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Abstract

Smart Objects are becoming part of consumers' everyday life. However, several aspects of Smart Object consumption challenge consumers and companies. On the one hand, consumers are exposed to several issues about Smart Objects. On the other hand, companies have to deal with increasing competition in the market. Based on that, understanding why people adopt (and do not adopt) Smart Objects may impact companies. Based on a systematic literature review, this paper gives companies six clusters of adoption factors that can be considered in the design and communication process. Also, a discussion about the challenges of adoption and what happens after it is provided.

Keywords: Smart Objects, Adoption, Consumer Technology, Internet of Things

Introduction and Research Question

We live in an increasingly technological world. Today one of the most significant technological trends is the Internet of Things (IoT), a network made of objects that can collect data about the environment and communicate with other objects or the user. In literature, these devices are named Smart Objects (SOs) and include a wide range of entities: physical devices, an assemblage of devices, but also services and Artificial Intelligence (Novak & Hoffman, 2019). From a corporate point of view, the Internet of Things and SOs can be used to implement and improve management and marketing processes (e.g. Solima et al., 2016; Taylor, Reilly, & Wren, 2020). Smart technologies, however, have not only implications and applications for companies but also for users and their everyday life. There are, indeed, many smart devices designed for consumers, such as wireless wearable devices (e.g. smartwatches and Fitbit devices), smart home devices (e.g. smart light bulbs), smart cars and voice assistants, often implemented in smartphones and smart speakers (Novak & Hoffman, 2019; Onete, Plesea, & Albastroiu, 2017).

Due to the novel characteristics of these technologies and their capacity to have different applications and benefits, SOs are likely to enter our everyday life increasingly. Growing trends in terms of the number of SOs (Amazon, 2020; Statista, 2020; Voicebot.ai, 2019a; Voicebot.ai, 2019b) and market value (Loup Ventures, 2019) support this idea.

Despite these encouraging numbers, the SOs landscape is not immune to challenges. Generally, the consumption of technological products can be exposed to paradoxes (Mick & Fournier, 1998), and, as the social impact of a technology increases, the

same do the ethical problems (Moor, 2005). This can also be the case for IoT and SOs.

Since it acquires data to propose personalized services, probably the most relevant and evident concern about the Internet of Things is privacy (Furey & Blue, 2018). Being so embedded in daily life and in charge of really sensitive data, another big issue deal with security. The vulnerability of devices such as smart cars, smart home objects and medical devices can expose the user to a large and serious range of risks (Onete et al., 2017). Other issues, such as autonomy, the digital divide and unethical companies behaviours, also have not to be underestimated (e.g., van Deursen & Mossberger, 2018).

This puts companies in a delicate position when designing and promoting their products in order to facilitate adoption. Research about the adoption of Smart Objects is rich and full of insights for managers. However, a review that synthesizes all the Smart Objects adoption factors is currently lacking. This research has the purpose of filling this gap and aims at answering the following research question: "Regarding Smart Objects, which are the adoption factors considered by consumers investigated by the literature?"

Methodology

A systematic literature review has been used to answer the research question. In order to select the papers interesting to the purpose of this review, the database Web of Science has been used. The selected keywords had to be connected with Smart Objects and consumption. Were excluded papers that contained keywords connected to the "corporate side" of IoT (e.g. "industrial-IoT"). After reading abstracts and titles and selecting only the articles relevant to the research questions (i.e., papers about adoption), the final sample was made of 52 papers.

Results

Why do people adopt and use SOs?

Several researchers have tried to answer that question with different approaches and focusing on different objects. From the literature six clusters of adoption factors emerge: Utility, Hedonic, Social, Cost, User-side and a residual category. The following section proposes a brief explanation and comments about them.

The Utility category involves all these factors that deal with the devices' useful features and benefits. It involves wide and abstract perceptions, such as perceived usefulness or perceived ease of use (e.g., Abrilahij & Boll, 2019), and more concrete and specific aspects, such as the capacity to help users in their everyday life, in handling their data and their time (e.g., Coskun, Kaner, & Bostan, 2018).

The Hedonic category refers to all the aspects that involve the hedonic experience of the use of the device. It can involve the look and the design of the object (e.g., Canhoto & Arp, 2017), its capacity to influence users' affect, or the use for fun (e.g. asking funny questions or listening to music - Liao, Vitak, Kumar, Zimmer, & Kritikos, 2019). The aesthetic factor seems to be important especially for smartwatches: this is not particularly surprising since the wearable devices can be considered as a part of the outfit, and their aesthetic use can follow the same logic as a normal watch (Juhlin, Zhang, Wang, & Andersson, 2016).

