



Does innovation-orientation lead to retail industry growth? Empirical evidence from patent analysis



Eleonora Pantano^{a,*}, Constantinos-Vasilios Priporas^a, Stefano Sorace^b, Gianpaolo Iazzolino^b

^a Middlesex University, Department of Marketing, Branding & Tourism, London, UK

^b University of Calabria, Italy

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ABSTRACT

Competitiveness and complexity in the retail industry are increasing due to rapid technological changes and diffusion. Patent analysis is largely used in innovation studies to assess and monitor technological changes in different sectors. The aim of this paper is to provide a comprehensive view of the innovative forces affecting the retailing sector, by focusing on the evaluation of innovation levels through the classification and analysis of patented innovations. The findings show that retailers might shift to more innovation-oriented strategies in order to propose innovative consumer solutions, due to the support of the technology advancements highlighted by the strong patent track record. Our study contributes to the literature by providing empirical evidence of critical areas for innovation in retailing and by offering bibliometric and patent analytical methods measures relative to the innovative forces affecting retailing, which might push the sector to be increasingly an innovation-oriented one. Finally, the high level of property rights (defined by the huge amount of patents) pushes retailers to invest more on acquiring patented technologies to achieve advantages over competitors or to adopt novel management practices as substitutes for patents.

1. Introduction

Competitiveness and complexity in the retail industry are largely increasing due to rapid technological changes and diffusion. For example, technology-based innovation can integrate leisure and entertainment into the retail experience while also providing new shopping experiences and enhanced retail services (Arnold and Reynolds, 2003; Demirkan and Spohrer, 2014; Hristov and Reynolds, 2015; Johnson et al., 2015; Poncin and Mimoun, 2014). As a consequence, these innovations challenge the retail industry to find new and efficient solutions to improving the consumer experience and retail management. These innovations can dramatically modify the retail landscape (Hopping, 2000; Pantano, 2016). In fact, demand pull has been largely considered a driver of innovation (Pantano, 2014; Venugopalan and Rai, 2015). However, this increasing technological complexity, in combination with the shorter technology lifecycle, makes decisions about innovating difficult (Han and Shin, 2014).

In recent years, several researchers have tried to investigate the innovative forces affecting the industry, by focusing on the drivers (Pantano, 2014; Tsai et al., 2010), process management (Evanschitzky et al., 2015), and innovation outcomes of the consumer experience

(Demirkan and Spohrer, 2014; Pantano, 2014; Poncin and Mimoun, 2014). Moreover, forecasting the success of future technology plays an important role for marketers in predicting the success of an investment in a certain technology (Altuntas et al., 2015). Similarly, a deep understanding of the innovative forces affecting the sector might provide useful insights for managers for better orienting investments and strategies (Barros, 2015).

However, while these studies provide a clear picture of the factors driving consumers' adoption of innovation in retail settings, they do not empirically support an understanding of retailing as a high innovation or low innovation sector. Similarly, they do not attempt to classify the critical areas of development in the industry. However, some authors (Lee et al., 2011) have highlighted the extent to which the increasing complexity and availability of technological innovation requires companies to monitor technological changes in order to maintain business profitability. Therefore, there is a need for clear measurement tools to enable develop understanding of the innovative forces in retailing and provide scholars and practitioners with new ways to successfully compete in the emerging context.

Other sectors have faced the challenge of evaluating innovation, and have started using patent analysis as a reliable tool for evaluating the

* Correspondence to: Middlesex University, Department of Marketing, Branding & Tourism, Business School, Hendon campus, The Burroughs, London NW4 4BT, UK.
E-mail addresses: e.pantano@mdx.ac.uk (E. Pantano), c.priporas@mdx.ac.uk (C.-V. Priporas), stefanosorace91@gmail.com (S. Sorace), gianpaolo.iazzolino@unical.it (G. Iazzolino).

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level of innovation and the level of technological development within a certain sector (Abraham and Moitra, 2001; Encaoua et al., 2006; Hana and Shin, 2014; Nelson et al., 2014). For instance, they base the analysis on the evaluation of the number of patents and their dynamics over a number of years (Cecere et al., 2014; Hicks et al., 2001).

Despite the benefits, this kind of analysis has not yet been fully exploited by the retail industry. Retailing (offline and online) is one of the most dynamic global economic sectors with total sales of more than \$22 trillion in 2014 and sales are forecasted to reach \$28.3 trillion in 2018 (emarketer.com, 2014). Beginning with patent analysis in the retail industry, the aim of this paper is to provide a clear understanding of the areas (i.e. payment systems, systems for product displays, etc.) that have witnessed the greatest changes.

The contribution of this paper is twofold. First, it attempts to fill a gap in the literature by providing empirical evidence through patent analysis on critical areas for innovation in retailing. To our knowledge this is the first study that uses patent analysis in retailing. Second, it suggests that by using bibliometric and patent analytical methods on the innovative forces affecting retailing, the sector might become progressively innovation-oriented one. Through the proposed analysis, scholars and practitioners can be made more aware of the importance of innovation and of those specific technologies that could offer more opportunities to increase business profits. In particular, retailers could use our insights to prioritize investment in innovation by identifying some key specific areas in order to achieve a competitive advantage.

