

Environmental Awareness Agro-education Training Participants in School Community: Case in Elementary School Brajan Tamantirto Village, Yogyakarta

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Abstract. Population growth has an impact on socioeconomic and environmental conditions, namely an increase in demand for food and shelter which can reduce environmental quality. Therefore, agro-education is expected to overcome these problems. This study aims to analyze the environmental awareness of agro-education training participants as the first step to solve the problem of food needs and a sustainable quality environment. Interviews using questionnaires were conducted on 78 respondents consisting of teachers, students, parents and communities who had attended agro-education training. The data were analyzed descriptively to illustrate the environmental awareness of the trainees. The results of the study show that the environmental awareness of training participants is high, but the attitude of appreciation of environmentally friendly, environmentally friendly habits and innovations still needs strengthening. Intensive assistance is still needed for the implementation of environmental awareness so that they can manage natural resources and the environment in a sustainable manner.

1 Introduction

Urban areas development massively has led to the green open spaces displacement [1]. The green open space loss greatly affects the environmental ecosystems stability that are declining in function [2], [3], [4] while pollution increases which adversely affects the health physically and mentally of urban people [5], [6]. One of the reasons for this problem is the urbanization process which causes a high rate of development so as to eliminate the agricultural land existence in urban areas [7]. The city can no longer meet its food demands autonomously. [8]. This will be a challenge in food fulfillment and food security [8].

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The increasing rate of population increase in cities will produce environmental concerns, ranging from land conversion to loss of environmental quality owing to pollution and waste. [9]. If the rate of population increase exceeds the rate of food production, it will endanger food security. [10]. Food insufficiency in parallel will have a reason on dependence between one region to other regions. This circumstance motivates the government and the people in metropolitan areas to begin trying to meet food demands independently and improve environmental conditions in order to produce a healthy and quality environment. [11].

Yogyakarta City is one of the main tourism destinations for domestic and foreign tourists as well as an educational city in Indonesia. This will have an impact on environmental issues that must be immediately addressed by all elements of society and the Yogyakarta City Government. Tamantirto Village is a suburban area on the outskirts of Yogyakarta City that is growing rapidly along with the development of industry, education services and housing. Two private campuses have been established in this area, namely the University of Muhammadiyah Yogyakarta with 20,000 students and the Alma Ata University campus. Meanwhile, based on observational surveys, Brajan is one of the villages in Tamantirto village which is already dense with settlements both boarding houses and housing. There are seven housing complexes in Brajan, namely Pondok Permai Tamantirto, Alam Brajan Housing, Tamantirto Village, Green Park, Alam Brajan Residence, Griya Brajan Asri and Griya Brajan Permai.

The development of population and dense settlements certainly has an impact on the decline in environmental conditions [12], [13] and an increase in the number of food needs for people in the region. Meanwhile, public awareness of environmental management is still relatively low [14]. Various environmental problems such as waste problems are still problems that always arise at any time. Therefore, efforts to build public awareness of the environment need to be instilled from elementary school age through environmental education that is practiced in everyday life in the daily environment [15]. One form of environmental education that can be applied while helping the provision of food for the community is agro-education [16]. The practice applied in suburban areas can be referred to as urban farming or urban agriculture as an urban environmental education program [17].

Urban agriculture Urban agriculture is basically urban ecological engineering with the direct goal of food production, which is expected to contribute positively to sustainable development in urban areas [18]. Urban agriculture has the potential to improve household food security and provide income commensurate with the biodiversity cultivated [19]. Therefore, such practices should be included in urban food policy [20].

The results of previous studies show the important role of urban agriculture for the ecosystem services management, confirmed by the increasing number and types of stakeholders signing up to cooperation with the National Park Authority. These findings speak to Turin's natural green infrastructure and innovative ideas for agricultural development. In order to create urban government models that bridge all territorial parties, strategic assets must be identified. By connecting agricultural output and tourism inputs, this strategy would advance the circular economy. [21]. Urban agriculture can boost local economies due to the various benefits of employment, income, and improved livelihoods and food security [22]. Climate change, food security, biodiversity and ecosystem services, agricultural intensification, resource efficiency, urban renewal and regeneration, land management, public health, social cohesion, and economic growth are the ten main social challenges of urbanization that urban agriculture contributes to. Urban farming is valuable because it can provide ecosystem services and co-benefits related to the environment, economy, and society. Urban farming implementation requires careful consideration of social, institutional, economic, technical, geographical, and ecological drivers and limits.

