

## Taking a Note from Marketing Research in Sustainable HCI

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Everyday life is full of decisions that often involve choosing between a sustainable choice and an unsustainable choice. For example, consider a typical purchase in a domain with lots of diversity, such as laptops. How do we determine which brand or model is the most sustainable one? And what does “sustainable” even mean here? Is it about the manufacturing process, how to use or consume this product, or how to dispose of it? And how do we allocate percentage of impact to the various factors? Where do I get this information, and if I have it, how might this conflict with my other requirements, my needs and desires? At times, these decisions can be hard, not just because of the difficulty in comparing products on seemingly incomparable scales of properties, but also because the information about these properties might not be accessible or understandable.

Sustainable HCI research has examined different aspects of how people make decisions regarding the purchase or acquisition of goods, and how information and conflicting needs come into play in these decisions. Studies such as those by Jina Huh et al. [1] and by Elaine Huang and Khai Truong [2] highlight HCI’s potential role in supporting sustainable decision making surrounding purchases. James Pierce and Eric Paulos [3] have studied reacquisition practices in order to understand how to provide HCI support. And a particularly in-depth study of consumption practices through the lens of sustainable HCI was conducted by Kristin Hanks et al. [4], in which they presented a model of consumer attitudes toward consumption of electronics, with tailored recommendations about how to encourage sustainable consumer behavior.

It is clear that in order to provide support for sustainable purchasing, sustainable HCI research needs to understand consumers and their purchasing processes. Understanding people and studying practices is not new to HCI. However, we have yet to seize the opportunity to draw insights about purchasing behavior and the buying decision process from a field that has been investigating these processes for several decades: marketing research. Marketing research has borrowed methods from psychology to study consumers and analyze their practices, using the results to inform the design of products and the dissemination of information to maximize the benefits for the interested stakeholders. Marketing research is often dismissed or overlooked in the HCI research due to the perception of it as primarily prescriptive rather than descriptive in regard to the relationship between consumers and products. However, marketing research also focuses heavily on conveying information to consumers to influence their behavior, and as such its goals align to some extent with those of persuasive technology, a major thread of sustainable HCI research. Therefore, we believe that an understanding of and familiarity with models and concepts drawn from the field of marketing research can enrich and inform research in sustainable HCI by putting a new lens on the existing body of research, offering potentially useful tools, and highlighting new or previously overlooked aspects.

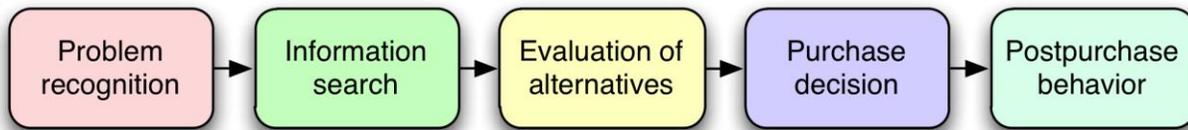


Figure 1: Five Stage Model of the Buying Decision Process (adapted from Kotler [5]).

Marketing research offers a wealth of concepts of potential value for sustainable HCI. As one such example, Kotler's [5] Five Stage Model of the Buying Decision Process (Figure 1) is well-established and has been refined over many years. Focusing on consumer electronics purchases, we apply this model to sustainable HCI and shed light on new opportunities for research and valuable framings for existing and ongoing work in the field.

### Problem Recognition

As a first step before every purchase, there is the initial desire to buy something. Marketing research calls this step *problem recognition*, with the problem being the consumer's lack of a certain product. The purchase intention can be triggered by many factors—basic needs such as hunger or thirst, but also external triggers such as seeing someone else using a certain device or looking at an advertisement. This need for a purchase can also be depicted by two different states: an actual state, which is the current state of the consumer, and an ideal state, which is the desired goal that can be reached by making a purchase.

For consumer electronics, the past has shown that the actual state is in constant elevation. After the purchase of a new device, the ideal state never lowers, but rather becomes the new actual state. This leads to a rapid turnover cycle and subsequently contributes to the *disposable technology paradigm* [2]. The questions that arise here for sustainable HCI research are: How can we design to address the feeling that the actual state lowers over time, while raising the actual state as perceived by the consumer? And additionally, is there an alternative way to get from actual to ideal state other than by replacing entire devices all the time? To some extent, research has tried to answer these questions—replacing parts of devices and upgrading hardware or software might reduce the need to buy a new device, addressing the second question. Answering the first question, however, might be even more promising, as it concerns the more fundamental question of perceived need. To address this, sustainable HCI research needs to further investigate, with the help of marketing research, the underlying question of how attachment to devices is being formed and what would encourage longer use rather than a rapid replacement cycle.

