Visual Communication in Sustainability Action: Public Understanding Through Human Behavior and Attitude

Ellyana Mohd Muslim Tan[1*], Valerie Anak Michael[2],
Muhamad Hafiz Hassan[2], Muhammad Fauzan Abu Bakar[2]
*Corresponding Author

[1] College of Creative Arts, Universiti Teknologi MARA, Puncak Alam, Selangor, 42300, Malaysia
[2] College of Creative Arts, Universiti Teknologi MARA, Cawangan Sarawak, Jalan Meranek, 94300 Kota Samarahan, Malaysia

ellyana@uitm.edu.my, valeriemichael@uitm.edu.my, hafizhassan@uitm.edu.my, mfauzan@uitm.edu.my
Tel: +6019 - 5601001

Abstract
The study aims to explore the essential elements of an idea in designing visual marketing, advertising, or design developments to impose sustainable efforts. The final data is distributed into four categories: Behavior and Attitude in Visual Development, Mechanism in Public Information, Process of Public Understanding, and Public Understanding in Visual Sustainability. The research suggests creators of visual communications consider how their work shapes attitudes and behaviours about sustainability. With awareness around information, public understanding, and connections between visual media and sustainability, designers can promote responsible, eco-conscious messages. This framework proposes the development process should cultivate mindfulness about communicating sustainability effectively.

Keywords: Visual Sustainability, Qualitative Interview, Sustainable Behavior and Attitude

1.0 Introduction
Visual communication through media such as infographics and animations has become an increasingly important tool for conveying messages and influencing behavior (He, Blye, and Halpenny, 2023). However, the elements and strategies needed for effective visual communication to promote sustainability awareness and action need to be better established. While factors like audience, functionality, and public interest have been identified as relevant design considerations (Quay & Hutanuwatr, 2009; Kornienko, Kukhta, Fofanov, and Kukhta, 2015), there remains a lack of framework guiding the development of impactful visuals for sustainability.

This study explored the key elements needed for visual communication to promote sustainability awareness and action effectively. The objectives were to 1) Identify core components related to impactful visual communication for sustainability, 2) Understand how these components can inform strategies for developing pro-sustainability visuals, and 3) Develop a theoretical framework to guide future efforts. A qualitative methodology was most appropriate due to the exploratory nature of the research and the need to gather in-depth insights from experts.

This study gathered perspectives from visual design and communication specialists and analysed them to identify critical factors in creating behavior-shifting visuals. The anticipated outcome was establishing a focus point for comprehending the messaging and imagery to communicate sustainability concepts to the public effectively. By developing a theoretical framework for impactful visual communication, this research aimed to provide valuable guidance for efforts to promote sustainable awareness and action through visual media. The proposed framework may facilitate further research and breakthroughs in pro-environmental communication.

2.0 Literature Review

The emergence of social media has demonstrated the power of visual communication for engaging audiences, driving participation, and influencing behaviours (Kujur & Singh, 2020). However, best practices for leveraging visual media to promote sustainability awareness and action still need to be explored. While visuals are impactful for information dissemination, strategies for crafting imagery that successfully imparts sustainability concepts require further investigation (Tölkes, 2018). Efforts to implement sustainability initiatives in the industry reveal a gap between academic theory and on-the-ground integration, pointing to the need for research on effectively translating ideals into resonating messaging (Raoufi et al., 2019). Attitudinal ambivalence has been identified as an emerging focus in understanding pro-environmental behaviours, but practical frameworks for resolving conflicting attitudes are lacking (Schneider, 2015).

Insights across diverse fields, from psychology to semiotics, can inform impactful visual communication. Explorations of emotional and cognitive components of attitudes provide direction for designing sustainability messaging (Netzer et al., 2018). Principles of visual rhetoric and meaning-making can further guide crafting compelling pro-environment imagery (Lim, 2007; Kovach & Adolphs, 2015). Consumer research highlights the role of emotional motivators in decision-making, indicating a need for sustainable communication eliciting imagination and self-transcendent values (Hartmann et al., 2022). Educational psychology underscores the importance of repetitive multimodal exposure for transforming behaviours (Marín-Díaz et al., 2022).

