The Meaning of Sustainability for Design
A Comparison Between Users, Design-Educated and Professionals

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Abstract
The necessary dialogue between users, students, and professionals in the field of sustainable design requires a precise understanding of the conceptual meaning of the term 'sustainability'. This concept is multi-componential, and different categories of actors on the design scene attribute varying components and varying degrees of importance to each component. This research, conducted on a sample of 304 participants, employed qualitative analysis to map the differences between the groups, both for the static definition of the concept and the definition anchored in perceptual data. It is interesting to note that the specific materials used, and the impact of the product's life cycle on the environment emerged as the most frequently cited topics by all participants. Furthermore, our research finds significant differences in conceptualization between the different groups: the idea of sustainability is substantially different for professionals, individuals with design education and general users. The differences identified by this study are essential for designers who aim to create in a way that aligns with the categorization of users.

Keywords
Sustainability
Conceptualization
Perception
Sustainability dimensions
Qualitative analysis

Introduction

Since it was first defined in 1987, sustainability has had an increasingly prominent role in our lives (United Nations, 1987, p. 247). Thanks to the attention it has received from policymakers, media, companies, and research, the terminology has spread among users, leading to growing concern, knowledge, and awareness (Barone et al., 2019). Considering that the terminology of disciplines such as design is not always as distinct from everyday language as it is in the so-called hard sciences, due to its engagement with the market world, it is fundamental to conceptualize the term 'sustainability'. Reducing the flexibility and uncertainty of the terminology's semantic boundaries, to achieve a precise definition, is crucial to establishing an abstract and formal conceptualization of sustainability, making it a valuable tool for designers. To achieve this aim, it is important to investigate how sustainability is conceptualized, particularly by different actors: the users, who are the final recipients of the design process and play an active role in circular design; individuals with design education; and finally, professionals.

Sustainability

Originally, sustainable development was defined as the "development that meets the need of the present without compromising the ability of future generations to meet their own needs" (Brundtland, 1987). The underlying idea is to harness long-term development to improve three main areas defined as the "triple bottom line": the environmental, social, and economic dimensions (Elkington, 1997). The economic dimension concerns value creation and financial performance improvement, while the socio-cultural dimension addresses business impacts on society and social issues. Conversely, environmental sustainability focuses on preserving nature and promoting environmental management within businesses (Chen et al., 2020; Kim et al., 2015).

According to some scholars, the original definition of sustainability is vague and abstract and has led to a diversification in the definitions, operationalizations, and measures of the terminology (Simpson & Radford, 2012; Barone et al., 2019). The confusion surrounding the complex terminology of sustainability is compounded by the experts' failure to clarify which attribute they are referring to, making it difficult to determine whether they are referring to a more comprehensive and holistic approach to sustainability or to a unidimensional meaning related to the environmental dimension alone, which is the most frequently addressed (Goedertier et al., 2024; Catlin, Luchs & Phipps, 2017; Simpson & Radford, 2012). The same misunderstanding exists among the media, policymakers, and companies, who use the terminology generically or refer specifically to the ecological dimension (Goedertier et al., 2024; Simpson & Radford, 2012).

This lack of a formal definition favoured users' unidimensional understanding of sustainability. Specifically, the concept is commonly associated with the environmental dimension, while both the social and economic dimensions are typically mentioned in

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association with the environmental one (Bausch et al., 2020; Goedertier et al., 2024; Hanss & Böhm, 2012; Simpson & Radford, 2012; Stancu, Grønhøj & Lähteenmäki, 2020). Nevertheless, some users are aware of the terminology's complexity, associating it with other attributes beyond the triple bottom line, such as temporal aspects or long-term societal orientation (Goedertier et al., 2024; Simpson & Radford, 2012; Hanss & Böhm, 2012). Furthermore, differences in the meaning of sustainability arise among users based on the type of product or service under consideration and the cultural context they belong to (Stancu, Grønhøj & Lähteenmäki, 2020; Bausch et al., 2020; De Koning et al., 2015; Barone et al., 2019).

The complexity and multifaceted nature of the concept of sustainability cannot be ignored, and to achieve a formal conceptualization it is crucial to consider all the different actors involved in its definition. Therefore, the present work aims to investigate participants' understanding of sustainability and the product's attributes associated with it, by taking into account the views of the final recipients of the design process, the design-educated, and the professionals.

