A Literature Review of Sustainable Behaviours. Asserted in the Context of Everyday Life in Cities

Revisão da Literatura Sobre Comportamentos Sustentáveis no Contexto da Vida Urbana Quotidiana

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Retirado de: http://convergencias.esart.ipcb.pt

ABSTRACT: The work presented in this paper is a part of a doctoral research in Design, which aims to promote sustainable behaviours in everyday life through the use of fashionable wearables. The comprehension of what kind of behaviours can be considered as being sustainable is needed for backing the design solutions including the wearables. Thus, a literature review was conducted, followed by a content analysis, intended to explore and frame those behaviours. Akenji and Chen's (2016) framework was chosen and modified to structure the type and domains of sustainable behaviours. The results suggest a trend for the sustainable behaviours to be associated with topics in the domain of housing, food, goods consumption and mobility. Furthermore, "effuse" behaviours that target positive impacts such as reusing, recycling, conserving and eco-innovative solutions are also frequently suggested.

KEYWORDS: Sustainability, Sustainable Behaviour, Sustainable Lifestyle, Behaviour Change.

RESUMO: Este artigo é parte de uma investigação de doutoramento em Design que visa promover comportamentos sustentáveis no dia a dia através do uso de moda inteligente. A compreensão de quais os tipos de comportamentos que podem ser considerados sustentáveis é necessária para apoiar as decisões de soluções de moda que incluirão "wearables". Assim, foi realizada uma revisão de literatura, seguida de uma análise de conteúdo, com o objetivo de explorar e enquadrar os comportamentos considerados sustentáveis na literatura. O enquadramento de Akenji e Chen (2016) foi escolhido e modificado para estruturar o tipo e os domínios dos comportamentos sustentáveis. Os resultados sugerem uma tendência para associar os comportamentos sustentáveis a tópicos nos domínios da habitação, alimentação, consumo de bens e mobilidade. Além disso, comportamentos "efusos", que visam impactos positivos como a reutilização, reciclagem, conservação e soluções eco-inovadoras, também são frequentemente sugeridos neste contexto.

PALAVRAS-CHAVE: Sustentabilidade, Comportamento Sustentável, Estilo de Vida Sustentável, Mudança de Comportamento.

1. Introduction

The promotion of sustainable habits, having people and their behaviours as a starting point for the change, has been suggested as one of the main keys to achieve sustainability (Lilley, 2009; Sustainable Consumption Roundtable, 2006; Bhamra, Lilley, & Tang, 2011). Previous studies developed design strategies, theories, models and frameworks to influence sustainable behaviour and lifestyles. Most of their approaches were mainly focused on "how" to persuade users to behave in a particular way and mainly from the point of view of behaviour change models (Spencer, 2014). The majority of the ways used to implement behaviour change models/ theories comprehend the perception and psychology of users in order to persuade them. Although these are beneficial and significant concerns, a gap of knowledge was found on understanding "what kind" of sustainable behaviours needs to be explored.

This paper presents findings of a literature review that is part of doctoral research aiming to support the design of fashionable wearables, which can work as active elements in the promotion of behaviours considered more sustainable, as part of a system in smart cities context. We assume that the combination of functionality and seduction power of fashion products design, when combined with Internet of Things (IoT) Technology, can make an important contribution to sustainability.

One of the first methodological steps was to grasp what is the current understanding of sustainable behaviours. We were looking to understand things such as, what kind of behaviours can be considered as sustainable and which behaviours in the city life might have more negative impact. These data would help us to find how to match fashionable wearables with the identified behaviours. In this sense, the main question that this paper tries to answer is - "Which type of sustainable behaviours could be better options for the case of behaviour change studies targeting sustainability?".

1.1 Human Behaviour and Lifestyles in the context of Sustainability

Human behaviour refers to a range of actions made by humans and that is typically influenced by several determinants (Hemakumara & Rainis, 2018). These independent determinants are, according to the Theory of Planned Behaviour (Ajzen, 1991), "attitudes towards behaviour", "subjective norms" and "perceived behavioural control" and they contribute to the behavioural intentions that inform later actions. Behaviour is mainly a response to various stimuli or inputs, unconscious or subconscious, voluntary or involuntary. When these responses or actions focus on the overlap of environmental, social and economic concerns, it can be considered as sustainable behaviour.