To ensure the effective scaling up of urban farming, the study created an integrative assessment methodology to measure the implementation and impact efficiency. [23].

The ten main social challenges of urbanization that urban agriculture contributes to are food security, urban renewal and regeneration, biodiversity and ecosystem services, agricultural intensification, resource efficiency, land management, public health, social cohesion, and economic growth. Because it can offer ecosystem services and co-benefits pertaining to the environment, economics, and society, urban farming is valuable. When implementing urban farming, social, institutional, economic, technical, geographical, and ecological constraints and drivers must be carefully taken into account. In order to guarantee the successful expansion of urban farming, the research developed an integrated assessment approach to gauge the effectiveness of implementation and effects. Nevertheless There needs to be more increased public awareness of the importance, technical support in the best practices demonstration and the modern technologies use (such as aquaponics and mini hydroponics), homestead-based food safety requirements for products [24]. As a result, in order to maximize the function of mixed land use in urban areas and support a sustainable transition, one must consider food systems and use urban design as a tool [25].

Urban agriculture may facilitate community involvement and education, link the socioeconomic and health systems, and promote a number of conservation objectives, such as biodiversity preservation and nutrient recycling. Urban agriculture is small-scale and geographically dispersed, which makes it possible to repurpose unused land, water, and fertilizer resources. When replacing grass, urban agriculture uses less water and emits less carbon dioxide. Urban farming faces several problems, including labor and time needs, the possibility of environmental and nutritional pollution, and limited water resources [26]. All models present technological innovation, high productivity and certified organic food production and with an emphasis on sustainability in contributing to the reduction of emissions (CO₂) in nature [27]. The existence of urban agriculture is also very beneficial for environmental sustainability, reducing air pollution, and creating beauty and coolness in people's residences [28].

The integrated and sustainable development of urban agriculture also has health, education and tourism values. Urban areas that are densely packed with buildings make green open space (GOS) increasingly limited. This will have an impact on environmental quality degradation. With urban agriculture, green space in cities can increase, CO₂ absorbing areas become more so that air quality becomes better. This kind of education will emerge when urban agriculture develops in an integrated manner. The existence of GOS is not only used as a gathering place for residents to socialize and recreation, but also contributes positively to improving the quality and sustainability of the environment in the city area. Urban agriculture also provides tourist value for city dwellers. The limited GOS and the scarcity of agricultural practices, make real examples of urban agriculture a special attraction for people to travel as well as an educational means for children.

Agroeducation can be applied as a form of community empowerment in the school environment through the active participation of teachers, students and parents. This activity in addition to maintaining a comfortable and healthy environment, also produces healthy food by utilizing the resources and environment available in the school environment such as land and waste water and household organic waste. Vacant land around the school can be used for vegetable and fruit crop farming activities. Agricultural production can be used for the fulfillment of nutrition and food for the community even if it is abundant can be a source of income as funding for educational activities. Therefore, the implementation of agroeducation requires active participation from all elements of society, especially teachers, students and parents who are expected to be pioneers of environmental awareness education for the community. Studies on agro-education are still very limited. Previous agricultural education discussions focused on agro-industry [29]; [30]; [31] and Environmental

education [32]; [33]; [34]; [35]. Meanwhile, our paper emphasizes the discussion on aspects of agricultural education to build environmental awareness for the community.

Based on observations in the field, State elementary School of Brajan has pioneered urban agriculture by utilizing land in the school environment planted with various types of vegetable and fruit crops. This effort has given the impression of a cool, comfortable and beautiful environment. However, the arrangement of the environment has not been optimal. There is still land that seems shabby and unused. While many crops are well maintained, drought is due to untreated and adequate irrigation facilities are not available. This activity only involves a few teachers. Not all communities in the school environment are involved in environmental management. There has been no community participation, especially students and parents involved in the activity. Therefore, agro-education training for them is one of the efforts to increase environmental awareness and participation in managing a sustainable environment. This paper discusses the role of agro-education training programs in building community environmental awareness so that they can contribute to the conservation of natural resources and a sustainable environment.