Knowledge from psychology and communication studies sheds light on how imagery conveys meaning. Explorations of attitudes' cognitive and emotional components provide direction for designing impactful visuals (Netzer et al., 2018). Principles of rhetoric and semiotics also offer tools for crafting compelling pro-sustainability messages (Lim, 2007; Kovach & Adolphs, 2015). However, best practices remain unclear for applying this interdisciplinary knowledge to the context of sustainability promotion. While research has examined factors like colour, simplicity, and emotional appeal in isolation (Sadozai et al., 2022), a unified framework synthesising key principles still needs to be developed. Studies focused on promoting general pro-social behaviours have illuminated effective strategies like framing and narrative (Warner et al., 2020), but their application to sustainability communication still needs to be explored.

Bridging insights across diverse domains, including psychology, education, and semiotics, this study aimed to develop an integrated model for pro-environmental visual communication. A review of relevant but fragmented literature revealed a gap in human-centred, evidence-based guidelines purpose-built for sustainability promotion. This research sought to address this gap by combining multidisciplinary perspectives to generate actionable recommendations and establish best practices for this critical behavioural intervention. The questions emerged from the identified need for a unified framework tailored to crafting impactful visual messaging and content to promote sustainability awareness and action. This study endeavoured to produce an applied model to inform impactful pro-environmental visual communication efforts by consolidating dispersed but complementary knowledge across disciplines.

3.0 Methodology

This study utilised a qualitative methodology to gather in-depth perspectives from experts on visual communication for sustainability. One-on-one semi-structured interviews were conducted with 14 professionals in sustainable development and visual design. An open-ended interview format enabled the collection of rich insights on strategies for impactful pro-environmental visuals.

Participants were selected based on their extensive professional experience creating sustainability communications and visual media for public campaigns. Criteria for inclusion required at least five years of relevant work in roles spanning government, academia, and industry. This purposive expert sampling allowed the synthesis of insights from diverse vantage points. The interview questions were developed based on key themes from the literature review, exploring (1) Behavior and Attitude in Visual Development, (2) Mechanism in Public Information, (3) Process of Public Understanding, and (4) Public Understanding in Visual Sustainability. Follow-up probing questions were adapted based on each participant's unique expertise.

In total, 47 answers were gathered and analysed using NVivo software. Data was coded into 4 major categories: visual development, public information, public understanding, and visual sustainability. Further subthemes emerged under each category through an iterative process. Though limited in sample size, this in-depth approach allowed for gathering rich, multifaceted perspectives on this complex topic.

4.0 Findings

Visual communication is an educational tool that can be executed through a medium dispersed in many areas. Public viewers can discern the availability of sustainability efforts implemented in their living standards; thus, conducting a qualitative interview on Public Sustainable awareness regarding behaviour and attitude is essential.

Table 1: Behaviour & Attitude In Visual Development

Category	N = 14	Transcription

Behavior in Sustainable	5	- Sensorial Learning - Capacity Building - Local Government Initiatives - Sensorial Learning - Limitation of Sustainability Communication - Seasonal Issue on Sustainability - Communicate through the audience by understanding them
Attitude in Sustainable Action	9	- Theories of Behavior - Attitude Model - Audience Background - Media reach via Public Interest (ex: Photograph) - Influence on Communications

Table 2: Mechanism In Public Information

Category	N = 10	Transcription
Element in Visualization	3	- Visual encouragement - Visualization in Capacity Building - Visual awareness
The mechanism in Sustainable Communication	4	- Visual Ideas from Public Marketing (ex- Public Art) - Visual as Practice in Sustainability Awareness - The value of Social Media - The value of Technology in creating awareness
Medium in Modern Sustainability	3	- Visual as Minor Medium - Social Media Platform

Table 3: Process Of Public Understanding

Category	N = 7	Transcription
Importance of Sustainable Education	3	- The importance of the Education Approach to Sustainability - Practice in Sustainability - Maximize the Important role in Substantiality Practice with Visual Communication - Every level of Early Education
Information in Visualization	4	- Visual as Minor Medium - Social Media Platform

Table 4: Public Understanding Of Visual Sustainability

Category	N = 10	Transcription
Role of Technical in Sustainable Impact	1	- The effect of Color on Visual Awareness
Role of Visuals in Sustainable Communication	4	- Role of visuals in Creating awareness - Visual reduces complexity in understanding - Via the Theory of social constructions
Value in Visualization	1	- Attentive Information via visual
Visual in Sustainable Communication	1	- Visual conveys the audience to react to bigger issues

Table 5: Role Of Visual Sustainability In Public Communication

Category	N = 6	Transcription
Sensual Component in Visual Sustainability	1	The sensual Component is a sequential process in formulating visual
Value in Perceptual & Sensual Communication	5	- Perceptual development cognitive activity - Emotional effects - The importance of practising - Visual influences the audience's emotion