Manning (2009, p. 7) argues that the transition to sustainability introduces new ideas and behaviours as well as ambiguity. Even though people are optimistic about sustainability, they are uncertain about how to behave in a sustainable way and implement it in their everyday lives. They are either in need of social proof that convinces them that the effort serves the purpose or have difficulty in changing some social norms. In other words, people's rational minds may know that the change is needed, however it is not always the rational minds that drive the behaviour. People think in two different cognitive systems of reasoning: A rule-based which is reflective, conscious, self-aware, and an associative system which is automatic, unconscious, sensory-driven (Sloman, 1996; Thaler & Sunstein, 2008). Manning (2009) addresses the problem of sustainable behaviour as having little appeal to the associative system:

> *Consider a behaviour like biking to work: a person's rule-based system thinks it's a great idea because of all the benefits (health, money savings, fitness), but his associative system responds with a definitive "No way!" perhaps because it just can't handle the idea of walking into the office with "helmet hair." One way to empower sustainability is to make sustainable actions appealing to the associative system (…) A second strategy is to get the attention of the rule-based system so that it can assert itself against the associative system's rejection of a sustainable action ("Helmet hair is really no big deal. We're biking!") (Manning, 2009, p. 3).*

Additionally, many unsustainable actions are considered perfectly normal such as driving alone, living in a very large house that requires unnecessary heating, eating foods that have travelled long distances, constantly shopping for new products. However, sustainable behaviours such as buying second hand products or taking short showers are seen as lower status or undesirable (Manning, 2009; Sadalla & Krull, 1995). Many other behaviours that take place in everyday life, compose lifestyles. Plus, lifestyles are representative of how humans interact with each other in the decisions and choices they make that can have strong impacts on the environment and community itself.

Lifestyle refers to a pattern of consumption reflecting people's choice in terms of spending time and money, usually attitudes and values come attached to these behavioural patterns (Solomon, Bamossy, & Hogg, 2006). Patterns of choices or demands based on lifestyles mostly consist of many components that are shared by others in similar social and economic circumstances. However, each person provides a unique "twist" to this pattern and makes each lifestyle unique. Solomon, et al (2006, p. 558) give this example: "a 'typical' student may dress much like his or her friends, go to the same places and like the same foods, yet still indulge a passion for running marathons, stamp collecting or community service, activities which make him or her unique". This unique twist which can be rephrased as seeking for individuality, might come into surface in various activities, interests or opinions. These three categories of variables - activities, interest and opinions (AIOs) - are suggested as the dimensions to assess lifestyles. Wells and Tigert's (1971) psychographic research argues that one can understand lifestyle "by discovering how people spend their time (activities), what they find interesting and important (interests) and how they view themselves and the world around them (opinions), as well as demographic information" (Solomon, Bamossy, & Hogg, 2006).

Creating sustainable lifestyles, which means rethinking the ways of living and individual actions (UNEP, 2011), is quite important to empower sustainable behaviour. Creating this particular lifestyle also means rethinking how people organize their daily life, altering the way of socialization, exchange, share, educate and build identities. It is about transforming the society towards more equity and living in balance with the natural environment. "Everyday life" or "lifestyle" expressions are mostly highlighted in various studies that contribute to sustainability in terms of behaviour (Manzini & Jegou, 2003; UNEP, 2011; Petersson, 2016; Thieme, et al., 2012; Barr & Gilg, 2006; Marchand & Walker, 2008). Furthermore, many concerns in the base of encouraging sustainable behaviour and altering lifestyles towards an environmental base are considered in the context of urban life (Manzini & Jegou, 2003; UNEP, 2011) as well as inside and around the home (Barr & Gilg, 2006).

2. Methodology

To better understand, examine and characterize sustainable behaviours in the context of everyday life in cities, both quantitative and qualitative data were gathered from a literature review, semi-structured interviews and observations. However, this paper only presents findings from the literature review part, which was conducted into 4 phases:

(1) Knowledge expansion and selection of publications,

(2) Review for framework selection,

(3) Data collection, framing and content analysis,

(4) Interpretation of results.

