awareness across diverse systems and domains, promoting insightful dialogue and practical identification of software system effects on sustainability.
Papasolomou et al. 2022	Consumer awareness of fashion product impact on the environment was lacking, with informed consumers not consistently exhibiting sustainable behavior. Retailers needed to ensure accurate, comprehensible, and credible product labeling to empower consumers in making environmentally informed choices.
Schrage et al. 2022	The critical approach to SDGs involved understanding, analyzing, and co-producing actionable knowledge to inform decision-making, fostering positive impacts despite inherent challenges.

Trigo et al. 2022	Participants prioritized sustainability's economic impact, noting limited government involvement, while advocating holistic approaches across social, environmental, and governance dimensions, emphasizing policy assessment for progress.
Tribelhorn et al. 2023	Not all libraries in the USA had embraced sustainability. Surveys indicated that the primary focus was on the environmental aspect of sustainability, and very few libraries used KPI and assessment tools to measure sustainability progress.
Toth-Nagy et al. 2023	Macroeconomic attitudes towards goals such as fair work and economic growth, no poverty, responsible consumption and production, justice and strong institutions were noted, with the highest attitude towards sustainable cities and communities.
Mylonas et al. 2023	Utilizing gamification, playful interventions, and sensor data in schools effectively introduced sustainability and energy-saving awareness to K-12 students, integrating competitions and interventions into daily school life, complemented by a comprehensive strategy to engage and educate users.
Vazquez et al. 2023	Consumer clusters showed positive correlations between eco-label premiums and concerns about food safety/environment. Younger, educated women were more aware of labels and used them, contrasting with older, less-educated men who were less knowledgeable and less likely to utilize labels in purchasing decisions.
Pradeep et al. 2023	In the UAE, Generation Z prioritized price and fashion over sustainability despite awareness, driven by cultural influences favoring mainstream brands for factors like modesty and affordability.

Anis et al. 2023	Sustainability governance practices increased operational efficiency but reduced banks' profitability. Operational efficiency mediated the relationship between sustainability governance practices and banks' profitability.
Rasool et al. 2023	Altruistic-self boosted consumer food-saving attitudes, while hunger awareness didn't affect attitudes. Altruistic-self, food-saving attitudes, and hunger awareness promoted socially responsible plate-food consumption, with congruity enhancing food-saving attitudes.
Urbaniak et al. 2023	Students at CMU demonstrated lower sustainability knowledge than staff/faculty, especially regarding campus initiatives like electronics recycling and energy conservation. Personal values and backgrounds shaped behavior more than external influences.
Hamoudi et al. 2023	Government intervention shaped a regulated market driven by consumer awareness, guiding businesses towards sustainability and benefiting consumers through lower prices, contingent upon the regulator's capacity to raise environmental awareness.
Chalmeta et al. 2023	Specialized strategies and formal OSNs enhanced user connections, positively impacting sustainability awareness. Platforms like Twitter, YouTube, WhatsApp, and Google effectively promoted sustainable behavior across sectors.
Jaradat 2024	Awareness gaps hindered sustainability in Jordan's construction sector despite decent stakeholder knowledge. Green building advantages necessitated government and private sector actions like regulations, incentives, education, and collaboration for adoption.

Ghoniyah et al. 2024	Sustainability awareness notably impacted business sustainability, emphasizing the importance of understanding its goals for enhancing business sustainability, particularly when integrated with Islamic Work Ethics for more effective continuity.

IV. CONCLUSION

In a nutshell, it has been found that the maximum number of articles are from the year 2017 and Journal named as "Green Energy and Technology". Moreover, most articles are from the USA and continental Europe. Furthermore, various themes have been highlighted regarding sustainability in varied areas but highest articles are of sustainability in the environment. Townsend (2016) stated that Library used different methods to promote their LEED certification and green building features like: pamphlets/brochures/handouts, posters/displays, visible display of the LEED-certified certificate, promotion at public events, building tours, information on the library Web site, signage highlighting green building features and news/media.

Based on all the findings, it has been observed that collaboration among government, industry, academia, and the public is crucial. Addressing sustainability requires collective efforts, and initiatives like co-creation, new business models, and stakeholder engagement can significantly contribute to achieving sustainable development goals. Consumer awareness and corporate sustainability actions are interlinked. Educating consumers about the environmental impacts of their choices and improving corporate transparency through credible communication can enhance sustainability efforts. Thus, the present study attempts to provide insights in the field of sustainability awareness and future areas to explore sustainability awareness in varied fields.

