

Mapping Business Model Research: A Document Bibliometric Analysis

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Abstract

Today, the business model (BM) is one of the most studied concepts within managerial and innovation literature. Although scholars have shown a growing interest in understanding and analysing the BM, a theoretical conceptualization is still lacking. This paper provides a systematic review of the current state of BM research by mapping the research landscape to identify key research publications, journals that had relevance in developing the BM literature, and the main areas of research. Using the ISI Web of Knowledge “core collection”, this study conducts a document bibliometric analysis of 3,604 publications in the fields of management and business that were published between 1985 and 2017. The use of quantitative methods allowed us to overcome the shortcomings of the past subjective literature reviews. We clustered the selected articles on the basis of two distinct perspectives. First, we identified the founders of the discipline, creating a map of co-cited articles (co-citation analysis); this enabled us to identify five major research clusters, formed on the basis of similar co-citations, that characterize the historical evolution of the BM studies. Second, throughout the bibliographic coupling analysis, which

aggregates articles sharing a similar bibliography, we captured the main emergent research sub-fields of the most recent BM literature.

Keywords: Business model; business model innovation; co-citation analysis; bibliographic coupling analysis; cluster analysis.

1. INTRODUCTION

In the last two decades, many scholars have addressed the business model (BM) concept and analysed it from different points of view. During the 1990s, with the birth of the dot-com era, scholars started to study how the digital revolution was leading change in the ways of conducting transactions and doing business (Timmers, 1998; Tapscott et al., 2000; Rappa, 2001). In this early phase, the approach was more descriptive than analytic; in fact, these studies simply listed the new BMs that were using the Internet for their transactions.

During this period, the literature on the BM was strictly connected to the advent of e-business, as many new, young ventures began developing Internet-based offers (Mahadevan, 2000) and scholars simply defined and classified different BMs by using different methods (Timmers, 1998; Kaplan and Sawhney, 2000; Tapscott et al., 2000; Alt and Zimmermann, 2001; Applegate, 2001; Bartelt and Lamersdorf, 2001; Petrovic et al., 2001; Rappa, 2001).

Since the beginning of the 2000s the BM concept has been studied and analysed in depth, leading to its growing popularity among researchers and practitioners. After 2005, the number of annually published articles reached almost 100 units. Despite the popularity of the concept, a common understanding is still lacking because it is open to a variety of definitions, fields of study, and interpretations. According to Zott et al. (2011), the BM can be considered as a new unit of analysis distinct from the product, the firm, the industry, or the network, and it is centred on the logic with which resources and transactions are organized by the focal firm in its networks. Moreover, following the contribution of Baden-Fuller and Morgan (2010), we will look at the BM as a “model” that can be copied or replicated, even if it is often associated with the name of a firm to describe a specific business. In the words of Teece (2010), “A business model articulates the logic, the data and other evidence that support a value proposition for the customer, and a

viable structure of revenues and costs for the enterprise delivering that value” (p. 179). Following Fielt’s (2013) examination of a large body of the literature, we considered another conclusive conceptualization asserting that “a business model describes the value logic of an organization in terms of how it creates and captures customer value and can be concisely represented by an interrelated set of elements that address the customer, value proposition, organizational architecture, and economic dimensions” (p.99).

Specifically, in this paper, the goal is to understand through the use of a bibliometric approach the BM literature’s theoretical perspectives that have been indirectly incorporated in the various BM definitions, the BM’s current state of the art, and the future directions of the BM. Despite several other published literature reviews of BM literature, such as Mahadevan (2000), Magretta (2002), Al-Debei and Avison (2010), Zott et al. (2011), Fielt (2013), Markides (2015), Taran et al. (2016), Wirtz et al., (2016a) Foss and Saebi (2017), Wirtz and Daiser (2018), and Nielsen et al., (2018), as far as we know, this particular approach has not been used before. Our scientometrics analysis (Mingers & Leydesdorff, 2015), developed on citations and methodologies of filtering articles, is realized through an automatic selection of articles and citations (by using keywords, in titles, keywords, and abstracts), excluding a subjective manipulation by the individual researcher. Our work has involved approximately 3,600 articles (including the analysis of the related bibliographies, which correspond to approximately 88,000 references) published between 1985 and 2017. In comparison with other approaches, a bibliometric analysis appears to be more objective and less influenced by theoretical and interpretative bias. Clearly, this approach loses detail and presents substantially only a macro view on the evolution of the literature on the BM theme. Therefore, we correct this limit through a careful scrutiny of the more cited articles, exploring the content of the most relevant articles (in terms of connections) identified in the various clusters elaborated by the software.

