Design and Implementation of Sustainable Social Shopping Systems

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Abstract. Sustainability is one of the most often discussed topics in our society. Although no one argues that individuals are the main players in changing society and the environment, individuals have always been treated as just actors and decision makers who transform the organizational, societal, national, and/or global sustainability practices. However, our fundamental belief is that individual and personal sustainability are at the heart of organizational and societal sustainability. One of the key activities that humans undertake that has an overwhelming influence on the economic, environmental, and health facets of their life is shopping. In this paper, we explore the possibility of using the concepts and principles of decision-making, habit formation, social networks, and benchmarking to influence consumer behavior towards sustainable shopping. We propose a framework and architecture for Sustainable Social Shopping Systems. We are in the process of prototyping and implementing them in the context of a purely online supermarket.

Keywords: Sustainability · Social shopping · Decision-making · Consumer behavior · Transformation · Habit formation · Wellbeing · Health · Finance · Environment

1 Introduction

"How can we live well?" is a question that has been asked through the ages. A burgeoning self-management $13 billion industry has grown around trying to answer this question [1]. In addition, the recent proliferation of smart device technologies has made the self-management industry to broaden its services to the web and mobile applications [2]. Individuals can now manage their lives easily as they can access their daily life data from web services and mobile applications. Despite the increase in the so-called "self-improvement/self-management" apps and web services, recent research and consumers have started to question the efficiency and effectiveness of the web services and apps. For instance, 26% of users reported to have used health apps only once [8]. A key reason for their failure could be that they have overlooked the behavioral side of individuals' activities, decisions, habit formation and transformation. To be sustainable, individuals need to create balance among physical and spiritual values, thoughts, actions and behaviors [7]. This means that these web

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services and mobile applications also should support the various dimensions of an individual's life allowing the prioritization of various aspects in accordance with situations [3–6]. To support true sustainability, it is crucial to identify human activities, which can change our behaviors to be sustainable. Shopping is a household activity that has an overwhelming influence on individuals' sustainability as it has close relationships with financial, health, philosophical and environmental values, and is often carried out by individual's habitual behaviors [9, 10].

This paper proposes Sustainable Social Shopping as a pathway to individual sustainability, by synthesizing concepts, models, processes, and frameworks from sustainability, shopping, social shopping, decision-making, and habit formation. This paper reviews the literature related to individual sustainability, shopping, online shopping, sustainable shopping, and social shopping. After that, the paper suggests concepts, models, framework and architectural components for the design of Sustainable Social Shopping Systems. Finally a prototypical implementation of a sustainable social shopping system in terms of the process and system views will be described.

2 Individual Sustainability

"Sustainability" was initially outlined by the World Commission on Environment and Development Report in 1987 and gained international momentum in 1992 Rio de Janeiro Earth Summit which was sponsored by the United Nations [11]. Since "Sustainability" and "Sustainable development" became a global buzzword, the concept has been studied and discussed in many academic disciplines. In general terms, the concepts of "Sustainability" have been approached and developed by incorporating ecological and environmental issues at the organizational level. However, to achieve true sustainability, researchers and policy makers had also recognized the social and economic dimensions of sustainability and sustainable development. This encouraged organizations to manage integrated and balanced performances of economic, environmental and social aspects. These three key performance indicators is now known as the Triple Bottom Line (TBL). TBL encourages organizations to take the driving seat for "People, planet and profits" to be sustainable [12]. TBL brings the idea that people are an important factor to consider in order to make our society sustainable. Ordinary individuals are the real decision makers for sustainable development [13], as they are responsible for understanding and improving awareness of sustainability, and decide whether to adapt their attitudes and behaviors for sustainable development within different roles of their lives, for instance, as an individual or a family member [14]. More and more individuals are becoming aware of the importance of sustainability and they tend to engage with choices that contribute to positive changes and happiness [15]. We synthesize these ideas and propose a model of sustainability where the individual is at the heart of a sustainable society (Fig. 1).

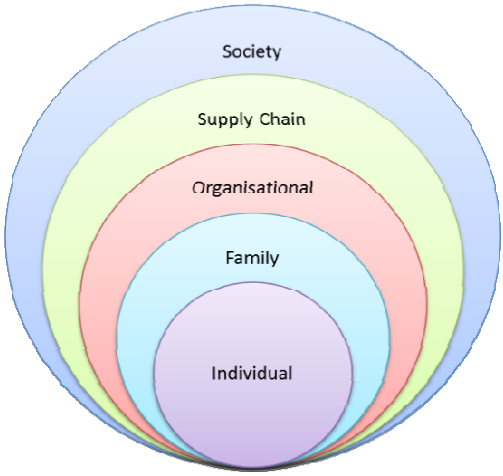

Fig. 1. Level of Sustainability

3 Shopping, Sustainable Shopping and Social Shopping

Shopping is a decision-making process that people or households make on a daily basis [16]. Many people do shopping like a mundane task, but it is an activity that influences not only individual or household life patterns, but also business production and distribution processes, and even the national economy [9]. At the individual household level, shopping affects people's lives from financial and health considerations to philosophical values. At the organizational or global level, shopping directly influences the businesses' profits, and thus indirectly has an effect on the entire economy and the global environment. Also shopping is the activity that can bring fundamental changes in our life, because it is habitual and often reflects life values [9].

