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A bibliometric review of the innovation adoption literature

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ABSTRACT

Innovation adoption is of utmost importance for company survival. That is why it is important to develop a thorough understanding of this research domain and the themes it encapsulates. Since the early work of Everett Rogers, the adoption of innovation literature has attracted considerable attention and has continued to grow rapidly, resulting in a large but fragmented body of literature. The goal of this study is to provide a coherent overview of the theoretical cornerstones as well as recent research trends in the innovation adoption literature. To this end, we conducted a bibliometric review and performed bibliographic coupling and co-citation analysis. First, based on co-citation analysis, we illustrate that innovation adoption research is built on four theoretical cornerstones including: institutional theory; theory of reasoned action; theory concerning the determinants of adoption, and; diffusion theory. Second, bibliographic coupling was used to assess the current research trends. This review is the first to identify thematic areas in an exhaustive manner revealing five clusters of thematic related publications or “research trends”: determinants of IT adoption; adoption of technological standards; organizational rationales associated with adoption; modelling diffusion, and; adoption of agricultural innovations. We conclude this review with the limitations and future research orientations in the field of innovation adoption.

1. Introduction

Many scientific publications in the field of innovation research start from the premise that innovation contributes to a firm's competitive advantage and is considered a necessity for firm survival.

Adoption-diffusion literature can be traced to the work of Gabriel Tarde, a French sociologist, who introduced the *Laws of Imitation* at the beginning of the 1900s (Tarde, 1903). However, not until Everett Rogers (1962) introduced the *Diffusion of Innovations Theory (DOI)* did adoption and diffusion research gain widespread recognition. Rogers conceptualized innovation adoption as a communication process whereby adoption reflects a pattern of information flow about an innovation. We start from the semantic work of Rogers (2003) to assess the innovation adoption literature.

A number of arguments speak for the theoretical and practical relevance of producing a review on the adoption of innovation. First, the innovation adoption literature has continued to grow rapidly since these early works which resulted in a large but also fragmented body of literature (Fagerberg and Verspagen, 2007; Gupta et al., 2007; Keupp et al., 2012). Second, as have been addressed by Gupta et al. (2007) and Keupp et al. (2012), innovation literature is organized in specific

domains. While adoption research entered a wide variety of sectors within the economy (Rogers, 2003), the understanding of innovation adoption has grown considerably building on theoretical insights from innovation, organizational and behavioural centred theories. It has been suggested that a “schools of thought” approach might be a prominent path bringing together existing knowledge and theories (Furrer et al., 2008). Third, as have been emphasized in previous reviews (Keupp et al., 2012; Tidd, 2001), innovation research in the past decades has failed to deliver clear and consistent findings, coherent advice to managers, and convincing “best practice” solutions so far.

The aim of this article is to present a bibliometric review of the innovation adoption literature. In particular, we aim to 1) identify the theoretical foundations of innovation adoption, 2) pinpoint current themes in adoption of innovation research, and 3) identify avenues for future research. By helping innovation adoption scholars to understand better the key cornerstones of this field of research, the direction in which it is developing and by pointing to potential research gaps, our study is intended to provide a guideline for scholars in positioning their future research efforts. Therefore, we focused on two questions. First, what are the key theoretical cornerstones of innovation adoption research? Second, what are the current research trends within the field of

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innovation adoption? The first research question involves a classification of scientific articles which revealed four theoretical cornerstones including: A) Institutional Theory and the legitimization of innovative behaviour; B) Theory of Reasoned Action and the Technology Acceptance Model; C) The determinants of innovation adoption through an econometric perspective; and D) Diffusion Theory. For the second research question we assessed the same cited references and identified five trending research directions including: 1) Drivers and impediments of information technology adoption; 2) The adoption of technology standards; 3) Organizational rationales associated with innovation adoption; 4) Modelling the diffusion process; and 5) Adoption of agricultural innovations.

The most recent influential innovation adoption review dates from the 2003 review by Greenhalgh et al. (2004). Since then, novel bibliometric methods have been developed to review the literature. Bibliometric studies have already shown their usefulness in a broad array of management research, including innovation (Kovacs et al., 2015a; Marzi et al., 2017). Bibliometric reviews differ from highly cited reviews in this field (Feder et al., 1985; Geroski, 2000; Legris et al., 2003; Tornatzky and Klein, 1982; Van Eck and Waltman, 2010), on the aspects data, analysis and coverage (Furrer et al., 2008). A key benefit of bibliometric methods is their ability to help reduce reviewers' subjectivity and bias, which are inherent to conventional qualitative reviews (Vogel and Güttel, 2013). In contrast to respected and highly cited reviews in the field, our bibliographic study of the innovation adoption field is based on quantitative data rather than qualitative interpretations which tend to reflect the subjective views of the authors (Furrer et al., 2008; Marzi et al., 2017; Van Eck and Waltman, 2010). This article presents a bibliometric review of the innovation adoption research over the period 2003–2016.

