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Connecto ergo sum! an exploratory study of the motivations behind the usage of connected objects

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ABSTRACT

The Internet of Things seems about to revolutionize individuals' attitudinal and behavioral patterns and their habits. Increasingly, everyday objects will come with connected features and functions. In this context, it is crucial for companies to study motivations to use connected products and to understand the specific role played by user's connectedness. On the basis of individual interviews with 43 users of various connected objects, this research explores such motivations and proposes a theoretical framework in which desirable attributes, perceived value, and psychological traits play a key role. The results are then discussed from both theoretical and managerial perspectives.

1. Introduction

The Internet of Things (IoT) has spawned a new industry representing the meeting point between the physical and digital worlds, and makes it possible to provide internet services through everyday objects [1]. In this emerging universe, the possibilities for new products are various and adjustable to user's needs. Connected objects are a real revolution, in terms of information management, design, and marketing. Is it not the dream of every individual to possess products that adapt to their moods and desires, in real time? At the 2020 horizon, global IoT revenues are estimated to reach 30 times those of the Internet and to include 25 billion connected objects around the world. The worldwide market in connected objects should become the next trillion dollar communication industry [2].

This market is currently organized around four types of product: (1) connected objects that carry out orders (e.g., connected coffeemakers); (2) connected objects that give access to different types of information (e.g., applications with QR codes); (3) connected objects that collect and analyze data and provide users with reports enabling them to live through their *quantified self* [3], and which can even set them challenges (e.g., connected forks); and (4) smart connected objects that can act without being commanded (e.g., intelligent cars) [4]. Another segmentation of this market, more related to our research objective, is to consider their usage [5]. This segmentation distinguishes between fitted connected objects that can sometimes recognize the user (e.g., connected locks), mobile connected objects (e.g., connected glasses), and m-health objects (ingestible, implantable, or usable in the home). These products are a genuine human revolution, increasingly enabling the real and the virtual to become one, and thus contributing to improve individuals' quality of life [6,7].

The promising possibilities of connected objects make it important for managers to improve their understanding of the transformations that affect behaviors and the opportunities that these can offer. Therefore, the issue that interests, both researchers and practitioners operating in the IoT industry, is the motivations that lead individuals to use connected objects. The main argument of this paper is that IoT devices lead to more connectedness among users. There is a common belief according to which information technologies isolate individuals and cause them to be disconnected [8]. Here, we defend the opposite thesis in the specific case of IoT devices. To support this argument, we conducted an exploratory study to identify the determinants of connectedness, and to model the process underlying this behavior.

We consider connectedness as an important sociological trend, capable of remodeling society and the relationship between individuals, objects, and other people. Very few research studies have been performed on connectedness in the framework of the IoT. This article attempts to address this void in the literature. This paper is structured as follows. After presenting the literature review, we describe the methodology used for our qualitative research and our results, before discussing its theoretical and managerial contributions.

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2. Connectedness: an important sociological trend

Connectedness refers to the degree to which a connected object helps users stay connected with others and create/keep social relationships. It leads to a "subjective awareness of being in close relationship with the social world" [9], p. 338). It can be achieved through a wide scope of technology uses to fulfill different social needs in users' daily lives [10]. It goes along with a feeling of being part of one or several groups and sharing with a multitude of people, some of them being strangers. Connectedness through connected objects allow: (1) strengthening the social link between users and those around them through conversations, content sharing, and multiplayer games [11]; (2) sharing experiences and performance; and (3) meeting and knowing new people using similar connected objects and evolving together in communities. In such communities, IoT users are able to explore and interact with other members' interests and activities. This leads to virtual – and sometimes real-life – relationships as users may identify persons with similar interests and connect with them [12].

Connectedness can lead to a society more according to the idea of networks, involving new forms of relations, and interactions [7]. The network is emerging as a contemporary social space taking the form of a huge number of connections between people and things. This "deterritorialized," dematerialized social space, in which information is the keystone, makes a clean break with traditional spatiotemporal references [13]. Thanks to the ubiquitous character of IoT, connectedness may occur in unexpected places and times, and may take new forms [14].

The IoT brings a deep mutation into users' social reality, as society is considered as a huge network, itself made up of networks (family, interest, and utilitarian networks). It also impacts the political and economic reality. The networks develop outside national borders. Organizations use networks and connectedness to develop commercial and financial signs that structure their commercial, financial, and social activity. Finally, the material and technical reality are changing because Internet, mobile phones, and connected objects have become an integral part of social life [15,16]. Connectedness is now involved in activities as diverse as trade, banking, education, social communication, interaction, leisure, health, security, and retailing [17]. The connectedness experience has several components summarized in Table 1.