When "Sustainability" became one of the biggest tasks to address solutions for the good of the public, researchers and policy makers focused on individuals and household shopping activities while businesses and organizations tried to transform themselves to meet sustainability regulations and policies. Sustainable shopping, sustainable consumption, green consumption and many similar terminologies were conventionally used in various articles to explain how shopping activities can lead the ecological sustainability of the world [10, 16–18].

The idea of sustainable consumption emerged at the 1992 Rio Earth Summit, and the action plan for sustainable development was endorsed by 179 heads of state [16]. Taking this into consideration, sustainable shopping concept has been used in the context of environmental issues, in particular concepts that included bringing changes in consumer's quality of life. Jackson suggests that sustainable consumption does "not only involve changes in consumer behavior and lifestyle" but is also achieved through improvements in efficiency [19]. Therefore it is worthwhile to consider several concepts related to shopping for supporting true sustainability.

Firstly, sustainable shopping concept needs to be considered. Although sustainable shopping has been promoted strategically by government level agencies, it is a daunting task to make families and individuals to shop in a sustainable manner [17].

Newton and Meyer conducted an exploratory study of attitude and action gap in household resource consumption. In this study Newton and Meyer found that most Australian households were concerned about environmental problems and strongly showed their support towards saving water and energy through sustainable consumption. However the majority of households claimed that "lack of information" and "can't work out what's best" were the main barriers to take an action [20]. In other words, if information was readily available, then the majority of households would be willing to contribute to sustainability.

Another recent shopping trend is social shopping [21, 22]. Cambridge Business English Dictionary [23] defines "Social shopping" as "a method of shopping on the internet where people can communicate with other buyers and sellers to discuss products, get advice about what to buy, and buy products in groups" [23]. In a shopping context, consumers are spending more time and money when family or friends are doing the shopping together [24]. This is because consumers can share and get opinions on products that they are looking for and enjoy interactions with other people who have similar interests [25]. Consumers can engage with others through social shopping features, e.g. share purchases on their social network services, and then often form their social presence by interdepending, connecting and responding to shopping behaviors within their relationships [26]. Social shopping is rapidly gaining attention and popularity from the marketplace, because communication and interaction are key elements in the success of eCommerce [27].

Table 1. Keywords frequency in leading IS Journal and in Google Scholar (2000-2014)

IS Journal	Sustainability	Sustainable Consumption	Shopping	Sustainable Shopping	Social	Social Shopping	Sustainable Social Shopping
Information Systems Research	1	0	164	0	371	0	0
MIS Quarterly	16	0	140	0	864	0	0
Journal of Management Information Systems	3	0	163	0	434	0	0
Information Systems Journal	0	0	62	0	208	0	0
European Journal of Information Systems	2	0	98	0	312	0	0
Communications of the ACM	13	0	740	0	1,330	0	0
IS Journal Total	35	0	1,367	0	3,519	0	0
Google Scholar Across Disciplines	997K	16.2K	1,200K	201	451K	1.7K	0

Sustainable shopping and online social shopping are mutually sustaining concepts that could be leveraged to support individual sustainability. However, no studies or practical solutions have been attempted, to combine these readily available concepts and mechanisms as a solution for individual sustainability. This became more obvious when key words related to "Sustainability", "Social", and "Shopping" were analyzed in six leading Information Systems journals for the last 14 years [28] and searched for in Google Scholar. While many articles have been found with each key word separately, a distinct lack of research interest has been apparent when combining concepts from these key words in the Information Systems discipline. A Google Scholar search across disciplines shows that there is research interest when combining any two from these key words, however there is no single matching article returned when the three key words of "sustainable social shopping" were combined (Table 1). In the next section, we propose Sustainable Social Shopping Systems (SSSS) as a means by which we can practically support individuals to become more sustainable and ultimately transform their lives.