2 Research method

The study took cases in the elementary school community of SDN Brajan involving students, teachers, school administrators, parents, administrators of parents and local community leaders as research subjects. It is located in Brajan Tamantirto Village Kasihan Sub Distric Bantul District Special Region of Yogyakarta Indonesia (<https://tinyurl.com/SD-Brajan>). It is located in the Java Island part of Indonesia as presented in Figure 1 dan Figure 2.



Fig 1. Java Island part of Indonesian Indonesian archipelago

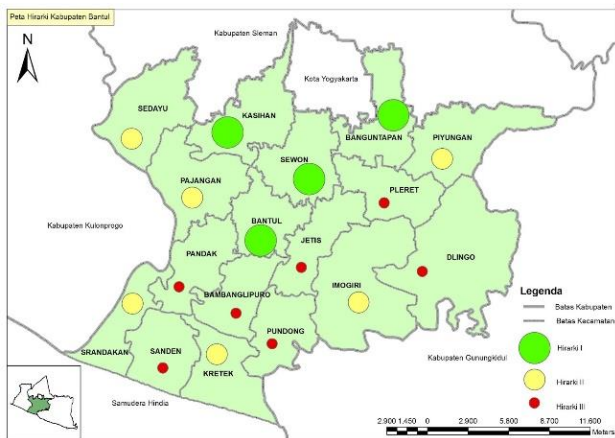


Fig 2. Bantul Distirct Map, part of Yogyakarta Special Region Indonesia

Data collection interviews were conducted with 78 respondents, all training participant by census. This activity measure their environmental awareness after attending agro-education training. The forms of training carried out are training on hydroponic cultivation of vegetable plants, tilapia farming, tarpaulin ponds, biofloc systems, and school garden arrangement. Environmental awareness is measured based on knowledge, attitudes and environmentally friendly actions. Detailed measurements of environmental awareness are presented in table 1. Data analysis used correlation formulations to determine the relationship between environmental awareness and their internal factors, namely age and education. The value of Rank Spearman’s correlation formulation is as follows [36]:

$$Rs = \frac{1-6\sum D_i^2}{n(n^2-1)} \pi r^2(1)$$

Description:
Rs: Coefficient of Rank Spearman’s correlation
Di: The difference in scores between indicators
n: Number of samples

Table 1. Variables of Environmental Awareness

Variable	Aspects	Measurement
Environmental Awareness	Knowledge	Test score 0 - 10
	Attitude (approval, responsiveness, appreciation and responsibility)	Scale likert 1 - 5
	Action (readiness, habits, reflectiveness, innovation)	Scale likert 1 – 5

3 Results and discussion

3.1 Environmental Awareness

3.1.1 Eco-Friendly Knowledge and Attitude

Respondents' knowledge of natural resources and environmental conservation was included in the high category of 9.03. This value shows that eco-friendly literacy of training participants is good, but has not shown the ability to solve environmental problems. Ideally, good eco-literacy shows good environmental awareness and environmental problem-

solving skills [37]; [38]. Another finding is that even prospective teachers in Turkey have sufficient levels of environmental literacy, and their levels of environmental literacy do not vary by class and gender [39]. Therefore, environmental literacy is expected to strengthen awareness, attitudes and eco-friendly behavior [40].

Eco-friendly attitudes are formed by four components of attitudes sequentially, namely approval, responsiveness, appreciation and responsibility. Figure 3. Shows that program participants have a high approval towards efforts to conserve environmental natural resources through agroeducation. Approval towards natural resources and environmental conservation programs is a potential for the community to build their awareness about the importance of conservation of natural resources and a clean, friendly, healthy, productive and sustainable environment.

