Designing Information Systems for Sustainable Consumer Behavior in Online Grocery Shopping

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Abstract

Sustainable behavior in grocery shopping has great significance today due to the increase in food consumption. Consumers play an important role in contributing towards sustainability with their sustainable behavior in grocery shopping. The study aims to develop an understanding on how to design an online grocery shopping application to support sustainable consumer behavior by applying Design Science Research (DSR) and Persuasive Systems Design (PSD) model. The focal contribution of the research is to investigate what motivates consumer behavior towards sustainable consumer behavior and with that knowledge providing a design solution for that. In the end, a prototype of an online grocery shopping application will be designed and tested in iterations that should support the consumers in making better informed sustainable choices with the help and persuasiveness of the design.

Keywords

Sustainable consumer behavior, design research, persuasive design

1. Introduction

Consumption of food has been increasing with the growing population of the world. The production of food has led to many negative impacts on the Earth, such as climate change, biodiversity loss, and the degradation of ecosystems [1, 2]. Thus, the challenge is to produce sufficient, nutritious food to feed a growing number of global citizens, while concurrently reducing the environmental footprint of the entire food chain, but perhaps especially that of consumers, since 61% of the world's food waste takes place within households [3]. Meaning that consumers play a vital role in transitioning towards a more sustainable future when it comes to groceries.

Changing consumer behaviour is, however, more difficult than it sounds. Despite our increasing awareness about the factors influencing sustainable behaviour, or its lack thereof, there is still a dearth of empirical research about effective ways to target these factors and put what we have learned into practice [4, 5]. Additionally, there is a lack of research on the role of digital information systems in aiding and nudging consumers to make more sustainable grocery choices. The existing digital tools in grocery stores for consumers are focused only on the streamline of cash flow, but not consumer behaviour or their preferences. This project focuses on enabling consumers to act more sustainably in their purchase decisions of groceries with a digital technology (e.g., app), based on the consumer's decision-making and behaviour processes. We will interview consumers to understand their grocery buying process, their views on sustainability and sustainable consumption, what factors and design solutions influence their grocery choices and behaviour, and how a digital technology might aid them with better informed options. The purpose of this project is, with a particular focus on sustainability, to develop knowledge on influencing factors on consumers' decision-making of grocery purchases and the potential knowledge on the design factor of digital technologies in this process. The design factor

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involves how to design a digital technology keeping the consumers at the centre in the design process.

2. Literature Review

Consumers with a positive attitude towards environmental concerns are more likely to try to reduce environmental impact [6]. Despite showing positive attitudes towards the environment, consumers later do not perform sustainable actions [7]. Research on the attitude-behavior gap between sustainable attitude and sustainable actions are explored by scholars [8, 9], which suggests that customers do not act as they say; this "attitude-behavior gap". Framework like "SHIFT' can be useful in addressing sustainability [10].

There has been an increased interest in sustainable development in IS field due to climate change and environmental problems [11]. IT can be instrumental in fighting and providing solutions to the negative effects of the environment [12]. IT can be a change actant in sustainability innovation [4] through the force that changes human behavior [13]. IS scholars advocate that IS can contribute with its solutions in lessening negative environmental impacts of people's behavior by demonstrating societal values [14]. However, there have been few works on IS solutions that contribute to sustainable development [4, 15]. There is also a lack of focus on social aspects in most of the papers on IS and sustainability [16].

Persuasive technology/ design plays a vital role in encouraging people to behave in certain ways for the better. There are many research on persuasive technology, but most of them are health, wellbeing or medical related [17-21]. However, very few research focuses on food, though in different ways, such as, wastage awareness [22] and health-conscious grocery shopping [23] etc. Thus, this project is an opportunity to explore the persuasiveness of design and its role towards sustainable consumer behavior.

This project attempts to investigate how technology with its design can be influential in consumers grocery purchase decision-making. Thus, this project can help in understanding the role of the design of a digital solution that motivate consumers towards better aware and better-informed choices in their grocery shopping, thus sustainable consumer behavior.

3. Research Objectives

The purpose of this study is to aid sustainable behaviour in grocery shopping through the design of an online application. We want to explore what motivates consumers to buy sustainable groceries and how we can integrate consumers' decision-making and behaviour processes as different features in designing an online grocery shopping application. The results of consumer's experience of grocery shopping will provide us with the insights of what they look for when selecting or buying products, the influencing factors of their choices, what features of the application they most and least enjoy, and how they navigate through the application in the whole buying process. The results will be useful in academia, as it will provide knowledge with its explorative approach on what and how design features/principles can be used to motivate consumers towards sustainable behaviour, in this case, behaviour of sustainable grocery purchasing. It also contributes to practice by showing what consumers find important or difficult in their grocery shopping, and thus how they can implement the design in real life to motivate consumers towards sustainable grocery behaviour.

4. Research Questions

As the work focuses on designing information technology to promote consumers towards more sustainable food purchasing habits. The main research objective is to contribute with new knowledge on how digital services can influence sustainable consumer decision making. To meet the aim of the research, it is necessary to investigate the factors influencing consumers' decision-

making regarding grocery shopping [24], and to draw from the theoretical insights as well as practice to design, develop and evaluate- an online application.

- How does the design of an online grocery shopping application affect the consumer's grocery choices?
- What characteristics/features are required in an online grocery shopping application to aid sustainable consumer behaviour?

5. Related Work

There are several technologies developed for shopping, from smart phone applications to hardware integrated into shopping trolleys. There have been some applications that enable consumers to get information about a product just by scanning the product's barcode, e.g., GoodGuide, RedLaser, and GoogleShopper [25]. Most of the applications did not last that long. Despite this fact, it is evident that there is an active community that wants consumers to be aware of their purchase choices. In the last couple of years, especially regarding food purchase, grocery companies like Axfood [26] and COOP [27] started providing consumers with information on different factors of the products.