4 Foundation of Sustainable Social Shopping Systems

Sustainable social shopping system (SSSS) is an online shopping cart system that provides insightful information to help consumers to be sustainable. Unlike an ordinary online shopping cart system, SSSS will provide at least three life dimensions information (financial, health and environmental aspects) in an integrated manner. In SSSS consumers will get two types of information for each life dimension. In a product detail and selection page, consumers will get notified on sustainability information for that specific product; in a shopping confirmation page, current overall shopping information for sustainability, and historical shopping information, of three life dimensions are given for comparison or future reference. Information for each life dimension will be guided by either commonly adapted method or government regulations. For example, information about health dimension in the selection page will be shown in traffic lights color code manner (green, amber and red), based on the UK guideline to creating a front of pack (FoP) nutrition label for pre-packaged products sold through retail outlets [29]. To be sustainable, integrated and balanced information should be offered to consumers. It was clearly shown in interviews conducted by Young et al. [30], that 30% of UK consumers were very concerned about environmental issues. However, interviewees pointed out "lack of information" of environmental and social performance of products and producers were the main barriers to action. Therefore SSSS can be a very attractive system for both consumers and eCommerce businesses, as it not only supports individual sustainability, but also has the potential of becoming a promising business model.

Traditionally, multiple cognitive steps were broadly adapted to understand consumers' behavior in marketing studies [31]. For example, when consumers make a purchase of an item, they often follow the five-stage buying decision process model, which involves need recognition, information search, evaluation, purchase decision and post-purchase behavior [32, 33]. Also shopping can be understood as a habitual

decision making process [20] because customers purchase products based on their daily life routine. Therefore this paper proposes the Sustainable Social Shopping System based on purchase decision model and habit model. According to Duhigg, habit is formed through a three-step loop; cue, routine and reward (Fig. 2) [34]. On a large scale, SSSS follows the habit model, but each step is incorporated with the details of the buying decision processes. Under the cue step, the need recognition stage begins with intrinsic and extrinsic stimuli like craving feeling, time based needs or commercial promotions. In the routine step, information search, evaluation and purchase decision stages are processed. In the reward step, post-purchase behavior stage is carried out and this step will feed the cue step again. Customers will experience these three steps through online shopping, and over time they will form a habit relating to shopping online. To support individuals' sustainable transformation, SSSS needs to provide prompt features for steps and stages that will inspire them to become sustainable.

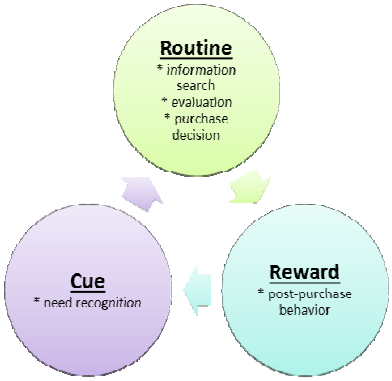

Fig. 2. Decision Making and the Cue-Routine-Reward Cycle

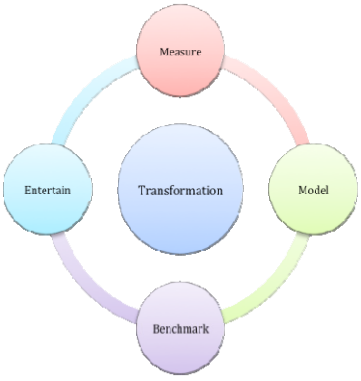

Fig. 3. A Framework for Individual Sustainability Transformation

In order to support individual's sustainability, SSSS should be able to provide insightful multi-dimensional information through the entire shopping process. However, there is no current framework that embraces all these concepts, models and processes completely. The ultimate goal of Sustainable Social Shopping System is helping individuals to transform their lives to be sustainable. As most individuals' current status is strongly engaged with inputs, the first step of transformation is to "measure" these inputs. This is followed by understanding these inputs through "models" tested by "benchmarking" (setting goals and meeting them), and finally "transformation" is achieved. "Entertain" is an element that entails "Transformation". While the process of measure, model, and benchmark may seem onerous there is a possibility that transformation could also be approached and achieved through gamification features, social features, and ultimately entertainment. For example, customers can share products that they want to purchase via social network and discuss about it with information provided by SSSS. While they are sharing their opinions about products and reaching a purchase decision together, individuals influence others and are influenced in turn by others too (Fig.3).

5 A Prototypical Sustainable Social Shopping Systems

Due to the prevailing use of mobile devices in these days [35], online shopping through mobile devices has become common [36]. In order to meet current consumers' trend, SSSS has a tablet-friendly design. Basically the system consists of 5 pages: Featured, Search, Statistics, Cart, and Profile.