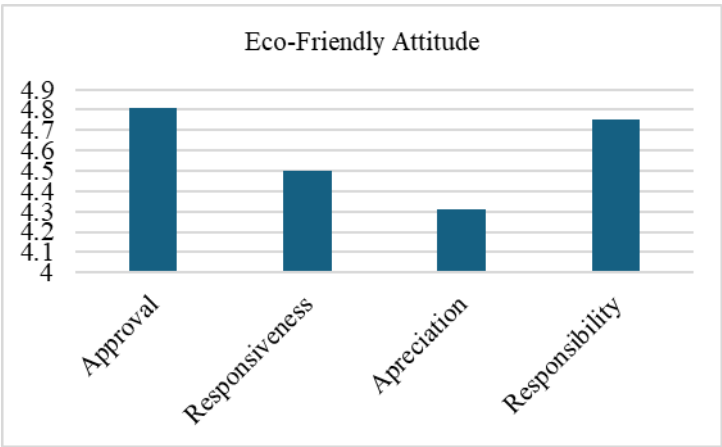


Fig 3. Eco-Friendly Attitude of agro-education training participants

They also have a high responsiveness and appreciation although not as high as approval and responsibility. They always give a good responsiveness to agro-education programs in an effort to preserve natural resources and the environment. They can enjoy and appreciate the green, fresh, clean and comfortable environmental conditions. This can foster their sense of responsibility towards efforts to conserve natural resources and the environment as an important part of efforts to build eco-friendly awareness. This can promote healthier and more sustainable behaviours [41].

Table 2. Correlation of Education and Age of Training Participants with Eco-Friendly Attitudes

Variable	Parameter	Eco-Friendly Attitudes			
		Approval	Responsiveness	Appreciation	Reponsisibilty
Education	Correlation Coefficient	-0.065	0.350**	-0.326**	-0.020
	Sig. (2-tailed)	0.575	0.002	0.004	0.859
	N	78	78	78	78
Age	Correlation Coefficient	0.050	0.625**	-0.096	0.098
	Sig. (2-tailed)	0.662	0.000	0.401	0.392
	N	78	78	78	78

The results of the correlation analysis show that education and age have a significant effect on the responsiveness in eco-friendly activities. This reinforces the finding that travellers' ages correlate positively with their eco-friendly attitudes and behaviours [42]. Although they showed a positive response to eco-friendly activities but higher education, their appreciation of eco-friendly activities went down. This shows that public education has not

been able to provide insight into the importance of conservation of natural resources and the environment. Education in Indonesia has been dominated by building a mindset of improving social and economic status. Meanwhile, education in order to build a sustainable natural environment is still neglected. Eco-literacy is therefore an important determinant of eco-friendly awareness [43]. Public awareness can increase after receiving eco-friendly socialization [44]. People's awareness and attitudes towards the environment positively impact their sustainable actions and behaviour [45]. In addition, Eco-friendly products and the use of social media have a significant influence on environmental awareness [46]; [47].

3.1.2 Eco-Friendly Actions

Eco-friendly actions of agro-education program participants consist of four aspects, namely readiness to care for the environment, habits to care for the environment, morals towards the environment and innovation in caring for the environment. Eco-friendly actions are shown in figure 4 which illustrates that morals as automatic actions or reflective actions against environmental problems dominate the eco-friendly actions of agro-education program participants.

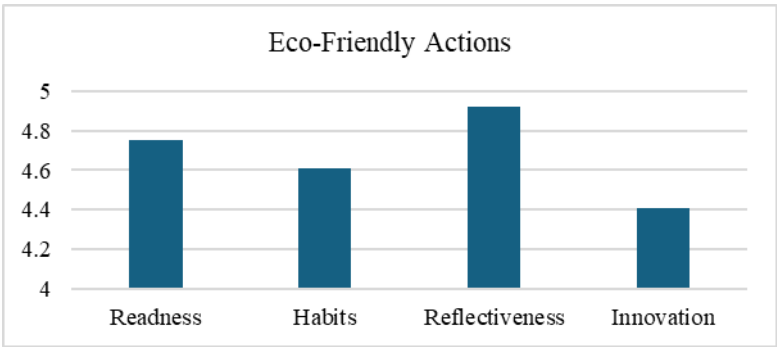


Fig. 4 Eco-Friendly Actions of Agroeducation Tairning Participants

Reflectiveness actions to prevent or care for the environment due to symptoms of natural damage show that they have a strong sense of environmental problems that pose a risk to life. In general, they have readiness and good habits in caring for the preservation of the natural environment. However, they still need to increase innovation in preserving natural resources and the environment. Therefore, it is necessary to develop environmentally friendly areas because this will play a role in shaping environmentally friendly attitudes and environmental concerns [48].