This study advances the BM research domain in multiple ways. First, by using a bibliometric analysis, we contribute to a better understanding of the BM’s current state by identifying the key publications and their common background, highlighted by the analysis of citations. Second, we use a cluster analysis to identify the founders of the discipline, creating a segmented map (divided in five different clusters) of co-cited articles (co-citation analysis), enabling us to underline the historical emergence of different perspectives in the BM studies (antecedent theoretical roots, methodological

approaches, early theoretical founders, the core of the BM literature, and the influence of the BM approach within the marketing literature). Third, by using the bibliographic coupling analysis, which aggregates articles with a similar bibliography, we are able to point out the main emergent BM sub-fields of research, ordered by time of publication (digitalization, high-tech environments, business model innovation (BMI), green and social innovation, open innovation, entrepreneurship, and servitization).

Our work is structured as follows. The next section describes the methods used to analyse our data. The following section reports the main findings in terms of both a general description of the articles analysed (and the related bibliography) and a visualization of the entire map of the co-citation and bibliographic coupling analysis. Then, we discuss the main results. Finally, the last section draws conclusions and indicates the limitations and implications for future research.

2. METHODOLOGY

Search strategy

The choice of the documents' database is one of the most important steps in performing a reliable bibliographic analysis. Thomson Reuter's ISI Web of Science (WoS) has long been considered the "gold standard" for bibliographic analysis, in measuring scholars' performance and is used in many international rankings of universities (Harzing and Alakangas, 2016). More recently, other databases such as Elsevier's Scopus and Google Scholar (GS) have been increasing in popularity. Elsevier's Scopus, entered the marketplace in 2004, is now a well-known alternative to WoS. Thus, the adoption of these two databases does not need further justification (Harzing and Alakangas, 2016). Another important player in the citation field is GS, a freely available tool, that indexes "peer-reviewed papers, theses, books, abstracts and articles, from academic publishers, professional societies, preprint repositories, universities and other scholarly organization" (Levine-Clark and Gil, 2008). Overall, the conclusion of most of the studies comparing WoS, Scopus, and GS is that GS provides broader coverage for most disciplines and that the WoS and Scopus provide qualitatively similar results (Vieira and Gomes, 2009; Mingers and Lipitakis, 2010; Amara and Landry, 2012; Roales-Nieto and O'Neill, 2012; Wildgaard, 2015; Harzing and Alakangas, 2016). GS, however, is not without its critics. In particular, Jacsó 2010 has documented serious doubts about the level of accuracy of its citation counts, because GS also covers non-scholarly

sources, and the inability of GS to recognize real matches between cited matches and citing items. In the light of these results, WoS still represents the most influential, relevant, and credible journals set by examining, according a “publisher-neutral” approach, basic publishing standards, timeliness, editorial scope and objectives, and finally results in the most used source for bibliographic analysis (among others, see Di Stefano et al., 2010; Appio et al., 2014; Fetscherin and Heinrich, 2015; Fiala and Tutoky, 2017; Gurzki and Woisetschläger, 2017).

WoS provides access to current and retrospective multidisciplinary information from more than 10,400 of the most prestigious, high-impact research journals in the world in the sciences, social sciences, and arts and humanities fields, with a coverage that goes back to the year 1900 for sciences, to 1956 for social sciences, and to 1975 for arts and humanities.

In order to ensure the quality of the sample of the publications, we downloaded articles from the “Core Collection” covering the period 1985 to 2017. Moreover, WoS has been used across a wide range of scientometrics studies and the main software of bibliometric analysis is set up for it (among others, see Di Stefano et al., 2010; Appio et al., 2014; Fetscherin and Heinrich, 2015; Fiala and Tutoky, 2017; Gurzki and Woisetschläger, 2017).