The following databases were selected: EBSCOhost, Elsevier, ScienceDirect, Google Scholar, OATD and bibliographic catalogue of IADE Library. The keywords used were: "sustainable behaviour", "sustainable lifestyle", "sustainable actions", "design for sustainable behaviour" and "design for behaviour change". Academic journals, conference materials, reports, books and dissertation/thesis were the type of sources included.

After manual sorting, evaluating titles and abstracts, 41 publications were selected. Among these publications and after analysing the alignment of the titles with the objective of the research, the availability of sustainable behaviours in the form of strategies, case studies, scenarios and the examples given in theoretical background, selecting one work of the same authors (directly proportional the amount of proposed behaviours), 10 publications remained (Table 2).

Table 2 — List of sources

Sources	Type of source	Brief topic
(Akenji & Chen, 2016)	Report	Shaping sustainable lifestyles - Framework
(Thieme, et al., 2012)	Article	Designing persuasive system to promote sustainable lifestyles – User study
(Bhamra, Lilley, & Tang, 2011)	Academic journal	Designing for sustainable behaviour - Case study
(Wever, van Kuijik, & Boks, 2008)	Academic Journal	User-centred design for sustainable behaviour – Case study
(UNEP, 2011)	Report	Recommendations to develop efficient sustainable lifestyles based on survey
(Petersson, 2016)	Report	Strategies to enable sustainable choices in everyday life – Guideline
(Monroe, 2003)	Academic journal	Encouraging environmentally responsible behaviours – Review / Theoretical Study
(Manning, 2009)	Report	Psychology of sustainable behaviour – Theoretical study
(Lidman & Renström, 2011)	Dissertation	Design for sustainable behaviour – Framework / Applied study
(Manzini & Jegou, 2003)	Book	Promoting sustainable everyday life by urban life scenarios – Framework / Case study

Source: Authors

2.1. The Framework – Everyday Life Domains

Everyday life or daily life is briefly "what we do every day" (Manzini & Jegou, 2003, p. 63) and consists of series of actions conducted by people and eventually is an output of unique lifestyles. These two terms "lifestyles" and "everyday life" were interchangeably used in the previous studies. In this study, we prefer to use the term "everyday life" because lifestyle has set of complex drivers such as personal situation, external social and economic conditions, as well as physical and natural boundaries (Akenji & Chen, 2016). The focus is based on promoting behaviours, therefore "what we do everyday" or "how we act everyday" is found more relevant in this context. Existing literature on promoting sustainable everyday life are also linked with city life. Increasing population towards urban areas (United Nations, Economic & Social Affairs, 2016), as well as individuals' "hope for a better life" (Eremia, Toma, & Sanduleac, 2017) and "gain access" (Etezadzadeh, 2016)to necessities were considered as the reason.

The first example in the city context was found in Manzini and Jegou's (2003) sustainable scenarios in urban life. In that project, the point of reference was "the daily dimension of human's existence" starting from local environment. The project offered possible scenarios and practicable alternatives by answering the question: "What might life be like in sustainable society?". Scenarios which promote sustainable urban life, were divided into different topics which are listed as "eating", "things", "work", "cities", "energy" and "vegetation". Another example was found in UNEP's (2011) Global Survey that asked young adults, living in urban areas from 20 countries, to examine their current lifestyles. The survey's main objective was to analyse young adults' perceptions and attitudes in everyday life as well as the visions of sustainable lifestyles, to encourage participation of sustainable scenarios, and to develop policy recommendations, focusing on opportunities, actors and responsibility. Sustainable lifestyles were divided into three major climate-related areas: "mobility", "food" and "housekeeping". "They were also three major consumption areas that have great impacts on environments and societies, and need to be looked at closely to tackle global challenges such as climate change" (UNEP, 2011, p. 18).

