Ubiquitous Computing, Contactless Points, and Distributed Stores

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INTRODUCTION

Nowadays, retailing is subjected to constant changes due to the continuous advancements in technology (Pantano, 2014). In fact, the increasing computing capabilities, the mobile and wireless technologies improvements, as well as the development of flexible software architectures and automatic identification technologies support the ubiquitous access to data for both consumers and firms. As a consequence, these new systems modify the interface between clients and vendor, by providing new consumer-oriented services (Ngo and O'Cass, 2013; Pantano, 2014), as well as the customer behavior and corporate approach to retail process, by changing both the way customers access and consume the information, and the way firms and organizations reach clients and deliver the service (Kim, et al., 2009; Demirkan and Spohrer, 2014).

In this scenario, ubiquitous computing is supporting ubiquitous access to information for consumers and marketers, with emphasis on retail services (Pantano, 2013). It is based on the ubiquitous computing, which can be viewed as an extension of mobile computing characterized by portable accessing technologies (i.e. cameras, Location Based Service, Ubiquitous Sensor Network, etc.), always connected to a network, and linked to web-based multimedia content repositories that adapt the provided contents according to users' data (i.e. location, preferences, etc.) (Lin, et al., 2011). Therefore, these innovations are removing the boundaries of the physical space (Kouroutha-nassis et al., 2007; Bourlakis et al., 2009; Demirkan and Spohrer, 2014; Pantano, 2013; Pantano, 2014), while pushing retailers to redefine the traditional business model and practices. Similarly, a huge number of "contactless technologies" is emerging as the most promising direction for supporting retailing and shopping experience, by providing new modalities for automatic payment and self-checkout (Lai and Chuah, 2010). These are based on proximity sensor that allows payment without entering any pin. For these reasons, the number of contactless transactions is speeding up fast the payment process, increasing the convenience of shopping experience and reducing the queues. In fact, many retailers are soliciting users to adopt this system, such as McDonalds that offers a free drink on any menu purchased via contactless. For instance, MasterCard reports that the 10% of transactions made in Australia under $100 is performed via contactless technologies, while VISA Europe reports more than 1 million of contactless purchases in August 2013 (VISA Europe, 2013).

The aim of this chapter is to provide a comprehensive view of the new retail competitive scenario, starting from the most innovative technologies in retail domain. Subsequently, it sheds

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light on the possible consequences of these radical innovations in terms of store structure, and provides some indications for predicting the trends of the future (technology-enriched) shopping places.

BACKGROUND

As anticipated, the continuous progresses in information and communication technologies (ICT) impact on retail strategy and operations triggering the proliferation of new channels and new modalities through which customers may directly interact with firms. Due to the large amount of technological innovations, the necessity to classify them emerges as the starting point for a deep understanding of the current scenario. In this chapter, we propose a classification based on the functions of these systems for retail purposes as follows: (i) technologies for virtually trying the products, (ii) technologies for automatic product search, (iii) technologies for automatic payments, and (iv) full-service technologies (technologies integrating all these services).

Technologies for Virtually Trying Products

Current advances in 3D graphics and virtual reality tools offer novel and realistic interfaces that can be easily integrated in physical environments for enhancing the sensorial inputs and enriching consumers shopping experience (Bullinger et al., 2010). Augmented reality emerges from the integration of virtual reality, with emphasis on the most advanced graphics, in real contexts by enriching the human sensory perception with multimedia contents and information to the reality. (Papagiannidis et al, 2014). Hence, it includes a real-time view of the physical world enhanced (augmented) with virtual computer generated information, such as digital images or video stream, etc. (Azuma, 1997; Carmigniani et al., 2011).

The integration in retailing offers virtual mirrors, virtual fitting rooms and interacting shopping windows, which customers might experience by virtually trying the products through digital interfaces under the promise to save time while living a more exciting shopping experience (Dey and Sandor, 2014). In this direction, one of the most promising areas of research is the virtual garment try-on experience (or virtual fitting), which allow consumers to try clothes and evaluating the effect without really wearing them (Chen et al., 2011; Pereira et al., 2011; Wang et al., 2012).

Technologies for Automatic Product Search

Technologies included in this category support the search of a certain product throughout the store. They are especially exploited in the large department stores for helping consumers to easily find the favorite item (in terms of exact location including floor, area, etc.) without the direct assistance of a salesperson (Pantano and Timmermans, 2014).

RFID (Radio Frequency IDentification) is one of the first examples of contactless technology, consisting of an enriched version of the barcode. It is the most common technology used to identify and localize objects from a distance (Garfinkel and Rosenberg, 2006). In particular, it consists of a radio frequency transceiver (transmitter and receiver) attached to the item to be identified by a reader device (interrogator device) used to read the information stored on the tag. RFID tags are also used to improve the in-store security, to enhance the rapid checkout of consumers, and to manage the shelf-life of products (i.e. by evaluating in real-time the quantity of a certain product on the shelf).

QR Codes technology has become one of the most-used types of two-dimensional barcode. Developed in the automotive contest, it is currently used in a broader context, including both tracking for logistics purposes and convenience-oriented

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