Axfood's mat.se [26] started to show product's CO_2 emissions, however the online application has now changed to mathem.se where it only shows information such as product origin, eco-labelled etc. COOP app [27] shows different sustainability aspects in their application. However, it is not clear to what extent they have considered consumers' behavior and preferences in developing the applications, but they do mention that customers are interested and willing to consider food's carbon footprint [26]. These applications can help consumers to make informed and conscious choices. These applications provide information on the environmental and sustainability aspects on food products. There is, however, a gap on knowledge on how, consumer decision making is affected by such information. The practical initiatives by the grocery chains thus signal the relevance of our research, and provide us with practically grounded questions, e.g., Is it (the information provided in the application) motivating consumers towards sustainable decisions regarding food purchase?, What factors of decision making can help in nudging consumers to have sustainable consumption?, What features of an application promote sustainable consumption behavior? These questions will be considered in this research. Our work thus explores many issues with the existing tools in grocery stores and aims at improving and developing the technology to encourage consumers in making sustainable choices in their food purchase activities.

6. Related Work

6.1. SHIFT

SHIFT framework for sustainable consumer behavior will be used in this research [10]. The acronym SHIFT emerged from different factors (Social influence, Habit formation, Individual self, Feelings and cognition, and Tangibility) that can help in encouraging consumers towards more sustainable behavior. These factors will be implemented throughout the project. These factors can guide both in designing and evaluating the application. The results can show what factors should be considered more of importance than other factors. It can also help in presenting consumer's responses towards the factors which can guide us to design for consumers sustainable behavior.

6.2. Design science research

The study will follow Hevner's [28] three-cycle design science research approach (relevance, rigor, and design) as the problem domain needs to be understood first and then find solutions

based on that; drawing relevance of the problem, working on a rigor cycle through literature studies, and conducting design-evaluation cycles to iteratively refine problem conceptualization and solution for the problem domain. Through this process we iterate, evaluate, validate, and provide refined outcomes continuously, supporting the emergence of both technology design (technological contributions) and abstract design knowledge (theoretical contributions).

6.3. An Eight-Step Design Process

The study will also follow Fogg's [29] eight-step design process. This process can be helpful as a guidance to the design process. The process is also flexible, so it can be used according to the necessity of the project. It helps the design process to be on track and going back and forth with the steps, along with the design can provide better outcome for the desired result.

6.4. Persuasive Systems Design

The key element of this research is to persuade consumers in sustainable decision-making in grocery shopping. As an artifact will be designed to support consumers to make sustainable grocery choices, so the artifact will contain persuasive designs. Therefore, the study will follow Fogg's Persuasive Technology [30, 31] and Persuasive System Design Model (PSD) [32] in the design process. Different design principles of PSD model will be implemented in the design of the application, which will go through iterations with the evaluation and testing done by the consumers.

7. Research Methodology

7.1. Ethics Application

The research intends to change consumer behavior towards more sustainable in grocery shopping, which requires some ethical consideration. Therefore, we applied for Ethical Application for the project to Swedish Ethics Board in December 2022 and received the approval in February 2023. The ethical application included the plan for the project, such as how the empirical work will be conducted, how the data will be stored and managed etc.

7.2. Survey

A survey is being conducted from April 2023 with a combination of open-ended questions and multiple choice to get an understanding of what consumers think and want when they buy groceries. It will provide insight into how consumers do grocery shopping, what matters to them, their opinion on sustainability and sustainable grocery shopping, and what affects their decision-making in buying groceries. The survey will stay open until May 2023. Consumers of diverse backgrounds (age, gender, marital status) are responding to it. The survey will later be analysed and the key important themes from the respondents' answers will be taken into consideration for the design phase.

7.3. Usability testing

Three types of prototypes will be designed, low-fidelity, mid-fidelity and high-fidelity. The low fidelity prototype will be designed from the analysis of the survey and existing applications. Usability testing will be conducted for all the prototypes, which will include think-aloud method while testing the application that will be followed by semi-structured interviews with the consumers. The think-aloud method will help in understanding what comes to the consumers mind while using the prototype that will help in editing the designs of the application. The interviews can be helpful in understanding consumers online grocery behavior in depth.

The objective of the usability testing is to understand whether the designed prototype has been successful in promoting or motivating consumers towards sustainable grocery purchasing behaviour. It will give us insights of what and how the implemented design criteria have been utilised in this study and give us opportunities for further improvements in future.

8. Research Contribution

This study will design an online grocery shopping application prototype, by applying a design science research approach with persuasive design principles, in an iterative process of empirical studies, inquiry into consumers' requirements and views, and evaluations of the designed prototype, that will help consumers to make sustainable choices in their online grocery shopping. The project will contribute to both Information Systems (IS) literature and practitioners by improving the existing applications for grocery purchase, especially towards sustainable consumer behvaior. The study is going to use DSR and persuasive design principles and consider consumers behavior regarding food purchase so that consumers act more sustainably in their purchase decisions with the help of a simpler, easier, and smarter online application. This research is Invention style DSR [33], a prototype will be designed where there is little understanding of the problem context and there are no effective artifacts are available yet as solutions [33]. The results of the study will help us identify a design guideline for designing an online application, in this case for online grocery shopping, that can aid consumers towards sustainable behavior.

The study is very relevant in today's time and can be used for further research as well. As it is mentioned in the literature review section that social aspect of sustainability should be more studied which can change or motivate people towards sustainable behavior. This research with design science research and persuasive systems design attempts to help consumers to make more informed choices with their grocery shopping, and thus motivating them to sustainable consumer behavior.

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