Recently, another UNEP report was proposing "evidence-based framework design" to enable lifestyle choices that contribute to sustainability (Akenji & Chen, 2016). The report argued that there were encouraging signs that society understands the impact of daily choices and the various ways of actions, models and surveys are helping people to live more sustainable lifestyles. However, there was still the need of a holistic vision of what constitutes a sustainable lifestyle. In this matter, based on consumption categories and groups of products that have the highest environmental impacts, as well as "equally problematic" social impacts, the key domains proposed were "food", "housing", "mobility", "consumer goods" and "leisure". Additionally, water, energy, and waste were not addressed in isolation but as cross-cutting elements that affect and were affected by almost every lifestyle domain (Akenji & Chen, 2016, p. 5).

Regarding these three approaches (Table 1), the main focuses were observed as daily activities inside home, eating habits and mobility. However, some dimensions were found unnecessary as they might be considered as sub-element under some proposed titles. Furthermore, considering consumption as a high impact of daily basis, and leisure time activities were also important as people spend considerable time as leisure.

Table 1 — Findings of key domains based on different sources

Key Domains of Everyday Life	Source
Eating (food preparation) **Things** (taking care of the house and household objects) **Work** (the organization of activity networks for work, study, entertainment, socializing) **Cities** (urban mobility) **Energy** (energy production and management) **Vegetation** (the creation of urban and non-urban green spaces)	"Daily dimension of human's existence" (Manzini & Jegou, 2003)
Housekeeping (Being at home) **Food** (Getting some food and eating) **Mobility** (Getting around, getting out)	"Major climate-related areas" (UNEP, 2011)
Food (What we eat/drink, how it is produced, processed, provided and disposed) **Mobility** (How/how often we travel) **Housing** (How/Where we live, what is used to build, heat and cool) **Consumer goods** (The type/quantity of products we buy, how we use and how often we replace) **Leisure** (How we spend leisure time, choice of tourism destinations, activities, how we use facilities)	"Key lifestyle domains" (Akenji & Chen, 2016)

Source: Authors

For our research, Akenji and Chen's (2016) approach was chosen as a framework due to its recency, practicality and holistic point of view. This framework was not used only for proposing the domains of daily life, but also the components of "everyday sustainability actions" (REDuse), which are formed as Refuse, Effuse and Diffuse. "Refuse" targets negative-impact activities and actions by individuals/households to avoid or reduce unsustainable practices. "Effuse" targets positive impact activities by individuals/ households that are sustainable. Finally, "Diffuse" collaborative engagement actions with wider communities that provide solutions and reduce environmental impact. These components are used to categorize reviewed behaviour types in terms of sustainability. On the other hand, lifestyle domains are renamed as "everyday life domains" and the behaviours found on previous cases which are not considered in any of these domains, are framed as "Other".

3. Results and Discussion

Framing different target sustainable behaviours according to the selected framework enables a number of observations to be made (Table 3).