Table 3. Correlation between Education and Age with Eco-Friendly Actions

Variable	Parameter	Eco-Friendly Actions			
		Readness	Habits	Reflectiveness	Inovation
Education	Correlation Coefficient	-0.117	-0.168	-0.006	-0.184
	Sig. (2-tailed)	0.309	0.141	0.959	0.106
	N	78	78	78	78
Age	Correlation Coefficient	0.088	0.007	0.114	-0.043
	Sig. (2-tailed)	0.445	0.949	0.319	0.707
	N	78	78	78	78

The results of the correlation analysis between education and age of program participants with environmentally friendly actions showed a weak relationship and tended to be insignificant. Education and age do not necessarily affect environmental awareness. Many

other variables need to be studied to identify determinants of environmental awareness, including the influence of knowledge as a moderator and the importance of social media in influencing environmental awareness [46]. Environmental awareness for the digital generation can be influenced through the use of social media influencers with rational and objective information from environmental best practices [49]; [50]; [51]. This will increase the adoption of eco-friendly products for them [52].

4 Conclusion and recommendation

The results of the study show that the environmental awareness of agro-education training participants has been very good. Education and age are positively correlated with environmental awareness, aspects of responsiveness, but negatively correlated with appreciation. Meanwhile, there was no strong relationship between education and age and environmental awareness of aspects of eco-friendly actions. Environmental awareness still needs to be improved, especially the attitude of eco-friendly appreciation, habit actions and eco-friendly innovation actions. Therefore, assistance in agro-education activities still needs to be continued as an implementation of environmental awareness in efforts to conserve natural resources and the environment sustainably.

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References

1. J. Yang, J. Sun, Q. Ge, and X. Li, Urban For. Urban Green. **22**, 1 (2017)
2. W. Wang, T. Wu, Y. Li, S. Xie, B. Han, H. Zheng, and Z. Ouyang, Sustain. **12**, (2020)
3. X. Wang, F. Yan, and F. Su, Remote Sens. **12**, 1 (2020)
4. L. M. R. Ferreira, L. S. Esteves, E. P. de Souza, and C. A. C. dos Santos, Ecosystems **22**, 266 (2019)
5. E. Hoare, F. Jacka, and M. Berk, Curr. Opin. Psychiatry **32**, 198 (2019)
6. D. T. C. Cox, D. F. Shanahan, H. L. Hudson, R. A. Fuller, and K. J. Gaston, Landsc. Urban Plan. **179**, 72 (2018)
7. B. Nath, W. Ni-Meister, and R. Choudhury, Groundw. Sustain. Dev. **12**, (2021)
8. X. Liu, Y. Xu, B. A. Engel, S. Sun, X. Zhao, P. Wu, and Y. Wang, J. Clean. Prod. **292**, (2021)
9. M. Marrero, M. Puerto, C. Rivero-Camacho, A. Freire-Guerrero, and J. Solís-Guzmán, Resour. Conserv. Recycl. **117**, 160 (2017)
10. X. Hou, J. Liu, D. Zhang, M. Zhao, and C. Xia, J. Clean. Prod. **238**, (2019)
11. S. Barthel, C. Isendahl, B. N. Vis, A. Drescher, D. L. Evans, and A. van Timmeren, Anthr. Rev. **6**, 71 (2019)
12. A. Raihan and A. Tuspekova, J. Environ. Stud. Sci. **12**, 794 (2022)
13. X. Liu and J. Bae, J. Clean. Prod. **172**, 178 (2018)
14. A. Amran, M. Perkasa, M. Satriawan, I. Jasin, and M. Irwansyah, J. Phys. Conf. Ser. **1157**, (2019)
15. Y. Li, Eurasia J. Math. Sci. Technol. Educ. **14**, 2277 (2018)
16. G. Petherbridge, M. M. Ismailov, S. M. Ismailov, M. K. Rabadanov, A. A. Gadzhiev, A. A. Teymurov, M. R. Rabadanov, M. G. Daudova, and A. G. M. Abdulaev, South Russ. Ecol. Dev. **16**, 142 (2021)
17. J. Delia and M. E. Krasny, Front. Psychol. **8**, (2018)
18. E. Ma, J. Cai, J. Lin, L. Liao, and Y. Han, World Reg. Stud. **30**, 136 (2021)