The year 1985 was chosen for the following reason. As Osterwalder et al. (2005) show in detecting the origins of the BM discussion, by using the Abrahamson method (Abrahamson and Fairchild, 1999), the term BM became prominent during the 1990s. In order to be sure to include in our analysis all the scientific works concerning this topic, we decided to enlarge our temporal window, and to use as a starting point the year 1985, which corresponds to the period covered by the database for the managerial disciplines. We have used as keywords “business model*” in the topic (abstract and keywords) or title. Since the term “business model” is used by a variety of disciplines, we have delimited our research to the fields of management and business.

Our attention given to publications within the BM domain from 1985 to 2017 leads to a final sample of 3,604 records (2,549 in the management field, 2,394 in the business field, and 1,339 in both the management and business fields) from 6,669 authors that were published in 1,146 sources/journals, with 88,021 cited references and 8,594 retrieved keywords. The publications in the cited references used for the co-citation analysis are not limited to the time period from 1985 to 2017 but can be from any date for

the publication year. The sample is limited to all available documents in English that comply with the criteria above.

Method of analysis

We have analysed this corpus of scientific knowledge by using bibliometric tools. Bibliometric analysis refers to a set of methods used to quantitatively analyse academic literature. Bibliometric techniques introduce objective measures of evaluation of scientific publications that contrast the potential bias embedded in subjective evaluation (Appio et al., 2014). By using the bibliometric technique, it is possible to create a map of science in a specific field or discipline. In the scientific literature, the map of science can facilitate the understanding of the past and current state of the art, considered by Holton (2000) as the first requirement of a good history of science, and facilitate the understanding of conceptual relationships (Small, 1999). Moreover, it can bring the researcher to new discoveries (Swanson, 1987). The most common methods are: (1) Direct citations: paper A directly cites paper B; (2) co-citation analysis: papers A and B are both cited by a third paper C; and (3) Bibliographic coupling: papers A and B cite simultaneously a third paper C. These three methods describe all the possible relationships between documents. As demonstrated by several scholars (Jarneving, 2005, 2007a, b; Sandström, 2009; Boyack and Klavans, 2010), of the three, pure citation-based approaches mentioned, bibliographic coupling slightly outperforms co-citation analysis in accurately representing the research front, while direct citation is the least accurate mapping approach. Thus, in this study, we use co-citation and bibliographic coupling analysis because these are the main and more accurate bibliographic techniques to quantitatively assess the relatedness between the subject matter of two documents.

Co-citation is a measure of how often two or more papers are cited together, while bibliographic coupling is determined by the number of cited references that two or more papers share in their bibliographies (Garfield, 1988). In particular, two documents are co-cited when they are jointly cited in one or more subsequently published documents. Thus, in co-citation, earlier documents become linked because they are later cited together; in bibliographic coupling, later documents become linked because they cite the same earlier documents (Smith, 1981).

Co-citation analysis is useful to identify the existence of clusters of documents. It provides a map of the intellectual structure of a discipline, showing significant clustering of topically related authors (White and Griffith, 1981). The cluster of co-cited documents is considered to represent the knowledge base of the speciality – the key concepts, methods, or experiments that researchers build on (Small, 1999). It is widely used to identify the seminal works in a certain stream of research.

Co-citation analysis has been adopted as standard since the 1970s, but recently there has been an increasing use of bibliographic coupling that is challenging the historical preference for co-citation analysis.

As suggested by several authors (e.g., Boyack and Klavans, 2010; Vogel and Güttel, 2013) the bibliographic coupling technique is more appropriate to study emergent literature fields and current research topics, and it enhances result accuracy.

In conclusion, co-citation is retrospective whereas bibliographic coupling is essentially a forward-looking perspective.

Clustering and data representation

The bibliographic method has its own roots in the social network analysis that, since the 1930s, has been used to understand the characteristics and relationships of social structures. Social network analysis represents an application of the “graph theory”, used to model pairwise relationships between individual entities. In our bibliometric analysis, a node represents a single paper and the lines are the number of co-citations or the number of couplings between papers, depending on the relationships that we want to analyse.

The common procedure for bibliometric analysis is: (1) to select a set of papers; (2) to estimate similarities between pairs of papers/documents using bibliographic coupling or co-citation counts; and (3) to allocate papers to clusters using similarity measures (Boyack and Klavans, 2010).