In combining two techniques, co-citation analysis and bibliographic coupling, we visualize the network of publications on innovation adoption and arrive at distinct clusters of thematically related publications. This quantitative review allowed us to create a more systematic and encompassing picture of the adoption innovation research agenda, especially in terms of theoretical foundations and avenues for future research.

This article is structured in the following way. In the section that follows, Section 2, we discuss the method we applied to this review and present the articles included. In Section 3, the theoretical cornerstones of innovation adoption research are discussed; in Section 4, we consider recent debates on innovation adoption research. Section 5 discusses the key findings of this review and elaborates about the potential paths for future research.

2. Data and methods

2.1. Data

For our two bibliometric analyses, we follow the four-step procedure as outlined by Kovacs et al. (2015b). First, we developed a search query for the Web of Science (WoS) database (–Core Collection). We included articles using the terms: “innovation [and] adoption”. We restricted our search to articles published between 2003 and 2016. We chose this time span because our preliminary analysis of the available review articles and meta-analysis studies indicated that the most influential literature reviews were at least three years old (see Table 1). A preliminary search resulted in the identification of approximately 6800 articles. To further narrow down our search, only articles from the WoS Research Area “Business Economics” were included in the review, since our primary interest is in the mechanisms that affect innovation adoption from an innovation economics viewpoint. In-depth analysis of this refinement revealed that top innovation journals and the most cited articles were not excluded from the review (see Fig. 2). Moreover, many of the articles that were excluded by this refinement addressed the status quo of a certain kind of “development” – describing them as

innovative is questionable – without contributing to the development of innovation adoption theory itself. As a result, application of these selection criteria resulted in 3713 articles that could be reviewed in greater depth.

Second, to ensure that each article in this study was relevant to the adoption-innovation domain, the abstract, key words, and introductory section were manually evaluated by the authors. This allowed us to exclude false positives, i.e. articles that include the terms “innovation” and “adoption” in the title, abstract, or keywords but are unrelated to the domain under study (see, for example, (Keizer and Halman, 2009)). We did not remove articles that were indirectly related to the innovation adoption debate, e.g. articles that focus on implementation and assimilation of innovations. These articles could well enrich the review and in case they are irrelevant to the domain under study they appear in the periphery of the visual map created with the Vos Viewer software. Applying the aforementioned selection criteria resulted in a set of 1260 articles (with 45,932 references) to be included in the bibliometric review. For each of the 1260 articles, an output file (tab-delimited) was generated from the WoS database. The cited references are relevant for this bibliographic review and formed the raw input for the VOS Viewer software. The full list of references can be found in appendix A.

Third, we analysed the WoS data of the remaining 1260 articles using the VOS Viewer software. Two types of output were generated: a co-citation analysis of cited references and bibliographic coupling of the 1260 articles identified. The VOS Viewer identified 1260 articles suitable for bibliographic coupling, that together have 45,932 cited references of which 155 have a minimum of 20 citations. Figs. 1 and 2 present descriptive statistics of this dataset.

During the fourth and final step, we interpreted the results of the co-citation analyses and the bibliometric coupling. To interpret and label the theoretical orientations of each cluster, all articles were downloaded from the Web of Science database and all books were accessed via the university library. The co-citation analysis of cited references was used to derive the theoretical cornerstones of innovation adoption research (Clusters A, B, C, and D). The output of the bibliographic coupling analysis allowed us to define the thematic clusters (Clusters 1, 2, 3, 4 and 5). Clusters A-D encompass a limited number of articles; therefore, the assessment of these clusters was relatively straightforward. However, each cluster, 1 to 5, holds up to 300 articles, making interpretation and labelling a less straightforward process. Therefore, for each cluster, the fifteen most cited articles were identified. However, since these articles could be situated on the periphery of a specific cluster, the 15 articles that are most closely related to each other were identified based on a cluster's density plot. The density view corresponds with the label view (Fig. 6) with the difference that the labels are now expressed by a colour scheme. The colour scheme (blue-green-red) depends on the density of items at that point, i.e. the colour at a certain point is calculated by the number of items in the vicinity of that point as well as on the importance of the neighbouring items (Van Eck and Waltman, 2010). The authors independently labelled the clusters after which the results were discussed to find an agreed label for each cluster. The theoretical cornerstones and current research trends identified will be discussed in Sections 3 and 4 respectively.

The validity of any bibliometric review depends in part on the selection of publications that form the input of the analyses. Although the journals included in WoS Core Collection meet the highest standards regarding impact factor and number of citations (Falagas et al., 2008; Marzi et al., 2017), we decided to further evaluate the robustness of our bibliometric review by using the Scopus database. This allowed us to verify if we omitted relevant studies that could have affected our core findings.¹ Our search queries in the WoS and Scopus database resulted

¹ The EBSCO Academic Search Complete database deemed not suitable for this purpose as it excludes relevant innovation journals and includes grey literature that we did not want include in our analyses. Furthermore this database did not permit us to limit our

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