Method

304 volunteers were recruited through a snowball sampling method based on their experience with the design sciences. The questionnaire was administered to users, who were respondents with no background in the design sciences (40%), the design-educated, who were university students enrolled in design degree programmes (26%), and professionals in the design field, such as architects or designers (34%). Participants were asked to respond spontaneously to two open-ended questions, without receiving any other input, and with no word or time limit: "What does sustainability mean to you in a product?" and "What features do you look for in a product to recognize its sustainability?". The questionnaire was distributed via an online form on Qualtrics, with the link disseminated through word of mouth. The experiment was approved by the IUAV Research Ethics Committee.

The responses were examined using thematic analysis, which involved categorizing the words based on their similarities. The process involved a semantic analysis based on the interpretation of the responses, which led to the development of codes and categories of codes that grouped them based on their similarities. The frequency with which each category was mentioned was also calculated, both overall and for each subject group. The qualitative analysis, along with the frequency of mention, was performed manually through the Atlas.ti Web (Version 8.0.3).

Characteristics	n	%	
Gender			
F	170	55.92	
M	134	44.08	
Expertise			
Users	122	40.13	
Educated	78	25.66	
Professionals	104	34.21	
	mean	standard deviation	range
Age (years)	31.77	15.29	18 - 85

Tab. I
Demographic characteristics of the participants (n = 304).

Results

The first question explored the meanings that participants attach to sustainability. All groups agree that its definition is heavily influenced by the environmental dimension. The least-mentioned dimension is the economic dimension, which is ignored by the users in particular. The social dimension is often cited by all groups. In this regard, there are differences in the meaning that the participants give to it: users additionally specify the idea of protecting people, associating its significance with occupational safety.

Regarding environmental sustainability, different topics were associated with the concept's meaning. While the negative impact of a product on the environment is the topic most frequently mentioned by all groups, users cited it the most. The second most often-cited theme is the type of material, with professionals emphasising it the most. Notably, they associated materials with reusing waste and recycled materials in production, whereas users were more interested in the materials' ends-of-life and recyclability. The design-educated mentioned both meanings equally. The third most frequently mentioned topic was the meaning of environmental sustainability. It was especially cited by professionals, who underlined the importance of taking its principles into account throughout the life cycle of the product. Users however, based on the number of mentions, seem to consider the meaning of environmental sustainability, the production phase, and the importance of respecting the environment all on the same level. Conversely, the production phase is considered by the professionals to be the fourth most important theme, and by design-educated individuals to be the seventh. Remarkably, while users associated the topic equally with avoiding the exploitation of resources and minimising resource and energy waste, professionals primarily emphasised the latter. Respect for nature was also very important for the design-educated, who made it their fourth most cited topic, but it was less noteworthy for professionals who classified it sixth.

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The end-of-life for a product was considered essential by all groups: it was the fifth most cited topic by professionals and the design-educated, and the sixth by the users. While the first two groups were interested in modifying or using the product again for other purposes, the latter also focused on its easier and complete recyclability and disposal. Interestingly, the users considered it as important as the pollution generated by the product, classified as eighth and ninth by the other two groups. Instead, the design-educated were particularly interested in the respect for environmental rules, principles, and norms, which was their sixth most frequently mentioned topic.

Finally, among the lesser-mentioned themes, professionals and users focused in particular on the stage of use of a product, considering it the seventh and eighth most important topic. Moreover, professionals and the design-educated both mentioned the design stage of a product, which was not cited by users. Other lesser-mentioned themes included the aesthetics and the quality of the product.

Users	Professionals	Design-educated
25,46%	16,67%	20,12%
Impact on environment	Impact on environment	Impact on environment
11,57%	13,89%	11,59%
Materials and resources	Materials and resources	Materials and resources
10,65%	12,04%	11,59%
Social sustainability	Environmental sustainability concept	Environmental sustainability concept
8,80%	10,19%	11,59%
Environmental sustainability concept	Social sustainability	Social sustainability
8,80%	9,26%	9,76%
Respect for environment	Production phase	Respect for environment
8,80%	8,33%	9,15%
Production phase	End-of-life phase	End-of-life phase
7,87%	6,48%	6,10%
End-of-life phase	Respect for environment	Respect for environmental norms
7,87%	6,02%	5,49%
Pollution	Economic sustainability	Economic sustainability
3,24%	5,56%	4,27%
Usage phase	Usage phase	Production phase
2,78%	4,17%	4,27%
Economic sustainability	Pollution	Design phase
2,78%	3,24%	3,05%
Respect for environmental norms	Respect for environmental norms	Pollution
1,39%	3,24%	3,05%
Other product's characteristics	Design phase	Usage phase
0,00%	0,93%	0,00%
Design phase	Other product's characteristics	Other product's characteristics

Tab. II
Code groups emerged from the results ranked by importance based on the frequency, namely the number of times the respondents mentioned them. The frequencies are expressed as percentages based on the number of times a topic was mentioned in relation to the total mentions of a specific group of participants.