The entire sample is analysed by using two types of software: Bibexcel (Persson et al., 2009) and VOSviewer (Van Eck and Waltman, 2010). Both softwares are freely available computer programs that are developed for constructing and viewing bibliometric maps. Bibexcel is used to organize and clean the

data and VOSviewer is used to analyse bibliometric networks and to cluster documents (Appio et al., 2014).

Bibliographic coupling and co-citation maps and clusters are generated through the VOSviewer mapping and clustering technique. VOS stands for visualization of similarities. VOSviewer uses a new mapping technique that can be an alternative to the well-known Multidimensional Scaling (MDS) technique (Van Eck and Waltman, 2010; Waltman et al., 2010). VOSviewer performs a distance-based mapping method called association strength. Distance-based maps are maps in which the distance between two items reflects the strength of the relationship between the items. A smaller distance generally indicates a stronger relationship (Van Eck et al., 2010). According to Van Eck and Waltman (2010), using the association strength (normalizing co-occurrence frequencies), the similarity s_{ij} between two items i and j is calculated as:

$$s_{ij} = \frac{c_{ij}}{w_i w_j}$$

where c_{ij} denotes the number of co-occurrences of items i and j , and w_i and w_j denote either the total number of occurrences of items i and j or the total number of co-occurrences of these items. It can be seen that the similarity between items i and j calculated using this formula is proportional to the ratio between the observed number of co-occurrences of items i and j , and the expected number of co-occurrences of items i and j , under the assumption that occurrences of items i and j are statistically independent. We refer to Van Eck and Waltman (2009) for an extensive discussion of the advantages of the association strength over other similarity measures, such as the cosine and the Jaccard index.

Then, VOSviewer determines the locations of items in a map by minimizing a weighted sum of the squared distances between all pairs of items.

Finally, clusters of related documents can be identified in the map, and these clusters can be linked to scientific fields. Clusters that are located close to each other in the map indicate closely related fields. For additional information about the mapping and clustering techniques, we refer to Van Eck et al. (2010) and Waltman et al. (2010).

3. RESULTS

Descriptive analysis of the sample

Since the 2000s, the growth of the number of publications related to the BM topic has been exponential, with peaks in the years 2015, 2016 and 2017 (see Figure 1); these peaks were likely triggered by growing interest from business, firms' management and academia in BM research and by an increase in publication opportunities due to a wider research community.

