

Influencing Attitude Change for Sustainability through Persuasion

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Abstract—Food mileage is one of the important issues concerning environmental sustainability. In this research we have utilized a prototype platform with iterative user-centered testing. With these findings we successfully demonstrate the use of the context of persuasive methods to influence users' attitudes towards the sustainable concept.

Keywords—Behavior Change, Food Mileage, Persuasive Technology, Sustainability.

I. INTRODUCTION

IN 2005, 86.5% of total worldwide energy consumption was derived from the combustion of fossil fuels which produce carbon dioxide[2]. This has led to a significant increase in concern for environmental issues such as global warming, greenhouse effect, energy use, etc during the past few decades [3]. Long distance food transportation is a major consumer of the fossil fuels, increasing greenhouse gas emissions which contribute to global climate change. Within the same grounds, Food Mile defines an important parameter related to this issue: the distance food travels from where it is grown to where it is ultimately purchased by the consumer or end-user [4]. Thus, higher the food mileage higher the fossil fuel consumption. In this age of consumption, ever increasing demands for consumables is causing an increase in consumption of resources and energy, yielding to more greenhouse gas emissions due to increased production. The global climate will become more destructive and less suitable for human habitation. Just as consumption has allowed human species to live and prosper, the accompanying damage has also been depriving us of a healthy environment. Hence, one should realize that practicing rigid economic environmental policies under such an irreversible environmental change is not sufficient; instead, from the stage of design, we should deliberate how to make the best of resources without depreciating their original value. In this way, we would not only need to cut down the consumption, but our life would also march onto a real phase of sustainable development. Under

such a vision, this research proposal expects to provide an Eco-effective (effective use of environmental protection, as the thinking of Re-think and Redesign) life sustainable cycle system instead of sticking to an Eco-efficiency system (highly efficient use of environmental protection as the thinking of Refine, yet it still focuses on less destruction, partially looking for value enhancement and cost reduction (Fig. 1)). We also propose to combine the traditional perspective of design with the concept of sustainability (Fig. 2). Through incorporating ecological intelligence into the design we hope that people could appreciate and reflect on the relationship between their own behaviors and the environment. This would extend to inspiring others in caring for issues concerning sustainability, making our living space and environment a platform for endless sustainable development.

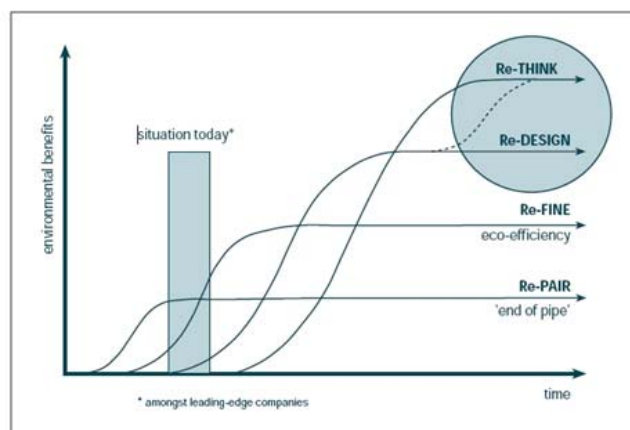


Fig. 1 4step model



Fig. 2 The shift to Sustainable design

II. CURRENT SITUATION

A. Fossilized Lifestyle

The lifestyles and concepts formed throughout the years of accumulation are difficult to change. Habits such as diet, daily schedule, consumption, sports and recreation, could easily become fossilized. Behind all these selfish personal behaviors generally lie the concerns for the future of the individuals as

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well as the earth and environment. The fossilization of individual concepts and values could make it challenging for individuals to conceive the sustainable concept, which may further cause the rest of living environment left to gradually disappear. Moreover, in the society today, people often concentrate merely on their own tiny space, so they may fail to detect their fossilized incorrect sustainable concepts, as well as their selfishness and ignorance. Food is indispensable for our lives. Due to modern technology, food can be easily imported than before. Statistics show that approximately 385,000 tons of vegetables, 567,000 tons of fruits, and 1,590,000 tons of potatoes have been imported to Taiwan in 2006 consuming considerable energy [7]; prices wouldn't reflect the real costs for the environment. The supply mode of hypermarkets in Taiwan is traditional and fixed. Regional agricultural products must be transported either to northern, central, or southern distributors, and redistributed to the supermarkets in each region. Such repeated transportation modes do not only increase the pollution caused by the emission of exhaust fumes, but also reduce the quality and the freshness of food.