Table 3 — Framed behaviour types and frequencies from the sources

Everyday Life Domains	*Refuse* *Boycott, Avoid, Reduce*	*Effuse* *Eco-innovate, Do-it-yourself* *Reuse, Conserve*	*Diffuse* *Share, Collaborate, Localize* *Evo-innovate*
Food	• Avoid food waste**** • Distinguish the 'sell by', 'best before' and 'use by' dates (some foods are safe to consume even after use by dates* • Avoid overconsumption of animal products (red meat)* • Stop eating, selling, serving giant prawns* • Reduce impact on global warming by not drinking heated beverages*	• Choose local, fresh, in-season and/or organic produce over exotic and out-of-season options**** • Urban gardening, urban farming, self-producing vegetables and fruits*** • Eating more fruits and vegetables*	• Initiate healthy, delicious and balanced low-impact meals at work canteen/schools* • Participate in local farmers market* • Support and invest in Food coop* • Food sharing, extra cooking for others to take away** • Guerilla gardening*
Mobility	• Avoid/reduce private car use; single-occupancy driving****	• Public transport as part of or all the way to work** • Walk or cycle for very short journeys such as the ones to local convenient store* • Using bike in the city**** • Using energy efficient vehicles**	• Car-pooling scheme, car club*** • Car-sharing for work commute*** • Teleconferencing facilities instead of long-distance face-to-face meetings*
Housing	• Avoid large houses (with low occupancy)* • Avoid unnecessary product promotions/discounts* • Avoid multiple/large electronic and electrical appliances (TV, fridges)* • Reduce fridge door opening times* • Reduce energy consumption****** • Reduce household wastes* • Switch-off the devices you don't use instead of stand-by*	• Home insulation** • Energy and water efficient behavior**** • Opt for renewable energy option** • Construct "passive houses" (reduce building's eco footprint)* • Use energy efficient light bulb* • Recycling in the household* • Correct dosing of cleaning agents (toothpaste, detergent)*	• Initiate/join a (neighbourhood) tools library or rarely used household tools/appliances** • Collective laundry washing in buildings* • Organized help-network, do-it-yourself support* • Neighborhood co-operation/exchange services*
Consumer goods	• Avoid one-time use products (plastic bags, razors, plastic cups, single use cleaning products)* • Stop buying goods that comes from slave labor* • Stop buying goods that causes destruction of environment*** • Use less washing detergent then recommended (safety margins)* • Decrease the need for purchasing new clothes**	• Repair* • Recycle**** • Purchasing green products based on degree of their environmental friendliness** • Use reusable sanitary protection instead of disposable ones* • Alter consumption habits* • Reuse/repair clothes*	• Give away old but still usable items (clothing, electronics, furniture)* • Rent less-frequently used goods instead of buying*
Leisure	• Decrease amount of waste* • Boycott tourism to sensitive biodiversity hotspots*	• Choose low impact yet enjoyable activities/experience for leisure (gardening, visit parks, local museums, theatre, cycling, volunteering, family party/picnic)* • Put up bird boxes* • Plant sea oats* • Re-use towels at hotels* • Clean the beaches from rubbish* • Keep streets clean/ nudging litter into the bin*** • Look up information, reading articles/books*	• Participate events and courses for lifelong learning** • Actively participate in leading environmental initiatives*** • Be kind and caring to all living things*
Other		• Recycle papers and cups at work* • Count wildlife populations* • Promoting prescribed fire* • Reduce waste in the production process*	• Make voluntary donation to charities** • Vote** • Establish mortgage criteria for energy efficient houses* • Sue a polluter* • Use legal system to force compliance with environmental law* • Protest, speech-making, letter-writing* • Invest in environmentally responsible companies*

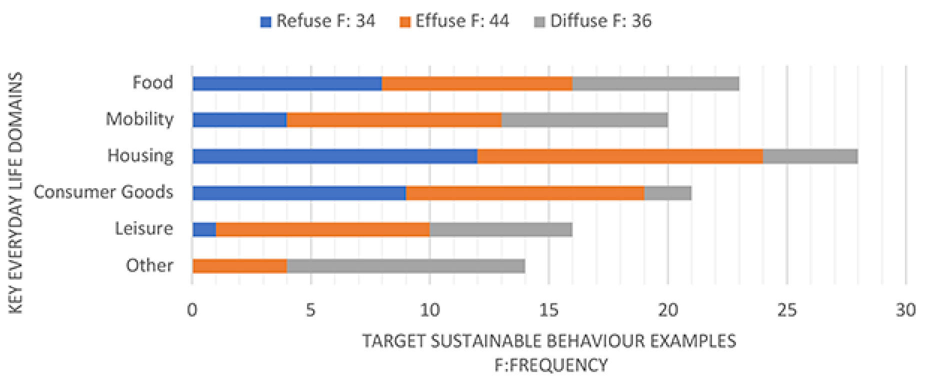
*The frequency of suggested behaviour

- Lobby to motivate others*

Source: Authors.

The next frequency chart (Figure 1) offers a graphical view of the different approaches grouped by everyday domain.

Fig. 1 — The frequency of target behaviour domains



Source: Authors

Firstly, the data suggest that the largest number of target behaviours is found in the housing domain, especially in the form of refuse and effuse. In other words, collaborative forms of behaviours are less suggested comparing to others. When examined in detail, referred behaviours are mostly related with energy consumption such as: "switch off devices", "reduce fridge door openings", "use energy efficient light bulbs" and so forth. The next domains to be more frequently indicated are food, consumer goods and mobility. The domain of leisure activities and the behaviours tagged as "Other", which are not concerned any of these key domains, are indicated at the least.