### Information Search

Once the intention to make a purchase has been formed, many consumers actively search for information. Marketing research classifies this information into four different categories: *personal* (recommendations or advice from acquaintances), *commercial* (advertisements, but also information sheets both in retail stores and online), *public* (reviews or news articles), and *experiential* (going to a store or a friend who owns the device and trying it out). Information from these sources is perceived differently. While quantitatively, most information comes from commercial sources, public and personal information is considered to be the most influential; information from these sources is often used to verify and validate information from commercial sources. The increased amount of information that is available, in particular because of the growing body of knowledge on the Internet, does not make the decision easier. To the contrary, more information often makes the choice much harder, leading to more

complexity [6] and choice paralysis. Therefore, simplification of the information search process is an important task for sustainable HCI research. Simply providing new and more information, especially about the environmental impact of a potential purchase, does not help but rather complicates a buying decision. Projects such as SourceMap [7], which make extensive use of information visualization, are just a first step. How can we offer filtering of information and provide consumers with only the information that is directly relevant to their decision? To do this, every consumer must be treated as an individual to learn what specific information she is looking for, to determine which information can be left out and how the remaining important information can be conveyed with maximum readability.

### Evaluation of Alternatives

When buying a product, the consumer has certain expectations about some of the properties and features of said product. The information gathered during the decision-making process is evaluated in light of the consumer's expectations, attitudes, and beliefs. This process can be formalized for the purpose of marketing insights to anticipate or reconstruct a certain decision; however, it can be unpredictable and subject to many factors that are often difficult to quantify, such as a person's beliefs or expectations.

Interfaces and applications for making purchases currently offer consumers the ability to evaluate alternative products under consideration through information specifically geared toward supporting comparison, such as feature charts or star ratings. There has generally been little mainstream inclusion of sustainability information, however. What might it mean to design tools that incorporate sustainability into this evaluation, or beyond that, even make sustainability a central focus of comparison? If issues of sustainability conflict with other consumer priorities, what kinds of support might be offered for allowing consumers to evaluate alternatives by optimizing their priorities? There is a substantial body of work within sustainable HCI on visualizing impact, but questions remain about how to facilitate explicit evaluations of alternatives. Marketing research identifies this evaluation of alternatives as a critical aspect of purchasing, and we believe it is one that warrants exploration in sustainable HCI.

### Purchase Decision

Some consumers do not actively search for information, instead making spontaneous purchase decisions without a preceding phase of information collection. Especially if the initial trigger was a device they saw and liked, their mind might already be made up, and there is no need for information search and evaluation. However, regardless of whether the evaluation phase was skipped, once the consumer has made a choice for a particular device, there are still factors that can influence the decision. A sign in the store, an advertisement on a website, shortage of money, unavailability of the device at the retail store, or last-minute advice from a friend. These factors may trigger change, postpone, or even cancel a purchase.

The takeaway for sustainable HCI research is that information counts until the very last second, and it can indeed be very powerful. That is not to say that this way of conveying information should be the main target in communicating sustainability issues, but it is one that needs more attention. There is already a significant body of research about sustainability information, but how do we make this more accessible to consumers who do not actively search for it? How can sustainable HCI offer support for last-minute decisions, and what does it mean to address consumers at this stage? Looking to marketing research may provide direction to help close the gap between the huge amount of information that is available for long-term decisions and the lack of support for more spontaneous consumers.

## Postpurchase Behavior

After the consumer has bought a product, he might recommend it to other people, or simply by using it spark interest and trigger a purchase desire in someone else, closing the loop. Postpurchase action (how the device is used and maintained) and disposal (how it is disposed of) are also issues of concern at this stage of the model that suggest directions for sustainable HCI research.

Facilitating news dissemination about a sustainable purchase, creating incentives for and guidelines on using a product sustainably, and offering assistance in proper disposal are just some of the options that need further exploration and action in research. Combining these problems with knowledge from marketing research highlights new challenges and leads to questions such as: Can sustainable HCI researchers create support for designers to help them generate more designs that lend themselves to more sustainable use? What does sustainable design even mean regarding the entire life cycle of a product—manufacturing, use, and disposal—and how can such design foster more sustainable behavior for the owners of the products?

## New Avenues for Research

It needs to be noted that this five-stage model is an abstraction of an extremely complex and diverse process. Some consumers might repeat several steps multiple times, while others might just skip to the fourth stage. However, the model depicts an abstraction of a body of knowledge that was acquired over a long period of time studying consumers and their decisions; sustainable HCI can benefit from this knowledge. The model can be applied to the research field to draw conclusions about how to better understand not only consumers' practices and routines, but also their needs and desires. It helps to look at our research field from a new perspective, provoking thought and providing inspiration for new ideas. Sustainable HCI is a relatively young field of research, and as such we believe it can greatly benefit from looking at other fields, learning from their insights, and applying their methods and models. The five-stage model presented here is an example—just one—of a concept drawn from marketing research that can inform sustainable HCI research and point to new directions for research.

## Endnotes:

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