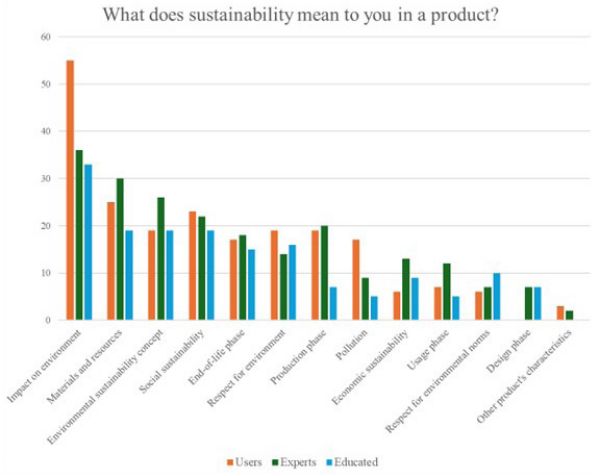

Fig. 1
Graphic transposition of Tab. II.

The second question investigated the attributes that participants observe to define if a product is sustainable. The overall results show that participants pay more attention to attributes related to the environmental dimension of sustainability. Both economic sustainability and social sustainability were cited mostly by professionals.

In terms of environmental sustainability, all groups identified the type of material as the physical element they focus on the most. The second attribute observed most frequently by users and the design-educated is the information and labels available on the product or its packaging. In particular, users look for general clues and non-specific descriptions of the product's eco-friendliness, while professionals and the design-educated list more exact eco-labels and green certification. Conversely, the production phase is the second most frequently mentioned element by professionals and the third and fourth most cited attribute by the design-educated and users, whereas the product's origin is the third most cited topic by users and the fifth most cited topic by both professionals and design-educated users, who take the production site as a cue.

The end-of-life phase is another crucial theme, being respectively the third, fourth, and fifth topic mentioned most frequently by professionals, design-educated individuals, and users. It is worth noting that the first two groups are more interested in the product's recyclability and disposal processes. Furthermore, the sixth most frequently named element is the usage phase, which was cited most often by professionals. With regard to this phase, there is a difference between users and professionals, and the design-educated. The latter identify it as a more important feature from which to infer environmental sustainability based on the product's durability.

The importance of focusing on eco-friendliness during the entire life cycle of a product is the seventh most cited topic. It was mentioned in particular by professionals. Moreover, users and design-educated individuals consider it to be as significant as the packaging, and the latter group judges it to be as important as the product's appearance, its shape for example. Whereas the professionals classified the two latter themes as the tenth and ninth most important topics, after the design phase. Interestingly, the ninth topic most frequently mentioned by users is the difficulty in understanding whether a product is sustainable and considering sustainability during purchase decisions. For professionals, however, this issue was not crucial, unlike retail, pollution, energy consumption, and marketing campaigns, which are ranked higher in terms of priority. The design-educated consider it to have the same value as energy consumption and retail. While the design phase is their tenth most cited topic, like the users, the marketing campaigns are their fifteenth most mentioned theme.

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Users	Professionals	Design-educated
30,89% Materials	26,06% Materials	34,20% Materials
24,39% Information - label	13,36% Production phase	16,58% Information - label
14,23% Origin	12,05% End-of-life phase	10,88% Production phase
6,91% Production phase	9,12% Information - label	10,36% End-of-life phase
1300,00% End-of-life phase	7,82% Origin	9,33% Origin
4,07% Usage phase	7,49% Usage phase	5,70% Usage phase
2,44% Environmental sustainability concept	5,54% Environmental sustainability concept	2,07% Environmental sustainability concept
2,44% Packaging	3,91% Social sustainability	2,07% Packaging
2,03% Not understandable - don't look for it	3,26% Designing phase	2,07% Appearance
1,63% Pollution	2,93% Appearance	1,55% Pollution
1,63% Energy consumption	2,61% Packaging	1,55% Designing phase
1,22% Retail	1,95% Economic sustainability	1,04% Retail
1,22% Designing phase	1,63% Retail	1,04% Social sustainability
0,81% Social sustainability	1,30% Energy consumption	1,04% Energy consumption
0,81% Appearance	1,30% Pollution	1,04% Not understandable - don't look for it
0,81% Economic sustainability	1,30% Communication	1,04% Economic sustainability
0,81% Communication	0,98% Not understandable - don't look for it	0,00% Communication

Tab. III
Code groups emerged from the results ranked by importance based on the frequency, namely the number of times the respondents mentioned them. The frequencies are expressed as percentages based on the number of times a topic was mentioned in relation to the total mentions of a specific group of participants.