The Social category refers to the involvement of other people in the adoption and usage process. It can be about the direct or indirect influence that other people can have on the consumer (e.g., Abrilahij & Boll, 2019), the entertainment that the SO can bring in social situations (e.g., Pridmore & Mols, 2020) or the symbolic meaning that owning the device has (e.g., status - McLean & Osei-Frimpong, 2019).

The Cost category refers to all the factors that deal with the convenience of the device. These involve the fact that the object can perform better than similar devices (e.g., K. J. Kim & Shin, 2015), or the possible benefits that facilitate the adoption (e.g., Wong & Leung, 2016).

The User category refers to user characteristics. It can be about consumers' personal traits and their orientation toward technology (e.g., Kowalczuk, 2018). It can also be about the control individuals have on the device (e.g., Coskun et al., 2018). Lastly, it can involve the presence of a goal that needs a SO to be achieved. For example, people can adopt wearable devices with the goal of losing some weight (Canhoto & Arp, 2017).

Lastly, the Other category is a residual one that refers to basic but relevant concepts that can positively influence the use and adoption of SOs. These factors are attitude, trust, and protection of privacy.

As this taxonomy shows, adoption in the world of SOs seems to be a complex process with complex mechanisms. Some researchers, for example, have claimed that adoption is not necessarily linked to the device itself: it can be about its network and the smart environment around it (Pridmore & Mols, 2020).

Why do people not adopt and use SOs?

In this sample, the literature is more focused on the "reason for" adoption instead of the "reason against". However, some insights can be extracted anyway. Some factors that negatively affect use and adoption, such as concerns about utility and design (Liao et al., 2019), reflect the «reasons for». On the other hand, other factors, such as privacy and perceived risk (Kowalczuk, 2018; Shuhaiber & Mashal, 2019), intrusiveness (Mani & Chouk, 2017) and identity issues (Coskun et al., 2018) are

more exclusive topics against adoption. These differences support the idea that adoption and resistance are two separate concepts (Kleijnen, Lee, & Wetzels, 2009). Not surprisingly, the concern about privacy has an important role in the SOs context (Chouk & Mani, 2019; Y. Kim, Park, & Choi, 2017; Mani & Chouk, 2019; McLean & Osei-Frimpong, 2019). It is interesting to notice, however, that actual users can learn to negotiate with this concern, adopting different coping strategies (Marakhimov & Joo, 2017; Pridmore & Mols, 2020). Identity also is an interesting topic concerning these technologies. Some activities contribute to users' pleasure, happiness and identity and so, people can be reluctant to be replaced or even helped in these activities by technological devices (Coskun et al., 2018; Leung, Paolacci, & Puntoni, 2018).

Beyond the adoption

Since SOs are innovative products in a constantly evolving technological environment, it is important to understand also what happens after the adoption. Some research, in that sense, focused on sustained use (Canhoto & Arp, 2017), or on the journey of consumption (Cho, Lee, & Lee, 2019). What there is beyond adoption is an interesting and also relevant area, since, after that, some problems may emerge. In the early phases of ownership, people can be engaged in experimenting with the innovative functions of the devices. However, in the medium-long run, enthusiasm and usage can decline (Lopatovska et al., 2019; Pridmore & Mols, 2020; Schweitzer, Belk, Jordan, & Ortner, 2019). For example, a study on Apple Watch users found that more than 25% of users, after 120 days, used the device less or stopped to use it (Lundell & Bates, 2016).

If adoption can be a complex process, what happens next, can be problematic as well. It is not surprising, in that sense, that the literature claims the necessity of a longitudinal or long-term approach in future research (Brill, Munoz, & Miller, 2019; Lee & Choi, 2017; Lopatovska, 2019; Mulcahy, Letheren, McAndrew, Glavas, & Russell-Bennett, 2019).

Discussion

This paper contributes to the literature about Smart Objects by proposing an overview of why people adopt (or do not adopt) Smart Objects. Devices like these have several tensions consumers anticipate and have to deal with (Puntoni, Reczek, Giesler, & Botti, 2021). In this scenario, understanding what aspects emphasize during the design process or communication campaigns can have important implications regarding company performance and Smart Object diffusion. Companies may also choose which aspect to emphasize more based on their positioning and the positioning of their products. For example, suppose a company wants to produce and sell a Smart Object that is aimed at being perceived as competent. In that case, there are several aspects that can be emphasized (e.g., perceived ease of use, or the ability to save time

for the user). Those aspects may be different if the Smart Object is positioned as a hedonic item.

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