Secondly, the most suggested behaviours are: "reduce energy consumption", "avoid food waste", "choose local, fresh, in season and/or organic produce over exotic and out of season options", "use bike in the city", "energy or water efficient behaviour" and "recycle". The majority of the frequently proposed behaviours are curtailing or ending a certain type of behaviour or substituting a new for an old behaviour.

Thirdly, the most suggested behaviours are found in the form of "effuse" behaviour which is mainly summarized as more efficient and innovative solutions for a particular behaviour type such as conserving, reusing, recycling or do-it-yourself suggestions. This demonstrates that the suggested target behaviours, which are also defined as sustainable behaviours, are proposed to promote more sustainable behaviour. Behaviours such as less goods consumption or less clothes purchasing are more efficient than recycling or repairing these artefacts since waste is an unwanted output. However, both type of behaviours are considered as sustainable behaviours, which can be understood in the sense that any kind of step towards sustainability is welcomed.

Fourthly, it is observed that some behaviours, such as "reduce energy consumption", "energy or water sufficient behaviour", "stop buying goods that causes destruction of environment", are being pointed out without clarifying a specific source or target, which might be considered as vague. On the contrary, some examples are clarified the generalized statements. For example, "Reduce fridge door opening" is focused on only one specific interaction with an industrial product instead of claiming reduce energy consumption. Another example might be given as "stop eating, selling, serving giant prawns" which put a finer point on the "goods that causes environmental destruction" and gives a specific focus on a particular seafood.

Finally, some behaviours that are defined as "political behaviours" (Monroe, 2003) or "civic actions" (Manning, 2009) such as voting, protesting, "ecosystem behaviours" (Monroe, 2003) such as putting up bird boxes, planting sea oats or behaviours which are specific to expertise or workplace such as reducing waste in production process are categorized as "Others". Nevertheless, it is observed that behaviours are also related with energy consumption, waste management or avoiding destruction of environment which are similar topics in other domains of everyday life.

4. Conclusions

Identifying the behaviours mostly claimed as sustainable was the main intention of this research, intended support an informed decision about which behaviour(s) to select in order design fashionable wearables. Based on the gathered findings the research can now proceed to the next step, which consists in collecting the user perceptions about this problematic. Domains of everyday life and type of behaviour framing were considered for the identification.

This research has explored and juxtaposed the understanding of sustainable behaviours through a content analysis of the reviewed literature. A number of studies were found presenting frameworks or seeking the answer on how to design, persuade, motivate, or encourage users in changing their behaviour. We could gather examples of strategies, frameworks or guidelines from them, which are being suggested as adequate for this purpose. However, we also found many statements that do not clearly define the type of behaviour being considered as sustainable. Thus, such an undefinition required a subjective interpretation, which we based on a feature of the product designs or case studies suggested in scenarios.

The conclusions of this study are limited by the following aspects: the articles included in the analysis are restricted to particular databases; the keywords used in the search of publications; the framework used to formulate the sustainable behaviours in the lens of everyday life.

As suggestion for future studies, we highlight the possibility of deepening the analysis and the inclusion of experts, as well as the conduction of focus groups with a range of stakeholders.

Acknowledgements

A preliminary version of this paper was published in DDC'19 Conference (Ayanoglu, Duarte, & Pereira, 2019)in: Duarte, E. (Ed.) (2019). *Design Doctoral Conference'19: TRANSformation. Proceedings of the DDC 6th Conference*. Lisbon: IADE, Universidade Europeia / EDIÇÕES IADE. ISBN: 978-989-8473-27-1

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Reference According to APA Style, 5th edition:
Ayanoglu, G. Duarte, E. Pereira, M. ; (2019) A Literature Review of Sustainable Behaviours. Asserted in the Context of Everyday Life in Cities. Convergências - Revista de Investigação e Ensino das Artes , VOL XII (24) Retrieved from journal URL: http://convergencias.ipcb.pt