Table 6: The Impact On Perceptual And Sensual Communication

Category	N =	Transcription
Sentiment in Visualization	3	- Visual is an effective way to spread information and develop communication - Impact of visual when an issue is raised
Strategising Visual Sustainability	12	- Attitude is based on strategising Visual Communication - Audience Personality to develop public awareness - Direct relationship to promote sustainability idea - Balance between factors in Capacity Building - Multiple media convey the awareness - Strategizing Capacity Building - Appropriate plan via the hands-on program with minor help from visual usage - Understand public preferences - Sustainability is a major subject at every education level
Sustainable Idea through Visual	1	-Simplicity in visual

Table 6 shows that good strategies could sustain visual sustainability in public understanding through human behaviour and attitude, where 12 respondents mentioned that attitude is based on strategising visual communication, audience personality to develop public awareness, direct relationships to promote sustainability ideas, understanding public preferences and education could generate the awareness of visual communication. In this sense, the finding also directly contributes to the Sustainable Development Goals, focusing on Goal 11, sustainable cities and communities; Goal 12, responsible consumption and production; and Goal 13, climate action. Also, the same goes for the contribution to society, where they would become more aware of visual sustainability.

5.0 Discussion
Based on the interview with the expertise, four new components reflect visual sustainability: 1) Behavior and attitude in visual development, 2) Mechanism in Public Information, 3) Process of Public Understanding, and 4) Public Understanding in Visual Sustainability.

1) Behavior and attitude in visual development
Table 1 shows that behaviour and attitude in sustainable action are the elements practised by the experts. Through this behaviour, the respondents practice sensorial learning in viewing the visual form. However, there are some issues in terms of communication, where there are limitations of sustainable communication and seasonal sustainability issues. Therefore, it is important to communicate through the audience by giving them a visual understanding to develop their behaviour and attitude. Meanwhile, in discussing attitude in sustainable action, the theories of behaviour, attitude model, and the audience background are crucial to building visual development. Understanding human behaviour in experiencing visual and human attitudes is crucial, highlighting the affect, behaviour, and cognition (Harreveld, Nohlen, and Schneider, 2015). Inconsistent cognitive and affective assessments will affect the relationship to the strength of the resulting attitude (Conner, Wilding, Harreveld, and Dalege, 2021).

2) Mechanism in Public Information
In Table 2, this mechanism focuses more on the instrument for public knowledge toward visual development. This section highlights elements in visualisation, the mechanism of sustainable communication, and the medium in modern sustainability. For example, in visual awareness, understanding and acceptance of the visual play are essential in ensuring the information or knowledge can be distributed to the public. In terms of mechanisms in sustainable communication, this section represents communicating or exchanging information visually and using some other medium, such as social media. In this sense, informative visuals play an essential role in providing knowledge to the public through the power of social media. In this way, the value of informative knowledge could create public awareness, contributing to the practice of sustainability awareness in society (Raoufi, Taylor, Laurin, and Haapala, 2019).

3) Process of Public Understanding
This process (Table 3) refers to educating the public about the importance of sustainability awareness to society. In this case, a strategy such as practising the educational approach should highlight sustainability that should start from early Education. The same goes for the information in visualisation; it also stresses social media as a medium to distribute and share knowledge about visual sustainability with the public. Siraj-Blatchford (2010) states that early childhood education provides a valuable beginning point for long-term learning.

4) Public Understanding of Visual Sustainability
The public understanding (Table 4) of visual sustainability focuses on the technical aspects of sustainable impact, visuals in sustainable communication, value in visualisation, and visuals in sustainable communication. In discussing the technical part, the colour's effect has become important in creating public awareness. The colour selection applied to the visual would lead to the role of the visual, and it can

reduce the complexity of visual knowledge (Cao et al., 2013). At this point, the collaboration between the faction of visual communication and the knowledge of the theory of social constructions is highly required to achieve visual sustainability among the public. The public could portray their reaction, perception, and thinking toward sustainable value through visual knowledge.

While limited qualitatively, these insights from interdisciplinary experts systematically synthesise strategies for visual sustainability promotion. The framework provides actionable direction for communicators and researchers seeking real-world impact. Limitations include the small sample size and lack of direct behavioural outcomes. Follow-up studies validating the model through quantitative measures are warranted. These human-centred findings offer a roadmap for purpose-driven visuals advancing sustainability awareness and action.