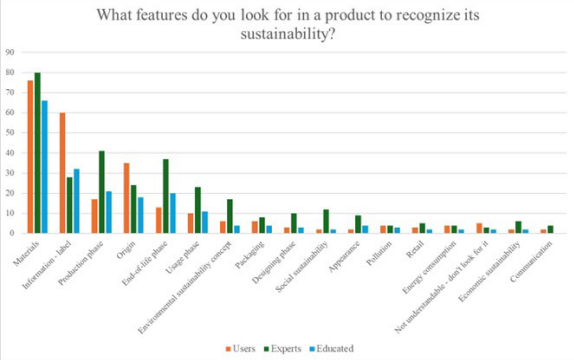

Fig. 2
Graphic transposition of Tab. III.

Discussion

This study aimed to explore the conceptualization of sustainability by subjects with different backgrounds and degrees of knowledge about design. This was achieved through two questions. The first question investigated the conceptualization of sustainability based on a classical conceptualization theory (Laurence & Margolis, 1999), in which each concept is defined based on a set of individually necessary sub-concepts (for example, the evaluation could be selectively focused on the material, the production LCA, or the environmental impact, etc.). The second question, instead, asked the participants to conceptualize sustainability based on perception, investigating whether abstract conceptualization differs from defining the term based on a perceptive act, which always refers to a concerted product (Clark, 1997; Tschacher & Scheier, 2012).

The study first demonstrates that the concept of sustainability is mainly associated with the environmental dimension, corroborating previous literature (Bausch et al., 2020; Goedertier et al., 2024; Hanss & Böhm, 2012; Simpson & Radford, 2012; Stancu, Grønhøj & Lähteenmäki, 2020). Regarding the different degrees of expertise in the design domain, users referred more frequently to abstract concepts and cues that explicitly inform the user about the product's sustainability. Professionals on the other hand mentioned more themes inherent to the product's life cycle assessment, which, interestingly, was taken less into consideration by the design-educated. Furthermore, the themes that emerged from the two questions were different. The second question elicited responses concerning more concrete and tangible properties of environmental sustainability, compared to the first question that prompted participants to mention more abstract elements.

Our study also confirms the existence of a difference in the conceptualization by subjects with different degrees of expertise. Sustainability was more associated with the economic and social dimensions by professionals. Regarding the meaning of the environmental dimension, users focused more on general and abstract themes, such as the product's impact and respect for nature and pollution. Similar results were observed by Hanss & Böhm (2012) and Stancu, Grønhøj & Lähteenmäki (2020). Conversely, when asked about the elements they observed to glean information about the product's sustainability, they mentioned explicit cues, such as the label, the origin, and the material of the product (Granato, Fischer & van Trijp, 2022; Steenis et al., 2017). These types of cues could be preferred because they communicate through consciously processed information, compared to more implicit and thus, unconsciously and automatically processed signs (Granato, Fischer & van Trijp, 2022). As some participants noted, this could be related to the difficulties in understanding the quality of sustainability from implicit cues and the significant impact of labels and written words, such as the influence of the word recyclable (Norton et al., 2022).

Conversely, professionals focused on more pragmatic issues, such as the materials, the production chain, the product's durability and its design. Similar results were observed by Whitmarsh, Swartling & Jäger (2009) in the sustainable transportation domain. While users were more interested in the comfort of the

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transportation, professionals focused on more practical and technical elements. Similarly, when asked about the risks of technological innovations, the professionals and design-educated focused more on technical aspects compared to users (Digmayer & Jakobs, 2016). The same authors maintain that this difference depends on the elements people use to build a concept. Professionals tend to draw factual information from their field of expertise, while users are more likely to consider previous experiences, values, and worldviews (Digmayer & Jakobs, 2016; Laws et al., 2004).