B. *Difficulty in Implementing Sustainable Actions*

People have sustainable concept in a traditional way. Most consumers do not understand today's highly complex global food system. Much of the food production and processing occurs far away from where they are consumed [3]. However, it has become customary that people buy imported goods from overseas in supermarkets for daily consumption. Even if some people are concerned about the environment, grocery shopping and home cooking do not facilitate a complete platform or service for implementing environmental protection and sustainability.

III. RELATED WORK

A. *Persuasive Technology*

Currently, there have been certain designs that explored the application of persuasive technology to environmental sustainability. For example, the SmartTrip is a small gadget used in mobile devices, which adopts a simple method to combine multiple trips of transfer to a single route. It aims to lessen the conditions in which people may refuse carpool or mass transportation services and thus use cars [8]. GreenScanner is a mobile device that allows shoppers to examine the effect of the goods on the environment in the store [9]. In these systems, computer devices serve as a kind of persuasive tools [10] [11], which are utilized to establish users' expectation by providing information, advice, and simplified operation. These designs may be able to result in immediate responses, yet whether the attitude of environmental protection is rooted in users' minds should depend on whether they have acquired the concept of long-term development. The behaviors and attitudes of changing environmental protection concepts and the approaches used to promote a sustainable culture exactly match the definition of persuasive technology proposed by Fogg [11]. It is broadly defined as a concept of intentionally changing attitudes or behaviors through persuasion and social

influence [11].

Fogg has also proposed a theory of behavioral chain on the use and engagement of online platforms [12]. In this theoretical framework, he claims that users will undergo three stages from the day they first encounter a platform to the day they become familiarized with it. In the first stage, Discovery, users will visit the platform and try to learn how to use it. In the second stage, Superficial Involvement, users will decide to use the platform and keep using it. Coming to the third stage, True Commitment, users will not only use the platform, but also create its value and content, becoming its loyal users. They will further involve others to use. Therefore, here we propose to discuss which approach could arouse users' interest in the platform, establish core concept and value, and make them stay loyal. Aside from this, in order to achieve the best outcome, the persuasive tools embedded in the external environment must provide appropriate but not disturbing persuasive-suggestions at the right time and in the right place [11][13][14]. The aforementioned are the main issues this research intends to explore.

B. *The Psychology of Persuasion*

The six weapons of influence theory proposed by the psychological researcher Robert Cialdini have suggested six approaches of how to influence users' attitudes [15]. In this study, it is pointed out that Reciprocity is one of the most significant behaviors in our interpersonal relationship. In general, an individual has to return the favor others have given to them [16]. Such a norm has not only helped maintain the fairness of the social exchange between two parties, but also has become an approach used to influence others. The other theory concerns how to affect people and make them receive others philosophy. Buss [17] has investigated the environment and strategies that could yield to compliance. They argued that the skills used to make others more compliant have something to do with our understanding of others, our own social status, and the nature of requests. The associated factors include that people are more likely to be compliant, in good moods [18], when reciprocity occurs as shown in the study of Dennis Regan [19] and when we could give them an acceptable reason or cause. With this study, we explore the best method to promote the sustainable concept.

C. *Social Cognitive Theory*

Social Cognitive Theory (SCT) includes the measures used to affect the psychodynamic of healthy behaviors and to accelerate behavioral change. In the social cognitive theory, human behaviors are mainly explained by the interaction and inter-influence among persons, behaviors, and environments [20]. In the social learning and imagination theory proposed by Miller and Dollard [21], it is argued that humans have acquired certain behaviors through observation. By imitating the observed behaviors, the observers would fossilize the acquired behaviors and obtain positive reinforcement [21]. When one's own behavior is rewarded, self motivations and positive feedbacks would then be activated, resulting in the reinforcements of the attitude. Furthermore, Bandura [22] has

suggested that there is an inseparable identification between the observers and the pattern, claiming that learning would be more likely acquired when the observers could also well handle their self-efficacy. We intend to observe the pattern of how the users interact with the others and the external environments. Based on this theory, we explore the application and matching of design approaches.

IV. USER TESTING

A. Approaches

Our major research is on the utilization of the platform, SuperEco, which promotes the concept of low food mile. To conduct our research we first start off by establishing a flow model to define the primary user persona. Then we interview the users through a rapid prototyped wireframe of the proposed platform to fine tune the final system with their feedbacks. Finally, with the implemented prototype of the platform, the users are involved in a series of scenario based user tests identify the influence of the system towards the low food mile concept.

