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The path-to-purchase is paved with digital opportunities: An inventory of shopper-oriented retail technologies

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ABSTRACT

This study focuses on innovative ways to digitally instrument the servicescape in bricks-and-mortar retailing. In the present digital era, technological developments allow for augmenting the shopping experience and capturing moments-of-truth along the shopper's path-to-purchase. This article provides an encompassing inventory of retail technologies resulting from a systematic screening of three secondary data sources, over 2008–2016: (1) the academic marketing literature, (2) retailing related scientific ICT publications, and (3) business practices (e.g., publications from retail labs and R&D departments). An affinity diagram approach allows for clustering the retail technologies from an HCI perspective. Additionally, a categorization of the technologies takes place in terms of the type of shopping value that they offer, and the stage in the path-to-purchase they prevail. This in-depth analysis results in a comprehensive inventory of retail technologies that allows for verifying the suitability of these technologies for targeted in-store shopper marketing objectives (cf. the resulting online faceted-search repository at www.retail-tech.org). The findings indicate that the majority of the inventoried technologies provide cost savings, convenience and utilitarian value, whereas few offer hedonic or symbolic benefits. Moreover, at present the earlier stages of the path-to-purchase appear to be the most instrumented. The article concludes with a research agenda.

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1. Introduction

While online retail sales still represent a minority of the total sales across all channels, their growth rates are exceedingly outperforming those of bricks-and-mortar stores, year after year (US Census Bureau, 2016). The continuing and explosive rise of e-commerce of about 20% on average each year sharply contrasts with the rather stable situation in traditional retailing (Deloitte, 2011). As a result, many researchers devote their attention to online shopping which is hot and 'on', as if bricks-and-mortar shopping is 'off' and on its demise. However, despite the many merits of electronic and mobile commerce, it is unlikely that traditional retail settings will disappear; rather both channels will complement each other in satisfying shopper needs (Zhang et al., 2010) in a seamless integrated shopping experience (Verhoef et al., 2015; Piotrowicz and Cuthbertson, 2014). Nevertheless, a proper strategic response is necessary in order to ensure the survival of offline retailing so it can assume its role in the omni-channel retail landscape (Pantano and Timmermans, 2014).

One of the main drivers of these changes in omni-channel shopping behavior, and consequently also in optimizing shopper marketing tactics, is technology (Shankar et al., 2011). Technology has always played a role as the primary enabler of change in the evolution of retailing (Hopping, 2000). Today, as bricks-and-mortar retailers are preparing for battle with online merchants, there are several areas they can draw upon in order to gain a competitive advantage (IBM, 2012). This article sheds light on the fairly underexplored topic of the promising role of technology for traditional retailers to survive in today's fierce multichannel competition. Indeed, as Bodhani (2012, p. 46) suggests '[…] rather than diminishing the traditional shopping experience, techniques that have been the preserve of the online shop are to some extent now informing the new in-store retail technology'. In this vein, Pantano and Timmermans (2014) introduced the concept of 'smart retailing', referring to the use of technology in retail to improve the quality of shopping experiences. In this smart retailing scenario, technologies are considered as '[…] enablers of innovation and improvements in

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consumers' quality of life' (Pantano and Timmermans, 2014, p. 103). Or how a digital infusion in physical retailing may serve well, switching the old-school retail stores from 'off' back to 'on'.

From barcodes, over in-store kiosks, ATMs, and self-scanning, to virtual fitting rooms, the technological possibilities for retailers to optimize their in-store experience offering are vast and continuously increasing. After providing an appropriate theoretical background for this study (cf. Section 2), this paper's first empirical aim is to compose a multi-disciplinary inventory of shopper-oriented in-store retail technologies, drawing from academic marketing and IT literature as well as from developments in the field (cf. Sections 3 and 4).

However, as Pantano and Timmermans (2014, p. 101) note, 'the idea of smartness goes beyond the concept of application of new technologies'. Since technology in retailing is and should remain a means to an end rather than an end in se, the most important objective of this article is to add to this inventory in terms of how these technologies entail potential for augmenting the shopping experience and eventually also the retailer's bottom line. History has shown that trying to capitalize on technological trends without appropriate business model evolution is a pitfall for many businesses (Sorescu et al., 2011; Rayna and Striukova, 2016). Clearly, 'technology *can* play a role in enhancing the shopping experience' but 'consumers are not interested in technology for its own sake' (Burke, 2002, p. 426–427). This study contributes to elaborating on the conditions when each of these technologies *will* enhance the offline shopping experience, by evaluating (1) what type of consumer value the technology foremost entails, and (2) at what stage of the customer's path-to-purchase the technology is likely to add value. Section 5 offers a summary of this exercise, guided among others by affinity diagram clustering methodology, and supported by inter-rater reliability evaluations. All this information is made available via web Appendix A, as well as via an easily accessible online repository offering *faceted* search, thus allowing for directed search for technologies that are suitable for a given context and set of expectations (cf. www.retail-tech.org). After conducting a deep analysis of the current state of the art of in-store shopper-oriented technologies (cf. Section 6), a research agenda for marketing and IT scholars concludes this paper (cf. Section 7). As such, this paper serves as a catalyst for further empirical research on smart retailing on the one hand, and for promoting retailer awareness and adoption of these technologies at the physical point-of-sale on the other hand.