REFERENCES

[1] Abd-Elwahed, M. S., & Al-Bahi, A. M. (2021). Sustainability awareness in engineering curriculum through a proposed teaching and assessment framework. International Journal of Technology and Design Education, 31(3), 633-651.

[2] Alahmari, M., Issa, T., Issa, T., & Nau, S. Z. (2019). Faculty awareness of the economic and environmental benefits of augmented reality for sustainability in Saudi Arabian universities. Journal of Cleaner Production, 226, 259-269.

[3] Álvarez-Nieto, C., Álvarez-García, C., Parra-Anguita, L., Sanz-Martos, S., & López-Medina, I. M. (2022). Effectiveness of scenario-based learning and augmented reality for nursing students' attitudes and awareness toward climate change and sustainability. BMC nursing, 21(1), 245.

[4] Alves, W., Ferreira, P., & Araújo, M. (2018). Sustainability awareness in Brazilian mining corporations: the case of Paraíba state. Environment, Development and Sustainability, 20, 41-63.

[5] Anis, I., Gani, L., Fauzi, H., Hermawan, A. A., & Adhariani, D. (2023). The sustainability awareness of banking institutions in Indonesia, its implication on profitability by the mediating role of operational efficiency. Asian Journal of Accounting Research, 8(4), 356-372.

[6] Birdsall, S. (2014). Measuring student teachers' understandings and self-awareness of sustainability. Environmental Education Research, 20(6), 814-835.

[7] Bonilla, C. M., Constanza de Del Cid, Z. A., & Moya Menjivar, J. E. (2016). Socioeconomic profile of students who have a grade point average" gpa" of 8.0, or above, from the fourth and fifth years of the bachelor in english With emphasis in teaching at the Department of Foreign Languages of the University of El Salvador in the year 2015 (Doctoral dissertation, Universidad de El Salvador).

[8] Bryant, L., & Eves, C. (2012). Home sustainability policy and mandatory disclosure: A survey of buyer and seller participation and awareness in Qld. Property Management, 30(1), 29-51.

[9] 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, 959-991.

[10] Cachón-Rodríguez, G., Blanco-González, A., Prado-Román, C., & Diez-Martin, F. (2021). Sustainability actions, employee loyalty, and the awareness: the mediating effect of organization legitimacy. Managerial and Decision Economics, 42(7), 1730-1739.

[11] Canto de Loura, I. (2014). Dilemmas in sustainability: A pedagogical approach to raise awareness on the key role businesses play to practice and promote sustainability. Journal of Management Development, 33(6), 594-602.

[12] Caronna, E., Gallardo, V. J., Alpuente, A., Torres-Ferrus, M., & Pozo-Rosich, P. (2022). Epidemiology, work and economic impact of migraine in a large hospital cohort: time to raise awareness and promote sustainability. Journal of Neurology, 1-7.

[13] Chalmeta, R., & Barbeito-Caamano, A. M. (2024). Framework for using online social networks for sustainability awareness. Online Information Review, 48(2), 334-353.

[14] Chen, C. L., & Tsai, C. H. (2016). Marine environmental awareness among university students in Taiwan: a potential signal for sustainability of the oceans. Environmental Education Research, 22(7), 958-977.

[15] Cogut, G., Webster, N. J., Marans, R. W., & Callewaert, J. (2019). Links between sustainability-related awareness and behavior: The moderating role of engagement. International Journal of Sustainability in Higher Education, 20(7), 1240-1257.

[16] Dach, L., & Allmendinger, K. (2014). Sustainability in corporate communications and its influence on consumer awareness and perceptions: A study of H&M and Primark. Procedia-Social and Behavioral Sciences, 130, 409-418.

[17] Dávideková, M., & Greguš ml, M. (2018). Concept Proposal for Integrating Awareness of Sustainability Through Student Assignments. In Teaching and Learning in a Digital World: Proceedings of the 20th International Conference on Interactive Collaborative Learning–Volume 1 (pp. 613-618). Springer International Publishing.

[18] Dazzi, C., & Papa, G. L. (2022). A new definition of soil to promote soil awareness, sustainability, security and governance. International Soil and Water Conservation Research, 10(1), 99-108.

[19] Dhanushka, P. H. G. (2017). The Opportunities and Risks of Sustainability Awareness in Sri Lankan Organizations. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 185-213.

[20] Duboc, L., Penzenstadler, B., Porras, J., Akinli Kocak, S., Betz, S., Chitchyan, R., ... & Venters, C. C. (2020). Requirements engineering for sustainability: an awareness framework for designing software systems for a better tomorrow. Requirements Engineering, 25, 469-492.