B. Rapid Prototyping

At this phase, we established the flow model in order to identify the network between meal preparation and material purchase, and define efficiency-oriented type of persona as the recruit target of primary user. The participants included seven mid-class housewives who were the deciders of their daily household purchases. Every participant cooks at home, and does grocery shopping once or twice a week. We provided 200 NTD for each interviewed participant as the rewards. We interviewed three participants. We defined task activities, and made the participants proceed the paper prototyping based on the primary project of the wireframe, in order to identify that the if the sustainable concept delivered through the platform is proper or not, and if it is conform the anticipation of the users. In addition, we adjusted the design based on the result of the interviews.



Fig. 3 Recipe of low food-mile ingredients

C. Scenario-based Prototyping

The design of the platform includes two major functional concepts: the platform at home connecting to the low food mile receipt system in the supermarket which provides some suggestions to the housewives that substitutes high mile food

with the low mile food for their meals (Fig 3); and the substantial platform in the supermarket where there are tasters for the low mile food, low mile food recommendation areas and provides housewives with discounts through the accumulation of environmental experiences with the purchase these low mile foods (Fig. 4, 5).

D. Scenario-based Prototyping Testing

The second phase is to integrate design into the primary platform scheme, present the image with computer, and add the scenario instructions so that the users would have the simulated experience of the utilization of the platform. In addition, we also interview the users about their feelings on the different technologies in the content of the platform. We interviewed four participants, and each participant has received the introduction of the platform concept, scenario instruction, and the process of two major task procedures. Researchers briefly described the concepts and gave directions to the participants, allowed the participants to decide the operation steps. In the experiment they can express their feelings about the technologies and elements in the platform. After the task is done, the researcher would re-interview the participants on their overall feelings about the platform.



Fig. 4 Screen showing low food-mile try-out dishes



Fig. 5 Screen showing dynamic map of store and indicating the low food mile ingredient zone

V. RESULTS

A. The Persuasive Method and the Corresponding Results

1) *Increasing users' interests through simplified environment setting:* The persuasive method that is used as a tool is able to form an instant attraction to the participants. E.g. the design of the taste section of low mile food in the supermarket is to reduce the target search and enhance the convenience of the shoppers. As one of the participant indicated that:

...this setting of the low mile food is very attractive, I saw it as the motion map at the first glance, and I can just pass by there, instead of search for the products I want everywhere...

Therefore, to integrate the concept that demands promotion of a certain section, and make the users to know that they can easily obtain certain things in that section, will relatively raise the attraction of learning and tasting.

2) *Instant rewarding feedback enhances users' satisfaction and involvement:* The purchase of low mile food would be rewarded, and the method of discount is effective. Even in the process of scenario-based prototyping testing, the users would not receive the real rewards, however, they all express that all kind of rewards are pleasant. This affirmation would continue the behaviors of the users.

B. The thrust of Reciprocity in the Community

1) *Generating the fulfillment by knowledge and information sharing:* The invented receipt platform at home would grow under the environment co-constructed by the participants. The users are able to make recommendations on the substitute materials, and share their experiences with others. Such interactions would assist users to obtain a sense of fulfillment and improve their motivation to invite other to join this system. One of the participants said:

...I'd like to recommend the substitute materials to others, because this experience makes me feel like an expert, also everyone can share their opinions together...

2) *Encouraging positive attitudes by communal influence:* The ranking system of the supermarket shopping bag is one of the effective methods which give the self-satisfaction to the users. In the shopping area, people who use shopping bags with different rankings, would give the user a more positive attitude, also promoting the ranking (the change of colors of the shopping bag) would make the user feel that their behavior of practice the environmental protection is encouraged. However, too many ranking diversities may undermine the feelings of the users and make them feel that only the highest rank is valuable, and feel others are no differences.

C. The anticipation of the Users

1) *Enhancing users' engagement by integrated experiences:* After the users accept these concepts, they would anticipate education. Therefore, at this time, the rights and wrongs should be identified clearly, so that the users would receive correct information rapidly and properly. For example, in this study, the expression form of high food mile and low food mile are

two very important factors to be considered. The users even address the extended concept as after tasting the low mile foods, as indicated by one of the participants:

...I would like to purchase the demand materials on the ground...

Therefore, it is obvious that once if they are persuaded to participate these activities, they would like to develop other related behaviors. Therefore, how to provide a series of integrated experiences during the process is essential.

VI. DISCUSSION

Through this study, we applied some basic methods of easily achieved behaviors, changes in attitude, and observed the users to see how they accept these methods and how they are affected. However, this study can be only the primary discussion, and provide the designers with basic suggestions to design projects that focus on changing people's attitudes. In addition, the utilization of users may be varied from the anticipation of the designers. In the future, there can be further studies on the practical fields or execution of the activities that closer to the reality.

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