Chapter 1
An Overview on IoT and Its Impact on Marketing

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ABSTRACT

The internet of things (IoT) is attracting increased attention from researchers, practitioners, consumers, and the media, and it is expected to change dramatically the production and consumption of goods and services, as well as the interaction between organizations and their customers. This chapter explores the challenges of IoT for marketing management. The authors present the main concepts associated to the theme based on the extant literature, considering information management, technological and ethical aspects of its adoption by corporations and consumers, and they discuss the expected impacts on different marketing application domains such as product placement, purchasing behavior, storytelling and communication, customer experience and consumer' brand perception, real-time persona development, and product and content development, among others.

INTRODUCTION

When the web emerged, organizations and people purchased Internet real estate in the form of domain names and built it out with websites. Consumers shopped, and people read the news online, but information applications were typically static and one-way in communication orientation (i.e., provider to consumer). Then web 2.0 gathered steam. Services allowed for dynamic information in a variety of forms and enabled n-way conversations and collaboration. Blogging, liking, tweeting, writing online reviews, sharing videos and photos, and such became commonplace (Kaplan & Haenlein, 2010). With social media, people keep private relatively fewer bits of information and reveal secrets more often. The web

DOI: 10.4018/978-1-5225-5763-0.ch001

3.0 comes with the "focus on ways to make the Web "smarter", with machine-facilitated understanding of information promoting a more intuitive and effective user experience" (Laudon & Laudon, 2016). Nowadays a new wave of Internet-connected technologies is gaining steam: the Internet of Things (IoT). IoT gives rise to several applications at level of augmented reality, wearable technology, chatbots, gamification, transmedia, and so on that impact on smart marketing.

Within the Internet of Things paradigm, many of the objects that surround us will become part of a network in one way or another. Radio Frequency IDentification (RFID) and sensor network technologies will rise to meet this new challenge, in which information and communication systems are invisibly embedded in the environment around us (Gubbi, Buyya, Marusic, & Palaniswami, 2013; Miorandi, Sicari, Pellegrini, & Chlamtac, 2012). Consequently, IoT is attracting increased attention from researchers, practitioners, consumers, and the media, and it is expected to change dramatically the production and consumption of goods and services, as well as the interaction between enterprises and customers. On the one hand, it offers new and innovative ways of seeing products and appliances, imagining them communicating together to improve people's everyday lives. On the other hand, it creates new opportunities for marketing activities and strategies. IoT has just started to invade the technology market but little is known about the adoption of smart connected objects by users (Attié & Meyer-Waarden, 2016). Wireless sensor technologies now allow objects to provide information about their environment, context, and location; 'smart' technologies are touted as being able to allow everyday things to 'think and interact' (Ng & Wakenshaw, 2017). The marketing as a set of processes for creating, communicating, delivering, and exchanging offerings that have value for customers, clients, partners, and society at large (Keefe, 2008) should leverage on these advances to generate more value for the businesses.

Under marketing umbrella, Ng and Wakenshaw (2017) present four conceptualizations of IoT. These conceptualizations are developed from the following theoretical constructs: liquification and density of information resources; digital materiality; assemblage and service systems; and modularity and transaction network. In the IoT, liquification further enhances the capacities of digitized objects. Intelligent sensors could provide precise real-time information about the involved devices and integrate with wireless sensors networks to better track and trace things in real time (Da Xu, He, & Li, 2014). Digital materiality refers to what the software embedded in the physical object can do by manipulating the digital representation of the physical object (Yoo et al., 2012). Assemblage refers to objects/devices working together and in this process, the ability to do things that none of these objects could perform on their own (Hoffman & Novak, 2015). Hoffman and Novak (2015) describe assemblage in consumer IoT as a collection of heterogeneous components that interact with each other. Constituents of IoT can be viewed as modules with capabilities that could converge and diverge to create 'thin crossing points' i.e. a boundary and a transaction between the modules' tasks for both the consumer and the producer, by dividing skills and competencies. Individuals could modularize their practices as tasks for the design of thin crossing points that allow for new resources (e.g. Internet-connected constituents) to be brought in and for new transactions to occur (Ng & Wakenshaw, 2014). Modularization in consumer experiential spaces can therefore lead to ways where latent needs could be discovered and fulfilled through new offerings.

For the IoT vision to successfully emerge, the computing paradigm will need to go beyond traditional mobile computing scenarios that use smart phones and portables and evolve into connecting everyday existing objects and embedding intelligence into our environment. This is what characterize the web 4.0 era, but also the promised web 5.0 - a linked web which communicates with us like we communicate with each other. However, despite the overall positive feeling about the IoT's development, and while the IoT brings considerable benefits when it works, this brings several challenges (De Cremer, Nguyen,