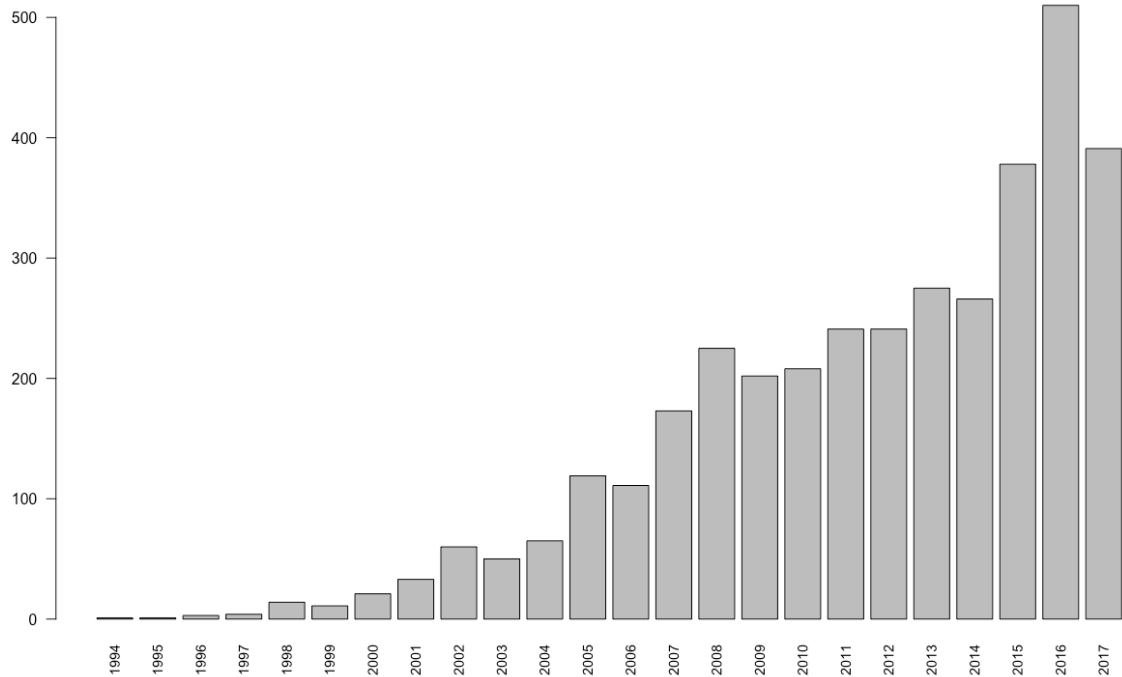


Figure 1: Number of publications per year

Table 1 shows a snapshot of the top 10 journals displayed by the number of papers published concerning the BM concept and by the diversity of fields that have taken an interest in the BM. We chose the first 10 journals to focus on the set of the most prolific journals related to the topic of BM. This analysis shows that general management journals, such as the *Harvard Business Review* (92 articles), the *Journal of Business Research* (46), the *MIT Sloan Management Review* (36) and the *California Management Review* (35), comprise the most significant group in terms of number of publications, underlining that the BM is a comprehensive concept. However, in this context, we can observe also the importance of other journals focused on innovation, technology management, and strategy (*Technological Forecasting and Social Change* (50), *Long Range Planning* (49), *Research Technology Management* (46), *R&D Management* (37) and *Technovation* (34)). Finally, BM literature is interconnected with a marketing

sub-field (*Industrial Marketing Management* (49)). In this context, it is interesting to observe that since 2013, a monothematic journal has been created, namely, the *Journal of Business Models*, which even if it is not yet represented in our ISI WEB collection, includes numerous research works written by researchers and practitioners. The journal analysis confirms the relative low heterogeneity of the studies, showing that they are able to embrace complementary communities of scientists, whereas the leading journals mostly cover the managerial, strategic, and innovation-related aspects of the BM concept. This underlines the interdisciplinary nature of the concept, which ranges from organizational science, strategy, and technology (Wirtz et al., 2016a).

-----insert Table 1: List of the top-10 Journals by number of articles published about the BM concept (1985-2015)-----

Citations are frequently used as a proxy of the works' influence in the specific research field. Table 2 lists the most influential BM papers by the average number of citations received per year.

The most cited study is Teece's (2010) research on "Business Models, Business Strategy and Innovation" (109.11 citations per year), in which he claims that the essence of a BM is in defining the manner by which the enterprise delivers value to customers, entices customers to pay for value, and converts those payments into profit. All businesses either explicitly or implicitly employ a particular business model. A business model describes the design or architecture of the value creation, delivery and capture mechanisms employed. The essence of a business model is that it crystallizes customer needs and their ability to pay, defining the manner by which the business enterprise responds to and delivers value to customers. Put differently, a business model reflects the management's hypothesis about what customers want, how they want it, what they will pay for it, and how an enterprise can organize to best meet customer needs and can be paid well for doing so. The business environment itself is a choice variable: firms can select a business environment or be selected by it; they can also shape it. The purpose of this article is to define what a BM is, to understand the importance of BMs and to investigate the BM connections with business strategy, innovation management, and economic theory.

The second most cited paper is Zott et al.'s (2011) article on "The Business Model: Recent Developments and Future Research" (74.38 citations per year), which proposes a broad and multifaceted

review of the analysed literature on BMs. Their review reveals that researchers do not completely agree on the definition of a BM and that the literature has been developing within separate silos (e-business, strategic issues, and innovation and technology management), but they found emerging common themes: (a) the BM is a new unit of analysis centred on a focal firm, but its boundaries are wider than those of the firm; (b) BMs emphasize a holistic approach to explaining how firms “do business”; (c) the activities of the focal firm and its partners play an important role in the conceptualizations of BMs; and (d) BMs seek to explain both how value is created and how value is captured. The Internet appears the principal driver of the surge of interest in business models and of the consequent emergence of a literature that revolves around the topic (Ghaziani & Ventresca, 2005; Magretta, 2002; Yip, 2004).

The third most cited paper is Amit and Zott’s (2001) article on “Value creation in e-business” (65.33 citations per year), which connects the BM concept to the e-business concept, as through the intense use of the Web, both established companies and new ones exploit the opportunities related to the Internet. E-business enables new ways of conducting transactions, leading to the creation of value through novelties (Schumpeterian innovations), efficiency, complementarities and lock-ins (avoiding switching).