19. G. B. Keding, C. Termote, and K. Kehlenbeck, Routledge Handb. Agric. Biodivers. 510 (2017)
20. S. O. Omondi, W. Oluoch-Kosura, and M. Jirström, Geogr. Res. **55**, 231 (2017)
21. D. Genovese, L. Battisti, I. Ostellino, F. Larcher, and L. M. Battaglini, Acta Hort. **1215**, 345 (2018)
22. J. K. Mensah, Dev. South. Afr. **40**, 1086 (2023)
23. M. Artmann and K. Sartison, Sustain. **10**, (2018)
24. B. Degefa, A. M. M. Albedwawi, and M. S. Alazeezi, Emirates J. Food Agric. **33**, 465 (2021)
25. T. Marat-Mendes, J. C. Borges, A. M. Dias, and R. Lopes, J. Urban. **14**, 356 (2021)
26. T. Nogueira-McRae, E. P. Ryan, B. B. R. Jablonski, M. Carolan, H. S. Arathi, C. S. Brown, H. H. Saki, S. McKeen, E. Lapansky, and M. E. Schipanski, Bioscience **68**, 748 (2018)
27. L. P. de Lucena and F. M. Massuia, Urbe **13**, (2021)
28. Darmawan Listya Cahya, Forum Ilm. **11**, (2014)
29. Y. Ragulina and T. Bratarchuk, IOP Conf. Ser. Earth Environ. Sci. **274**, (2019)
30. A. I. Imamzade, V. G. Tikhnenko, N. G. Kozhevnikova, A. V. Dranny, and E. L. Babicheva, J. High. Educ. Theory Pract. **22**, 172 (2022)
31. N. Efremova, M. Finko, P. Gerasin, and Y. Knyazeva, Lect. Notes Networks Syst. **575 LNNS**, 1243 (2023)
32. E. Fokides and F. Chachlaki, Technol. Knowl. Learn. **25**, 1 (2020)
33. E. G. Merritt, M. J. Stern, R. B. Powell, and B. T. Frensey, Environ. Educ. Res. **28**, 674 (2022)
34. P. G. Payne, J. Environ. Educ. **51**, 113 (2020)
35. C. H. Chung, D. K. W. Chiu, K. K. W. Ho, and C. H. Au, Inf. Discov. Deliv. **48**, 255 (2020)
36. Sugiyono, *Business Research Method (Quantitatif, Qualitatif, Combination, and R&D Approach. In Research Methodology*. (Alfabeta., 2017)
37. D. V. Sigit, L. Prastiwi, R. H. Ristanto, and M. Rifan, IOP Conf. Ser. Earth Environ. Sci. **1796**, (2021)
38. F. Y. Yeh, N. H. Tran, S. H. Hung, and C. F. Huang, Int. J. Sci. Math. Educ. **20**, 1883 (2022)
39. M. A. Yilmaz, Rev. Int. Geogr. Educ. Online **11**, 21 (2021)
40. J. W. Law, C. T. Lye, and T. H. Ng, Clean. Responsible Consum. **10**, (2023)
41. J. Kim, S. Kim, and J. Chung, Sustain. **15**, (2023)
42. I. Šagovnović, I. Stamenković, and D. Demonja, Sociol. i Prost. **60**, 89 (2022)
43. S. Kharbanda, N. P. Singh, and K. Sharma, Int. J. Sustain. Soc. **14**, 138 (2022)
44. D. P. Alamsyah, N. A. Othman, and Indriana, IOP Conf. Ser. Earth Environ. Sci. **824**, (2021)
45. S. C. Padhy and A. A. Hussain, Int. J. Electr. Hybrid Veh. **13**, 321 (2021)
46. A. Jaini, W. F. W. Zulkiffli, and M. Ismail, Lect. Notes Networks Syst. **194 LNNS**, 491 (2021)
47. N. T. Minh and H. N. Ngan, AIP Conf. Proc. **2406**, (2021)
48. L. Van Huy, H. T. T. Nguyen, P. Hoang Long, P. Quyen Phu Thi, and P. Tan Nhat, J. Hosp. Tour. Insights (2023)
49. P. S. Kapoor, M. S. Balaji, Y. Jiang, and C. Jebarajakirthy, J. Travel Res. **61**, 1138 (2022)
50. J. Yan, J. Pan, Z. Li, and Y. Chang, Int. J. Advert. **43**, 202 (2024)
51. W. Zhang, P. K. Chintagunta, and M. U. Kalwani, J. Mark. **85**, 10 (2021)
52. C. Delcea, L. A. Cotfas, C. L. Trică, L. Crăciun, and A. G. Molanescu, Sustain. **11**, (2019)