[21] Elkington, J. (1994). Towards the sustainable corporation: Win-win-win business strategies for sustainable development. California management review, 36(2), 90-100.

[21] Elshof, L. (2005). Teacher's interpretation of sustainable development. International Journal of Technology and Design Education, 15, 173-186.

Environmental Protection Agency. (2014, November 5). Learn about sustainability. https://www.epa.gov/sustainability/learn-about-sustainability#what.

[22] Francis, N. (2017). The Advantages and Risks of Sustainability Awareness in the Indian Higher Education Sector. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 215-241.

[23] Galbreth, M. R., & Ghosh, B. (2013). Competition and sustainability: The impact of consumer awareness. Decision Sciences, 44(1), 127-159.

[24] Garbie, I. H. (2015). Sustainability awareness in industrial organizations. Procedia Cirp, 26, 64-69.

[25] Garcia, S., Cordeiro, A., de Alencar Nääs, I., & Neto, P. L. D. O. C. (2019). The sustainability awareness of Brazilian consumers of cotton clothing. Journal of cleaner production, 215, 1490-1502.

[26] Ghoniyah, N., Amilahaq, F., & Hartono, S. (2024). Business sustainability performance through sustainability awareness and business work ethics in Islamic institutions. Cogent Business & Management, 11(1), 2303789.

[27] Gong, M., Gao, Y., Koh, L., Sutcliffe, C., & Cullen, J. (2019). The role of customer awareness in promoting firm sustainability and sustainable supply chain management. International Journal of Production Economics, 217, 88-96.

[28] Hamid, S., Ijab, M. T., Sulaiman, H., Md. Anwar, R., & Norman, A. A. (2017). Social media for environmental sustainability awareness in higher education. International Journal of Sustainability in Higher Education, 18(4), 474-491.

[29] Hamoudi, H., & Avilés-Palacios, C. (2023). Product Sustainability and Consumer Environmental Awareness in Differentiated Markets. International Advances in Economic Research, 29(4), 277-291.

[30] Harlem Brundtland, Gro, 1987. What is sustainable development. Our common future 8 (9)

[31] Herremans, I. M., & Reid, R. E. (2002). Developing awareness of the sustainability concept. The Journal of Environmental Education, 34(1), 16-20.

[32] Hoang, A. T. (2017). Sustainability Awareness in Vietnam's Higher Education Sector. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 149-184.

[33] Hörisch, J., Wulfsberg, I., & Schaltegger, S. (2020). The influence of feedback and awareness of consequences on the development of corporate sustainability action over time. Business Strategy and the Environment, 29(2), 638-650.

[34] Idrus, S., Aziz, N. A., Hadi, A. S., Ismail, S. M., Mohamed, A. F., Roslan, N., ... & Zubir, F. I. (2018). Challenges of Ecosystem Resilience: An Aspect of the Sustainability Science Approach in the Study of Environmental Awareness in the Selayang Municipal Council, Selangor, Malaysia. Handbook of Sustainability Science and Research, 597-612.

[35] Inmpey, O. C. (2017). Sustainability and Green Supply Chain Awareness in Nigerian Organizations. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 427-472.

[36] Issa, T. (2017). Sustainability perspective and awareness amongst higher education in Australia. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 17-33.

[37] Jaradat, H., Alshboul, O. A. M., Obeidat, I. M., & Zoubi, M. K. (2024). Green building, carbon emission, and environmental sustainability of construction industry in Jordan: Awareness, actions and barriers. Ain Shams Engineering Journal, 15(2), 102441.

[38] Javed, M. U., & Imtinan, U. (2017). Examining the Opportunities and Risks Associated with Sustainability Awareness in Higher Education in Pakistan. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 307-338.

[39] Johnson, M. P. (2015). Sustainability management and small and medium-sized enterprises: Managers' awareness and implementation of innovative tools. Corporate Social Responsibility and Environmental Management, 22(5), 271-285.

[40] K. Townsend, A. (2014). Environmental sustainability and libraries: Facilitating user awareness. Library Hi Tech News, 31(9), 21-23.

[41] Kopnina, H. (2014). Christmas tale of (un) sustainability: Reflecting on consumption and environmental awareness on the streets of Amsterdam. Sustainable Cities and Society, 10, 65-71.

[42] Kuroda, E. (2017). Sustainability Awareness in the Brazilian Higher Education. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 391-426.