5.1 Featured and Product Selection Pages

Featured page includes new and noteworthy products and packages, which stand out in the market and are potentially attractive to the user. A product or a package appearing in the featured page is a result of a process run by a sophisticated recommendation engine. Featured page infrastructure is flexible, which means sections (like Top-Charts, Social Choice etc.) are easily altered and updated. This page also shows the pre-defined shopping list (Fig.4). Within this page, customers can click into a detailed product information page and multi-dimensional information will be provided to help with individuals' sustainability practices (Fig. 5).

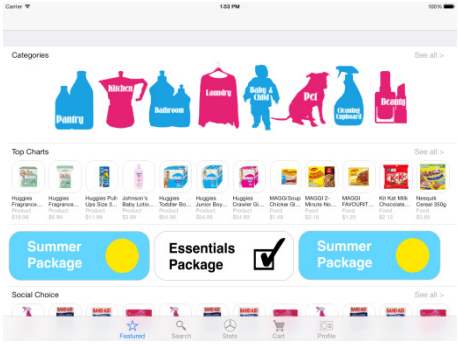

Fig. 4. Pre-defined Shopping List Page

Fig. 5. Product Selection Page

5.2 Search and Statistics

Search page provides basic search functionality for the user to be able to find products, categories of products or packages (Fig. 6). The statistics page is responsible for aggregating transactional data, produced by the user, and presenting useful information acquired from this data to the user in three dimensions (Health, Finance, and Environmental Footprint). This page is designed to let the user understand his/her online shopping behavior as well as the level of personal sustainability (Fig. 7).

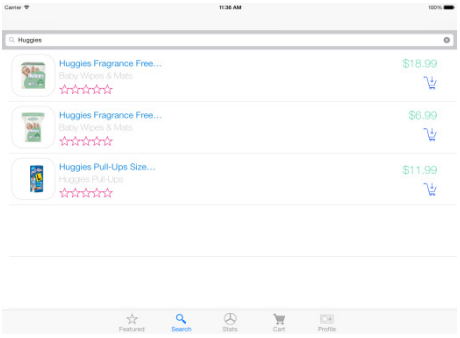

Fig. 6. Search Page

Fig. 7. Statistics Page

5.3 Cart and Profile Pages

All chosen products will be shown on the Cart page. Unlike the ordinary shopping system, it will show sustainability information and provide social shopping features (Fig. 8). Profile page includes user's basic personal information such as (name, username, billing information). The user will be able to log in using existing social networks; there is also provision to log into additional fitness social networks, which will later provide more useful information about health dimension of the user's sustainability status (Fig. 9).

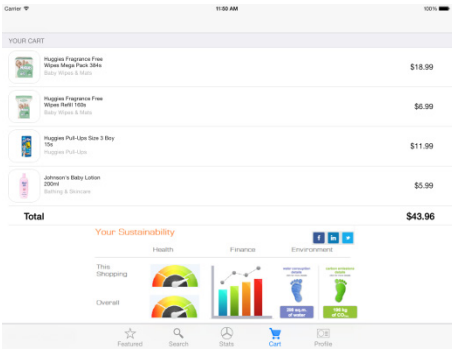

Fig. 8. Cart Page

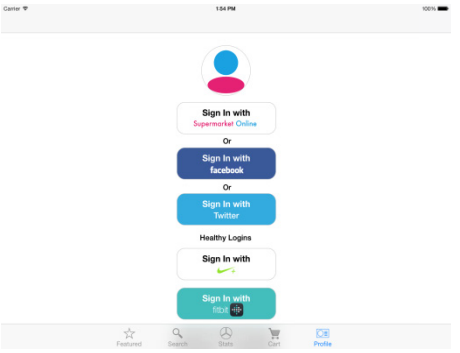

Fig. 9. Profile Page

6 Future Research Directions

The individuals' life spectrum is broad. Therefore, identifying human activities that influence multiple life facets and ultimately their sustainability is important. From the literature review, we identified shopping as a potential area for improving the sustainability of individuals. However we also recognized that there is sparse research on sustainable shopping and almost no research on sustainable social shopping. To

address this lacuna we have developed a Sustainable Social Shopping System (SSSS). SSSS will predict and recommend products to customers based on customers' specific circumstances, preferences and shopping history. Sustainability information on three life dimensions (finance, health and environment) will be provided in an integrated manner for assisting shoppers. Currently we are working on integrative models and recommendation algorithms. Parameters/KPIs for the three dimensions are heterogeneous, thus *integrative models* for understanding interrelationships between the data need to be developed. Based on these models, *prediction/suggestion/recommendation algorithms* also need to be developed. The data is currently sourced from product suppliers, government regulations and studies from expert organizations. However, in order to support a holistic individual sustainability, the system also needs to be flexible to incorporate other aspects of life dimensions and connect to a larger variety of data from outside sources in the future.

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