Chesbrough’s (2010) paper entitled “Business model innovation: opportunities and barriers” (58.78 citations per year) reflects on how companies commercialize new ideas and technologies through their BMs and explores the barriers to business model innovation (BMI). While companies may have extensive investments and processes for exploring new ideas and technologies, they often have little if any ability to innovate the business models through which these inputs will pass. The same idea or technology taken to market through two different business models will yield two different economic outcomes. Therefore, companies must develop new business models that bring new technologies and innovations to the market via the selling of technology or that create new start-ups. Chesbrough’s (2010) reference for the description of the BM and BMI is Osterwalder’s (2004) study and his 9 empirical elements that characterize a business model: value proposition, partner network, client segment, client relationships, key activities, key resources, distribution channels, revenue flows, and cost structure.

Chesbrough and Rosenbloom’s (2002) work entitled “The role of the business model in capturing value from innovation: evidence from Xerox Corporation's technology spin-off companies” (52.94 citations per year) explores a similar topic, showing how the Xerox Corporation’s spin-offs used different

BMs to commercialize and distribute the technology developed within Xerox PARC. The functions of a BM follow the Osterwalder (2004) model (value proposition, value created by the technology, the identification of the market segment, the revenue generation mechanism, the structure of the value chain, the complementary assets needed, the cost structure, the potential profit linked to the offering, the position of the firm within the value network, the linkage of suppliers and customers, and the competitive strategy by which the innovating firm will gain and hold an advantage over its rivals).

Among the most cited works, another article appears, namely, Zott and Amit's (2010) "Business Model Design: An Activity System Perspective" (46.56 citations per year), which focused on the conceptualization of a firm's BM as a system of interdependent activities. In their work, they define the BM as the structure and governance of transactions designed to create value through the exploitation of business opportunities. Their definition of a BM as an activity system is near to the Afuah and Tucci's (2000) BM conceptualization: a system that is made up of components, linkages between the components, and dynamics; in short, a system identifying what activities should be performed, how they should be performed, and by whom.

Casadesus-Masanell and Ricart's (2010) "From Strategy to Business Models and onto Tactics" (35.44 citations per year) deepens the differences between the concepts of strategy and BM. The adoption of a BM is the result of a strategic choice. Thus, for the authors, BMs are reflections of the realized strategy. Similar to strategy, tactics are also plans of action. Tactics are courses of action that take place within the bounds drawn by the firm's BM. An outside observer looking at the firms' outcomes will only be able to observe the realized strategy (BM) but not the entire strategy.

Morris et al.'s (2005) "The entrepreneur's business model: towards a unified perspective" (35.07 citations per year) proposes for the characterization of BMs a six-component framework, which, again, resembles the definitions proposed in the previously cited literature. A BM can be viewed as follows: factors related to offerings, market factors, type of organization, sources of competences, positioning, operating leverage, and growth models. Their model follows an entrepreneurial perspective and is less linked to the BM analysis related to customer interactions via Information and Communication Technology (ICT) adoption. In fact, "A business model is a concise representation of how an interrelated set of decision variables in the areas of venture strategy, architecture, and economics are addressed to

create sustainable competitive advantage in defined markets” (727). For Morris et al. (2005), for the firm, six questions underline the BM: How can we create value? For whom will the value be created? What is our source of competence? How do we competitively position ourselves? How do we make money? What is our income model?

Zott and Amit's (2008) article “The fit between product market strategy and business model: Implications for firm performance” (31.91 citations per year), through a formal model, examines the contingent effects of a new product market strategy and BM choices on firm performance, contrasting efficiency and innovation models.

The last article individuated here is Magretta’s (2002) contribution entitled “Why business models matter” (20.88 citations per year), which discusses the importance of a “good” BM to create a successful organization, regardless of whether the organization is a new venture or an established player. His approach is very narrative. For him, the BM is a way to tell a good story.

This group of articles represents the pillars of the BM literature and an unavoidable milestone for the authors working on BM definitions and classifications.