5.1 Purpose Theoretical Framework
The theories of human behaviour regarding visual sustainability development follow the understanding of the study result. The role of four indicators in implementing visual sustainability is divided into 3 (three) major elements and 2 (two) major developments.
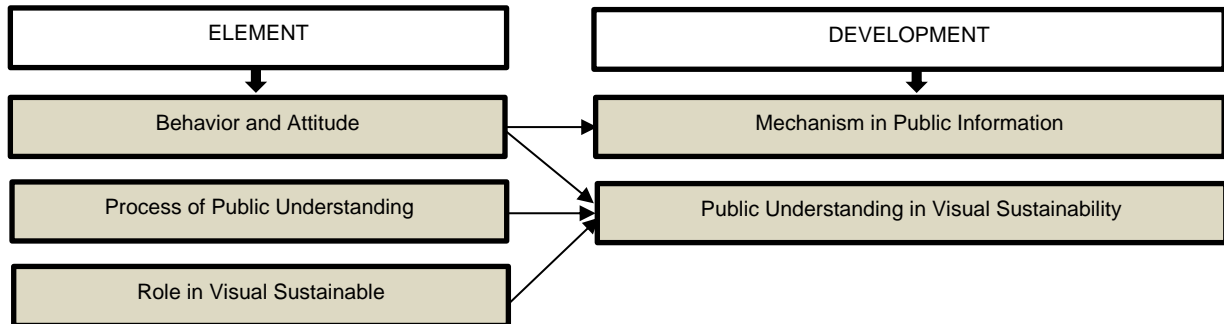

Fig. 1: The theoretical framework of the element and development in visual sustainability

The criteria that form the element are behaviour and attitude, the process of public understanding, and the role in visual sustainability. Meanwhile, in the development section, visual sustainability consists of mechanisms in public information and public understanding of visual sustainability. Next, the elements and development in visual sustainability are related. First is behaviour and attitude related to developing mechanisms in public information and public understanding of visual sustainability. Then, the element of public understanding, the process of public understanding, and its role in visual sustainability will relate to the public understanding of visual sustainability. The element is categorised into Behavior and attitude, which specify the person's awareness of the matters. This stage of elements would identify all three (3) major developments regarding the suitable mechanism and how far public understanding is reached and finalise the impact in visual communication. Next, the Process of Public Understanding remains to reach Public Understanding in Visual Sustainability.

6.0 Conclusion
In conclusion, this study illuminates core strategies for leveraging visual communication to promote sustainability awareness and action. The qualitative findings provide an initial framework for synthesising key principles across disciplines for shaping pro-environmental behaviours through impactful visuals. However, the research contains limitations, including a small sample size of experts and a need for direct behavioural outcomes. Follow-up studies with larger diverse samples and measuring real-world impacts would strengthen the conclusions. Researchers should also continue expanding the model with new disciplines and contexts. Despite these limitations, the human-centred insights offer strategic direction for sustainability promotion efforts. Specific recommendations include utilising sensory learning modules, incorporating sustainability across all education levels, partnering with social media platforms on participatory campaigns, and framing urgency through visual storytelling (Kujur, and Singh, 2020).

Further exploration of emotional motivators and messaging repetition is also warranted. This research initiates vital dialogue on translating sustainability ideals into actionable communication (Kovach and Adolphs, 2015). The proposed framework provides a roadmap for purpose-driven visual media advancing environmental agendas. As visual consumption increases across technologies, these strategies offer timely guidance for content creators and change-makers working to shape a sustainable future.

Paper Contribution to Related Field of Study

The visual form can also respond to the fundamental recommendations of Education in fostering community awareness to prioritise Education that starts with early Education into higher-level education. Based on outcomes, to create awareness in determining how much a decision can affect creating awareness, according to the research, it involves technical and visual, and ultimately impacts value in obtaining a long-term and sustainable connection.

References

Cao, F., Rickles, B., Vu, M., Zhu, Z., Chan, D. H. L., Harris, L. N., … Perfetti, C. A. (2013). Early stage visual-orthographic processes

Conner M, Wilding S, Harreveld F, V., & Dalege, J. (2021). Cognitive-Affective Inconsistency and Ambivalence: Impact on the Overall Attitude–Behavior Relationship, Personality and Social Psychology Bulletin 2021, Vol. 47(4) 673–687. https://journals.sagepub.com/d oi/full/10.1177/0146167220945900

Fei, V. L. (2007). The visual semantics stratum: making meaning in sequential images. T, D. Royce and W, L. Bowcher (Ed.) New directions in the analysis of multimodal discourse, 195-213.