2. Theoretical background

2.1. Defining the scope of 'retail technologies' in this study

The scope of retail technologies in this study pertains to generic and proprietary technologies that are (1) situated at the point-of-sale and (2) shopper-oriented. First, technology in retail can encompass different environments such as the point-of-sale, online or the supply chain (Renko and Druzijanic, 2014). The focus in this study is on technology at the *point-of-sale*, since a substantial part of the purchase decisions are cue-prompted or unplanned and triggered in the store (Neff, 2008). In particular, this study predominantly examines self-service technologies or technology-mediated customer contact, where '[…] the human customer service representative component of the service encounter is entirely replaced by technology' (Froehle and Roth, 2004, p. 3).

Second, since '[…] retailers increasingly realize the benefits of utilizing the store itself as a means of marketing, i.e., the concept of shopper marketing,' (Ligas and Chaudhuri, 2012, p. 2), the present study concentrates on *shopper-oriented* technologies, or technologies with which the customer directly interacts, rather than on behind-the-scenes (back-end) technologies such as RFID in function of supply chain management (Renko and Druzijanic, 2014). So, the emphasis is on how IT can serve as a pillar of the 'customer intimacy' strategy in retailing (rather than the 'operational excellence' strategy, cf. Efendioglu, 2015). The emphasis lies as such on technologies that rather serve as 'demand-enhancer' than as 'cost-reducer', from the perspective of the retailer (cf. Varadarajan et al., 2010).

Pantano and Viassone (2014) classify the most recent retail technologies in three categories according to their technical characteristics: (1) *touch screen displays/in-store totems* (e.g., ATMs or virtual garment fitting systems enabled by 3D body scanning systems; Choi and Cho, 2012), (2) *mobile applications* (e.g., product comparison apps on the shopper's own mobile phone; Rudolph and Emrich, 2009; Bennett and Savani, 2011), and (3) *hybrid in-store systems* that users can move around with in the store only (e.g., RFID recommendation systems, Wong et al., 2012; intelligent shopping trolleys, Black et al., 2009). Given this paper's focus on in-store shopper marketing, the empirical part (i.e., composing the inventory of retail technologies) centers on Pantano and Viassone's (2014) first and third technology categories. As such, this study discards purely mobile applications that bear no link to the in-store shopping experience, and can thus function on a stand-alone basis. This delineation is in line with Shankar's (2011, p. 33) classification of social and mobile media as being largely 'out-of-store activities'.

Note that both generic and proprietary technologies qualify for potential inclusion in this study's inventory (cf. Varadarajan et al., 2010). Generic technologies are readily available from an information technology (IT) vendor and tend to be more widely adopted by retailers. Investing in those technologies often becomes a 'competitive imperative' for retailers (Varadarajan et al., 2010, p. 105). Think, for example, about the widespread adoption of UPC (Universal Product Code) barcodes in retailing, to uniquely identify and capture data on products and to facilitate the automatic handling of stock keeping and sales transactions. Investing in barcode-related technology should nowadays rather be considered 'a cost of doing business that all competitors must incur in order to be able to effectively compete in the marketplace and not a potential source of competitive advantage for any retailer' (Varadarajan et al., 2010, p. 105).

Contrary to the ubiquity of (many) generic technologies, proprietary technologies are developed by a vendor that is commissioned by a given retailer that as proprietary has the ability to generate economic rents from the innovation for an extended duration of time (Varadarajan et al., 2010). Some examples of proprietary retail technologies are the Nike Fuel Station and the Adiverse Interactive Digital Shopping Walls (i.e., technologies number 173 and 33 in Appendix A). In this paper, we include both generic and proprietary retail technologies, since both can entail opportunities for retailers to differentiate.

While this potential is more directly obvious considering *proprietary* than *generic* technologies, the latter can also enable retailers to achieve a competitive advantage. The condition to succeed in that case is that the retailer should have superior insights into the potential of the technology (relative to its competitors) and/or complementary resources (cf. ad-hoc human capabilities within the organization to *understand*, *adopt* and *support* retail technologies; Varadarajan et al., 2010; Pantano and Timmermans, 2014; Kamprath and Mietzner, 2015).

2.2. Retail technologies and their strategic role for retailers

On an operational level, the use of technologies in retailing is widespread (Newell, 2013; Efendioglu, 2015). Finne and Sivonen (2008) confirm that *cost efficiency* is a priority focus for retailers in implementing technologies. Nevertheless, in the context of retailing the strategic potential of technology is still far from being exploited to its fullest extent. Particularly the *demand-enhancing* possibilities of retail technologies merit further attention of retailers and scholars.

Bricks-and-mortar retailers in particular face an erosion of their sales productivity as they struggle to redefine their role in an omni-channel world. In order to avoid that consumers shift their purchases even more online, they need to find a way to create a differentiating value proposition (IBM, 2012; Rapp et al., 2015; Pantano and Viassone,

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