Design-educated individuals on the other hand presented a mixed pattern of responses. In particular, like the professionals, they attributed greater importance to certain elements related to their area of expertise, such as the product's design, the norms of sustainability, or the product's end-of-life, but like the users they did not consider themes that were mentioned more frequently by professionals, such as the product's appearance or its usage phase. Subjects with different levels of expertise process and represent their knowledge differently (Popovic, 2004). According to the literature, professionals address tasks using their domain-specific knowledge, while students draw their conceptualization from their personal or commonsense understanding of the issue as well (Popovic, 2004; Damico, Aulicino & Di Pasquale, 2022).

Conclusion and Future Work

As demonstrated, sustainability emerges as a multi-componential concept, and its use generates significant communicative ambiguity when not specified by the components that define its meaning. For this reason, it is necessary to clarify its meaning as a technical term in design theories, to classify and give structure to its terminology, and share a code to involve users. Different studies from different disciplines have tried to systematize the vocabulary of sustainability. While some scholars have reviewed the meanings across time, others have based their work on the use of the term rather than its given definition, or classified the definitions based on their specific context rather than providing a hierarchical classification (Salas-Zapata & Ortis-Munoz, 2018; Bhanot, Rao & Deshmukh, 2019; Waseem & Kota, 2017). Interestingly Horani (2023) has proposed a system to classify sustainable design definitions. In particular, she gathered from different design disciplines' studies the terminology and meanings related to sustainable design following a chronological order, and grouped a set of unambiguous standard concepts and definitions, maintaining the dynamic quality of the concept. This categorization makes it possible to choose the concept and the terminology best suited to the individual's purpose, and a clear statement of the meaning to which reference is made increases the diffusion and understanding of sustainability. Moreover, it could serve as a valuable tool for identifying the meanings referenced by different studies, helping students to learn and use accurate terminology from an early stage.

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Future research could build upon and expand Horani's (2023) framework by creating and developing a database that can guide researchers, organizations, professionals, and users in navigating sustainability. Finally, the study will support conceptual sharing, an essential condition for the transmission of knowledge in education and science, as well as for design professionals whose creations will interact directly with users.

References

Barone, B., Rodrigues, H., Nogueira, R. M., Guimarães, K. R. L. S. L. D. Q., & Behrens, J. H. (2019). What about sustainability? Understanding consumers' conceptual representations through free word association. *International Journal of Consumer Studies*, *44*(1), 44-52. https://onlinelibrary.wiley.com/doi/abs/10.1111/ijcs.12543

Bausch, T., Tauber, V., Schröder, T., & Lane, B. (2020, December). Sustainability: Does the consumer understand what this might be in tourism? In *Consumer Behavior in Tourism Symposium–CBTS, 2020*, online. ZPID (Leibniz Institute for Psychology). https://doi.org/10.23668/psycharchives.4441

Bhanot, N., Rao, P. V., & Deshmukh, S. G. (2019). Sustainable Scenario: A Systematic Review of Definitions of Sustainability and Agenda for Future Research. *South Asian Journal of Management*, *26*(4), 32-70. https://www.i-scholar.in/index.php/sajm/article/view/194160

Brundtland, G. H. (1987). *Our Common Future: The World Commission on Environment and Development*. Oxford University Press.

Catlin, J. R., Luchs, M. G., & Phipps, M. (2017). Consumer perceptions of the social vs. environmental dimensions of sustainability. *Journal of Consumer Policy*, *40*, 245-277. https://doi.org/10.1007/s10603-017-9356-x

Chen, X., Sun, X., Yan, D., & Wen, D. (2020). Perceived sustainability and customer engagement in the online shopping environment: The rational and emotional perspectives. *Sustainability*, *12*(7), 2674. https://www.mdpi.com/2071-1050/12/7/2674

Clark, A. (1997). *Being There*. MIT Press.

Damico, A. B., Aulicino, J. M., & Di Pasquale, J. (2022). What does sustainability mean? Perceptions of future professionals across disciplines. *Sustainability*, *14*(15), 9650. https://doi.org/10.3390/su14159650

De Koning, J. I. J. C., Crul, M. R. M., Wever, R., & Brezet, J. C. (2015). Sustainable consumption in Vietnam: an explorative study among the urban middle class. *International journal of consumer studies*, *39*(6), 608-618. https://doi.org/10.1111/ijcs.12235

Digmayer, C., & Jakobs, E. M. (2016, October). Risk perception of complex technology innovations: Perspectives of experts and laymen. In *2016 IEEE International Professional Communication Conference (IPCC)* (pp. 1-9). IEEE. https://ieeexplore.ieee.org/abstract/document/7740510

Elkington, J. (1997). *Cannibals with Forks: The Triple Bottom Line of the 21st Century Business*. Capstone.