Connected objects make everyday life simpler because they can bear the following three dimensions of value: utilitarian, hedonic, and social (see Table 2) as do many of today's mobile systems [28,24,29]. From a utilitarian point of view, connected objects offer a multitude of new services, functions and information, and enabling enhanced interaction with several commercial and non-commercial interlocutors. They can have material uses, human purposes, or therapeutic uses. These utilitarian uses manifest themselves in the rapid, ubiquitous management of semantic, historical and personal data, time management tools, openness toward more knowledge of the world, other people and oneself, applications facilitating shopping, and interactions with businesses and other users [30]. At the hedonic level, connected objects offer "fun" functions [31], with games and entertainment. They are experience-centric products, in which emotions play an increasingly important role [32]. In addition, more and more connected objects are designed to be fun to use and allow immersion into online communities and virtual universes. The hedonic and utilitarian dimensions could be closely interlinked [31]. At the social level, users can connect directly with others using geolocation data allowing instant social networking and socialization. Individuals can also share their experiences and contribute to merge the virtual with the real [26]. Individuals are rarely interested in just one of the three dimensions of connectedness mentioned in Table 2 [33]. They use the multiple possibilities of the connected universe to construct for themselves a dematerialized, disincarnated "extended self," broadening the social field in which they can assert their digital identity (*connecto ergo sum !*[1]) through the sharing, co-construction, and narrative memory that are now available to them [13].

[1] I am connected, therefore I am!

Despite the value brought by connectedness, this phenomenon comes also along with some negative aspects that may undermine the motivation to use connected objects. Research reports situations where technology characteristics, customer characteristics, and context specific perceptions affect connectedness negatively [34]. For example, users may perceive risk and may have concerns about personal data security and privacy violations [35]. Other users may question or misunderstand the perceived usefulness of these devices and express concerns about them. This may imply user's resistance to their use. Resistance may also stem from risks related to perceived absence of transparency, product malfunctioning, losing control over these products, and health dangers because of radiations and harmful waves [36,37]. Schweitzer and den Hende [38] also highlight a certain number psychological effects and frustrations when relying on these objects: disempowerment and negative emotions. Disempowerment is related to the fear of situations, where connected objects supersede the human mind and make users dependent. Negative emotions are linked to situations where users feel fear, bad conscience, or sickness. Finally, an excess of self-control through connected objects may reduce the enjoyment related to connectedness and may affect users' motivation, engagement, and subjective well-being [39].

The next sections explain the methodology and the results of a qualitative research exploring how and why the IoT may contribute to more connectedness among users.

3. Methodology

To study the motivations related to the usage of connected objects and the specific role played by users' connectedness, we adopted an exploratory approach. Such an approach is justified by the relative scarcity of research in this field and by the current low penetration of this type of product [40,41].

We conducted semi-structured interviews with users of connected objects, selected in a way to constitute a diverse sample in terms of age, sex, and profession. To avoid limiting ourselves to the motivations related to the use of a specific connected object, we included respondents interested in a wide range of connected products. All our informants possess computers, smartphones, and tablets. Consequently, these devices do not appear in Table 3. We also ensured that our respondents used these products personally. We present the profile of our interviewees in Table 3. We used a snowball sampling procedure to select our participants. At the same time, we tried to encompass connected objects as varied as possible to collect diverse testimonies on the topic. We continued to collect data until, we reached a theoretical saturation [42].

The aim being to produce rich data, we interviewed 43 users of connected objects. The size of this sample is in line with the standards of qualitative research in that it guarantees the variability of data and thematic saturation [43,44]. The interview guide used by the researchers included the following four topics as summarized in Fig. 1.

During the interviews, we mostly used direct questions. However, projective formulations and narratives were also included. Projective formulations enabled us to reduce the effect of a number of defense mechanisms relating to situations where the usage of connected objects is intimate, taboo, or embarrassing, particularly if the interviewees experienced feelings of addiction or if they did not want to admit their uneasiness with regard to technology. These formulations oriented the discussion toward users of connected objects in general, to avoid defense mechanisms linked to excessively personal uses or opinions [45]. They give rise to general formulations reflecting informants' actual perceptions. For example, to avoid social desirability biases, instead of asking direct questions about respondents' mental blocks and inhibitions to use some connected objects, we asked questions like "Why do some people refuse to use connected objects?". By doing so, respondents are less worried about the image they may give of themselves and will be more at ease to express even their own personal inhibitors.