He, M., Blye, C. J., & Halpenny, E. (2023). Impacts of environmental communication on pro-environmental intentions and behaviours: A systematic review on nature-based tourism context. Journal of Sustainable Tourism, 31(8), 1921-1943. https://www.tandfonline.com/doi/abs/10.1080/09669582.2022.2095392

Kornienko, M., Kukhta, M., Fofanov, O., & Kukhta, E. (2015). Experience of Visual Perception in the Design Education. *Procedia - Social and Behavioral Sciences*, *206*(November), 365–368. https://www.sciencedirect.com/science/article/pii/S187704281505199X

Kovach, B., & Adolphs, S. (2015). Semiotic insights into online communication. Semiotica, 2015(204), 119-132. https://doi.org/10.1515/sem-2015-0007

Kovach, C. K., & Adolphs, R. (2015). Investigating attention in complex visual search. *Vision Research*, *116*, 127–141. https://www.sciencedirect.com/science/article/pii/S0042698914003010

Kujur, F., & Singh, S. (2020). Visual communication and consumer-brand relationship on social networking sites-uses & gratifications theory perspective. *Journal of theoretical and applied electronic commerce research*, *15*(1), 30-47. https://www.mdpi.com/0718-1876/15/1/4

Netzer, L., Gutentag, T., Kim, M. Y., Solak, N., & Tamir, M. (2018). Evaluations of emotions: Distinguishing between affective, behavioral and cognitive components. *Personality and Individual Differences*, *135*, 13-24. https://www.sciencedirect.com/science/article/abs/pii/S0191886918303702

Netzer, L., Van Kleef, E., & Tamir, M. (2018). Interpersonal instrumental emotion regulation. Journal of Experimental Social Psychology, 79, 124-134. https://doi.org/10.1016/j.jesp.2018.06.006

Quay, R., & Hutanuwatr, K. (2009). Visualisation of sustainability indicators: A conceptual framework. In *Visualizing Sustainable Planning* (pp. 203-213). Springer, Berlin, Heidelberg. https://link.springer.com/chapter/10.1007/978-3-540-88203-9_13

Raoufi, K., Taylor, C., Laurin, L., & Haapala, K. R. (2019). Visual communication methods and tools for sustainability performance assessment: linking academic and industry perspectives. *Procedia CIRP*, *80*, 215-220. https://www.sciencedirect.com/science/article/pii/S2212827119300897

Raoufi, M., Beaudry, C., & Francoeur, É. (2019). Organizational knowledge transfer and integration: The role of strategy and organization design. Global Knowledge, Memory and Communication, 69(1/2), 4-25. https://doi.org/10.1108/GKMC-03-2019-0039

Sadozai, S., Haider, A., Kumar, P., Yousafzai, S., Baloch, M. A., Khoja, S. A., Shah, G. A., & Brohi, S. N. (2022). Impact of color on consumers' buying behavior in online shopping: Moderating role of gender. SAGE Open. https://journals.sagepub.com/doi/full/10.1177/21582440221091568

Schneider, C. R., Zaval, L., Weber, E. U., & Markowitz, E. M. (2017). The influence of anticipated pride and guilt on pro-environmental decision making. PLoS ONE, 12(11), Article e0188781. https://doi.org/10.1371/journal.pone.0188781

Siraj-Blatchford, J., Smith, K. C., & Samuelsson, I. P. (2010). Education for sustainable development in the early years. Buenos Aires, Argentina: OMEP, World Organization for Early Childhood Education.

Tölkes, C. (2018). Sustainability communication in tourism–A literature review. *Tourism Management Perspectives*, 27, 10-21. https://www.sciencedirect.com/science/article/abs/pii/S2211973618300436

Van Harreveld, F., Nohlen, H. U., & Schneider, I. K. (2015). The ABC of ambivalence: Affective, behavioral, and cognitive consequences of attitudinal conflict. In *Advances in experimental social psychology* (Vol. 52, pp. 285-324). Academic Press. https://www.sciencedirect.com/science/article/abs/pii/S0065260115000039

Warner, L. R., Setzer, R., Wright, C. V., et al. (2020). Translating sustainability: The power of stories to inspire change. Journal of Sustainability Education, 22, 1-18. https://www.susted.com/wordpress/content/translating-sustainability-the-power-of-stories-to-inspire-change_2020_02/