The paper is organized as follows: the first part is an analysis of current studies which focus on the forms of retailing that have evolved due to new advances in technology, and on the current measures used to evaluate levels of innovation based on patent analysis in several sectors, with an emphasis on the emerging benefits. Secondly, we analyse the patents in retailing so as to discern the most critical areas. Thirdly, we analyse the patent trends in the retail sector and make some comparisons with other sectors. Finally, we discuss the outcomes and provide indications for both scholars and practitioners on how these insights could be used to develop new and more effective management strategies for the retail industry.

2. Theoretical background

2.1. Evolution of retail environments

Past studies have investigated how advances in digital technologies prompted evolutions in retailing, in terms of store layout, service delivery, product search, etc. (Pantano and Timmermans, 2014). In fact, actual retailing is characterized by a huge focus on the development of innovative consumer solutions for creating value for clients based on technological innovation (Maglio and Spohrer, 2013; Pantano and Timmermans, 2014). Thus, there has been a shift from a traditional face-to-face service to a technology-enriched one which can improve the shopping experience and consumer satisfaction (Demirkan and Spohrer, 2014; Pantano, 2016).

In this context, Evans (2011) anticipated the increasing integration of computing in consumer shopping activities through pervasive penetration supported by ubiquitous systems. For instance, Wu and Hisa (2008) identified the main steps in the evolution of stores as I-commerce (internet-based retailing), M-commerce (mobile technologies-based retailing) and U-commerce (ubiquitous computing-based retailing); whereas Williams (2009) identified the basic steps as the creation of: department stores, mail order catalogues, discount stores and e-tailing; and identified the introduction of online channels and e-commerce platforms, and metaverse environments such as Second Life. While other studies proposed the evolution of traditional points of sale towards ubiquitous stores based on a high level of connectivity and extensive usage of mobile devices (Blazquez, 2014; Kourouthanassis et al., 2007; Pantano, 2014). These studies introduce the new concept of an innovative store where boundaries are no longer physical or

temporal but technological, due to how they are integrated with advanced technology. Therefore, they underline how the current trend in retailing is based on the development of innovative technological environments, where a higher integration with technology has an impact on the spatial dimensions of the store. Current studies emphasize the use of mobile and high connectivity technologies for innovation in retailing, while excluding the usage of large fixed technologies to support shopping (Pantano, 2014). In summary, these studies predict the trend in retailing without highlighting the critical areas or the critical technologies that would redefine the concepts of 'stores' and 'shopping experience', while an analysis of the actual patents granted would clearly identify the key digital technologies that could be integrated in the future and act as a driver of this change.

2.2. Patents as measure of innovation

Technological change is an evolutionary process that requires constant monitoring to allow firms to understand the current scenario and react accordingly so as to maintain their competitive advantage (Lee et al., 2011). In recent years there have been an increasing number of studies aimed at investigating the trends within a particular field of technology through the development of new methods and tools that can enable a better understanding of these trends (Choi and Hwang, 2014; Jun, 2014; Lapple et al., 2015; Lee et al., 2011; Venugopalan and Rai, 2015; Yoon and Park, 2004).

The need to develop a measure of the technological changes affecting a specific sector or a geographical area has attracted the attention of a number of academics over the past decades (Archibugi and Pianta, 1996; Basberg 1987; Kim et al., 2015). For instance, several indexes have been applied to measure technological change as a function of patent quantity (Daim et al., 2006). In particular, patents have the ability to reflect inventive activity and innovation, and can be used to analyse the evolution of technology in a certain area (including geographical areas, particular industries, countries, etc.) (Basberg, 1987). Basically, patents consist of a document which includes the "source of technical and commercial knowledge about technical progress and innovative activity" (Park et al., 2005, p. 473), and they are the most used method for protecting firms' inventions (Archibugi and Pianta, 1996). They provide detailed information about the technology, including the technical and market attributes, the criteria for originality, such as technical feasibility and commercial worth, and details about the inventor. (Lee et al., 2011; Park et al., 2005). Patents also cover every field of innovation across different countries and over long periods of time (Park et al., 2005) and are particularly efficient in capturing the proprietary and competitive dimensions of a technological change (Archibugi and Pianta, 1996; Basberg 1987; Jun and Park, 2013; Kim et al., 2015). In fact, patents describe innovation activity at a technological and a country level, and their analysis can provide different insights across technological classes and similar insights across countries (Abraham and Moitra, 2001). Finally, patents are public documents that present information in a standardized way that can be easily accessed through public and commercial databases (Lee et al., 2011; Choi and Hwang, 2014). When considering the technology life cycle curve (TLC), patents can provide insights into the success of a technology in terms of possible future diffusion, patent power, potential investment areas, etc. (Altuntas et al., 2015). In fact, past authors have noticed that patent growth follows a trend similar to s-shaped growth, by considering that an emerging technology (early stage of s-shape) involves a very limited number of patents, while in a fast-growing period involves a huge number of patents (Daim et al., 2006).

Therefore, patent analysis is able to monitor technological change, because it (i) defines the economic indicators which synthesize the link between technological development and economic growth, (ii) estimates technological flows and their subsequent impact on productivity, (iii) evaluates the competitiveness of firms while comparing innovative performances in national and international contexts, and as well

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