[43] Kusumawati, A., Utomo, H. S., Suharyono, S., & Sunarti, S. (2019). Effects of sustainability on WoM intention and revisit intention, with environmental awareness as a moderator. Management of Environmental Quality: An International Journal, 31(1), 273-288.

[44] Lopes, R. P., Mesquita, C., de la Cruz del Río-Rama, M., & Álvarez-García, J. (2018). Developing sustainability awareness in higher education. Strategies and best practices in social innovation: An institutional perspective, 131-152.

[45] Loste, N., Chinarro, D., Gomez, M., Roldan, E., & Giner, B. (2020). Assessing awareness of green chemistry as a tool for advancing sustainability. Journal of cleaner production, 256, 120392.

[46] Martin, N., Sheppard, M., Gorasia, G., Arora, P., Cooper, M., & Mulligan, S. (2021). Awareness and barriers to sustainability in dentistry: A scoping review. Journal of Dentistry, 112, 103735.

[47] Mastroberardino, P., Calabrese, G., Cortese, F., & Petracca, M. (2020). Sustainability in the wine sector: An empirical analysis of the level of awareness and perception among the Italian consumers. British Food Journal, 122(8), 2497-2511.

[48] Morris, H., Skouteris, H., Edwards, S., Rutherford, L. M., Cutter-Mackenzie, A., O'Connor, A., ... & Williams-Smith, J. (2016). Feasibility of conducting a randomized trial to promote healthy eating, active play and sustainability awareness in early childhood curricula. Early child development and care, 186(11), 1752-1764.

[49] Mylonas, G., Hofstaetter, J., Giannakos, M., Friedl, A., & Koulouris, P. (2023). Playful interventions for sustainability awareness in educational environments: A longitudinal, large-scale study in three countries. International Journal of Child-Computer Interaction, 35, 100562.

[50] Oriade, A., Osinaike, A., Aduhene, K., & Wang, Y. (2021). Sustainability awareness, management practices and organisational culture in hotels: Evidence from developing countries. International Journal of Hospitality Management, 92, 102699.

[51] Papasolomou, I., Melanthiou, Y., & Tsamouridis, A. (2023). The fast fashion vs environment debate: Consumers' level of awareness, feelings, and behaviour towards sustainability within the fast-fashion sector. Journal of Marketing Communications, 29(2), 191-209.

[52] Pelletier, N., & Tyedmers, P. (2008). Life cycle considerations for improving sustainability assessments in seafood awareness campaigns. Environmental management, 42, 918-931.

[53] Petersen, S. A., Ahcin, P., & Petersen, I. (2019). Smiling earth-citizens' awareness on environmental sustainability using energy and transport data. In Entertainment Computing and Serious Games: First IFIP

TC 14 Joint International Conference, ICEC-JCSG 2019, Arequipa, Peru, November 11–15, 2019, Proceedings 1 (pp. 459-465). Springer International Publishing.

[54] Phoorisart, N. (2017). Sustainability awareness in Thailand. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 103-147.

[55] Polas, M. R. H., Tabash, M. I., Bhattacharjee, A., & Dávila, G. A. (2023). Knowledge management practices and green innovation in SMES: the role of environmental awareness towards environmental sustainability. International Journal of Organizational Analysis, 31(5), 1601-1622.

[56] Pradeep, S., & Pradeep, M. (2023). Awareness of sustainability, climate emergency, and generation Z's consumer behaviour in UAE. Cleaner and Responsible Consumption, 11, 100137.

[57] Prandi, C., Nisi, V., Ribeiro, M., & Nunes, N. (2021). Sensing and making sense of tourism flows and urban data to foster sustainability awareness: a real-world experience. Journal of big Data, 8(1), 51.

[58] Rasool, S., Cerchione, R., Centobelli, P., Oropallo, E., & Salo, J. (2023). Sustainability and socially responsible food consumption: an empirical investigation based on self-awareness and self-congruity theories. Asia Pacific Journal of Marketing and Logistics.

[59] Raymundo, M. G., Matheus, C., & de Moraes Hoefel, J. L. (2019). Awareness of Sustainability Issues: Holistic Housing Sustainable Thinking. Encyclopedia of sustainability in higher education, 76-83.

[60] Restrepo, J. E. O. (2017). Sustainability Awareness: Colombia Perspective. Sustainability, Green IT and Education Strategies in the Twenty-first Century, 353-390.