Goedertier, F., Weijters, B., Van den Bergh, J., & Schacht, O. (2024). What does sustainability mean in the minds of consumers? A multi-country panel study. *Marketing Letters*, 35, 317-333. https://doi.org/10.1007/s11002-023-09699-y

Granato, G., Fischer, A.R., & van Trijp, H. C. (2022). A meaningful reminder on sustainability: When explicit and implicit packaging cues meet. *Journal of environmental psychology*, *79*, 101724. https://doi.org/10.1016/j.jenvp.2021.101724

Hanss, D., & Böhm, G. (2012). Sustainability seen from the perspective of consumers. *International journal of consumer studies*, *36*(6), 678-687. https://doi.org/10.1111/j.1470-6431.2011.01045.x

Horani, L. F. (2023). Sustainable design concepts and their definitions: An inductive content-analysis-based literature review. *Technological Sustainability*, *2*(3), 225-243. https://doi.org/10.1108/TECHS-10-2022-0041

Kim, J., Taylor, C. R., Kim, K. H., & Lee, K. H. (2015). Measures of perceived sustainability. *Journal of Global Scholars of Marketing Science*, *25*(2), 182-193. https://www.tandfonline.com/doi/abs/10.1080/21639159.2015.1015473

Laurence, S., & Margolis, E. (1999), Concepts and Cognitive Science, in Concepts. In E. Margolis, & S. Laurence (Eds.), *Core Readings* (pp. 3-81). MIT Press. https://www.researchgate.net/publication/243782458_Concepts_and_cognitive_science

Laws, D., Scholz, R. W., Shiroyama, H., Susskind, L., Suzuki, T., & Weber, O. (2004). Expert views on sustainability and technology implementation. *The International Journal of Sustainable Development & World Ecology*, *11*(3), 247-261. https://doi.org/10.1080/13504500409469829

Norton, V., Waters, C., Oloyede, O. O., & Lignou, S. (2022). Exploring consumers' understanding and perception of sustainable food packaging in the UK. *Foods*, *11*(21), 3424. https://doi.org/10.3390/foods11213424

Popovic, V. (2004). Expertise development in product design—strategic and domain-specific knowledge connections. *Design Studies*, *25*(5), 527-545. https://doi.org/10.1016/j.destud.2004.05.006

Salas-Zapata, W. A., & Ortiz-Muñoz, S. M. (2018). Analysis of meanings of the concept of sustainability. *Sustainable Development*, *27*(1), 153-161. https://doi.org/10.1002/sd.1885

Simpson, B. J., & Radford, S. K. (2012). Consumer perceptions of sustainability: A free elicitation study. *Journal of Nonprofit & Public Sector Marketing*, *24*(4), 272-291. https://www.tandfonline.com/doi/abs/10.1080/10495142.2012.733654

Stancu, C. M., Grønhøj, A., & Lähteenmäki, L. (2020). Meanings and motives for consumers' sustainable actions in the food and clothing domains. *Sustainability*, *12*(24), 10400. https://doi.org/10.3390/su122410400

Steenis, N. D., Van Herpen, E., Van Der Lans, I. A., Ligthart, T. N., & Van Trijp, H. C. (2017). Consumer response to packaging design: The role of packaging materials and graphics in sustainability perceptions and product evaluations. *Journal of cleaner production*, *162*, 286-298. https://doi.org/10.1016/j.jclepro.2017.06.036

Tschacher, W., & Scheier, C. (2012). The perspective of situated and self-organizing cognition in cognitive psychology. In P. Van Loocke (Ed.), *The Nature of Concepts* (pp. 80-102). Routledge.

United Nations. (1987). *Report of the world commission on environment and development: Our Common Future*. UN Documents. https://www.are.admin.ch › dokumente › bericht

Waseem, N., & Kota, S. (2017). Sustainability definitions — An analysis. In A. Chakrabarti, & D. Chakrabarti (Eds.), *Research into Design for Communities, Volume 2. ICoRD 2017. Smart Innovation, Systems and Technologies, 6* (pp. 361-371). Springer Singapore. https://doi.org/10.1007/978-981-10-3521-0_31

Whitmarsh, L., Swartling, Å. G., & Jäger, J. (2009). Participation of experts and non-experts in a sustainability assessment of mobility. *Environmental policy and governance*, *19*(4), 232-250. https://doi.org/10.1002/eet.513

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Doi: 10.30682/diid8424l