[61] Rezgui, Y., Wilson, I. E., & Li, H. (2010). Promoting sustainability awareness through energy engaged virtual communities of construction stakeholders. In Collaborative Networks for a Sustainable World: 11th IFIP WG 5.5 Working Conference on Virtual Enterprises, PRO-VE 2010, St. Etienne, France, October 11-13, 2010. Proceedings 11 (pp. 142-148). Springer Berlin Heidelberg.

[62] Rich, K. M., PG, C., Muniyappa, A., Yadava, C. G., Manjyapura, G. S., Pradeepa Babu, B. N., ... & Rich, M. (2018). Coffee certification in India: Awareness, practices, and sustainability perception of growers. Agroecology and Sustainable Food Systems, 42(4), 448-474.

[63] Richardson, J., Grose, J., Bradbury, M., & Kelsey, J. (2017). Developing awareness of sustainability in nursing and midwifery using a scenario-based approach: Evidence from a pre and post educational intervention study. Nurse Education Today, 54, 51-55.

[64] Rustam, A., Wang, Y., & Zameer, H. (2020). Environmental awareness, firm sustainability exposure and green consumption behaviors. Journal of Cleaner Production, 268, 122016.

[65] Sacomano, A. R., & de Oliveira Costa Neto, P. L. (2012). Social Responsibility, Sustainability and its awareness in Brazil. In Advances in Production Management Systems. Value Networks: Innovation, Technologies, and Management: IFIP WG 5.7 International Conference, APMS 2011, Stavanger, Norway, September 26-28, 2011, Revised Selected Papers (pp. 405-411). Springer Berlin Heidelberg.

[66] Schniederjans, D. G., & Khalajhedayati, M. (2021). Competitive sustainability and stakeholder engagement: Exploring awareness, motivation, and capability. Business Strategy and the Environment, 30(2), 808-824.

[67] Schrage, J., Barraclough, A. D., Wilkerson, B., Cusens, J., & Fuller, J. (2023). Developing positional awareness in sustainability science: four archetypes for early career scientists working in an SDG world. Sustainability Science, 18(2), 1053-1058.

[68] Shadymanova, J., Wahlen, S., & van der Horst, H. (2014). 'Nobody cares about the environment': K yrgyz'perspectives on enhancing environmental sustainable consumption practices when facing limited sustainability awareness. International journal of consumer studies, 38(6), 678-683.

[69] Sweet, D. S., Seager, T. P., Tylock, S., Bullock, J., Linkov, I., Colombo, D. J., & Unrath, U. (2013). Sustainability awareness and expertise: Structuring the cognitive processes for solving wicked problems and achieving an adaptive-state. In Sustainable Cities and Military Installations (pp. 79-129). Dordrecht: Springer Netherlands.

[70] Talbot, D., Raineri, N., & Daou, A. (2021). Implementation of sustainability management tools: The contribution of awareness, external pressures, and stakeholder consultation. Corporate Social Responsibility and Environmental Management, 28(1), 71-81.

[71] Tóth-Nagy, G., Utasi, A., Neumanné, V. I., & Sebestyén, V. (2023). Data-driven supporting of Schwartz attitude model for a deeper understanding of sustainability awareness in Eastern European countries. Environmental and Sustainability Indicators, 17, 100226.

[72] Tribelhorn, S. K. (2023). Preliminary investigation of sustainability awareness and activities among academic libraries in the United States. The Journal of Academic Librarianship, 49(3), 102661.

[73] Trigo, A., Fragoso, R., & Marta-Costa, A. (2022). Sustainability awareness in the Portuguese wine industry: a grounded theory approach. International Journal of Agricultural Sustainability, 20(7), 1437-1453.

[74] Urbaniak, E., Uzarski, R., & Haidar, S. (2024). Assessment of sustainability awareness and practice in a campus community. International Journal of Sustainability in Higher Education, 25(9), 94-110.

[75] Van Cuong, C., Dart, P., Dudley, N., & Hockings, M. (2018). Building stakeholder awareness and engagement strategy to enhance biosphere reserve performance and sustainability: The case of Kien Giang, Vietnam. Environmental management, 62, 877-891.

[76] Vázquez, J. L., Lanero, A., García, J. A., & Moraño, X. (2023). Segmentation of consumers based on awareness, attitudes and use of sustainability labels in the purchase of commonly used products. Sustainable Production and Consumption, 38, 115-129.

[77] Weber, N. R., Strobel, J., Dyehouse, M. A., Harris, C., David, R., Fang, J., & Hua, I. (2014). First-year students' environmental awareness and understanding of environmental sustainability through a life cycle assessment module. Journal of Engineering Education, 103(1), 154-181.