----insertTable 2: List of the top-10 articles by number of citations -----

The Co-Citation Network Analysis

As previously discussed, the use of co-citations—two publications that are cited together by another paper, both appearing in the paper’s list of cited references (Chen, 2006)—can support our understanding of the key concepts, methods, or the current “state of the art” of a specific discipline. As a search for co-citations looks for the co-occurrences within the publication references of a sample of papers related to BMs, it is also possible that documents not directly connected to the BM concept can be identified and clustered. This method has a backward-looking approach and is widely used to identify the seminal works in a certain stream of research. The degree of relatedness of the co-cited papers is measured by using the association strength of co-citations.

To analyse the key publications, research clusters, and the intellectual base, this study uses a document co-citation analysis of 88,021 valid references, starting from our sample of 3,604 documents that have been cited by the BM publications in this sample.

Due to the high number of references related to the BM concept, in order to improve the interpretability of the network and to focus on the key publications, to obtain a final sample of 271 valid references, we set thresholds to include only papers with at least 20 citations. Twenty citations represent a fair citation count threshold in light of the maturity of this topic and also represent a fair balance between the reduction of information due to a too high threshold; a rapid loss of significance in the cluster analysis is due to thresholds lower than 20.

The analysis of the co-citation network reveals structural properties of both the network and the clusters. At the structural network level, the key network measures are density and modularity. Density values how well linked a network is. The network has a density of 0.608, which indicates that the network is highly dense, with very strong connections among the documents. Determined by using an algorithm for community detection, the modularity index measures how well the network can be clustered into groups (Waltman and van Eck, 2013). Within the network, the analysis identifies five main clusters: the modularity value is relatively low at 0.22, which reflects the strong connections among all the documents in the network and confirms the existence of a wide overlapping among the five clusters.

Using the betweenness centrality measure, we are able to identify pivotal publications in the co-citation network. Betweenness centrality measures the number of shortest paths that pass through that node. Thus, a high betweenness centrality indicates that the documents were cited together with publications from different research clusters and represent gatekeeper/bridge research nodes (Chen, 2005). A high betweenness centrality could also capture an intellectual turning point in the topic (Seyedghorban et al., 2016).

Representing a pivotal publication for the BM topic, the publication of Chesbrough and Rosenbloom (2002) has the highest betweenness centrality, with a hub score of 1. Chesbrough and Rosenbloom (2002) looked at the BM as a way to capture value from the early stage of the introduction of new technology. Their paper connects several sub-fields of research from business development, corporate strategy, and innovation, to technology management. The originality of their work is related to

their explanation of how a technological innovation can be exploited in different ways, demonstrating the capability of the BM to unlock latent values from a specific technology. This applied logic constrains all subsequent searches for new, alternative models for other technologies. Their article represents a bridging topic for all others research papers included in the five clusters.

The 2010 study by Teece has the second highest centrality score (betweenness centrality of 0.99). It explores the BM connections with business strategy, innovation management, and economic theory and is often co-cited with publications from a diverse range of clusters. The paper by Amit and Zott (2001) has the third highest centrality score (betweenness centrality of 0.98) and develops an integrated framework to capture the value creation potential of e-businesses on consumer value.

For the documents in each cluster, Table 3 reports their association strength, their label, and the clusters' description including their size and average publication year. Co-citation is defined as the frequency with which two documents are cited together. The co-citation frequency of two scientific papers can be determined by comparing the lists of cited documents in the Science Citation Index and counting identical entries. To be strongly co-cited, a large number of authors must cite together the two earlier works. Therefore, co-citation is a relationship that is established by the citing authors with the co-cited. Frequently, co-cited papers represent the key concepts, methods, or theoretical frameworks that can be used to map out in great detail the relationships between key ideas.

In the following, the five different clusters are presented, and a qualitative evaluation of the cluster content is provided. To trace the development of the BM research field, the clusters are presented in chronological order based on the average publication year of the documents of the cluster members (see Table 3).

Co-citation Cluster 1: BM Antecedent Theoretical Roots

Cluster 1 is composed of the oldest articles included in the BM bibliographical literature selected (the average year of publications is 1992). In this cluster, the co-cited authors do not represent the intellectual “founding fathers” of the discipline but the common intellectual background that was applied by the first authors interested in developing the BM approach. Ingrained in the “resources-based view” (subsequently integrated in the more holistic “dynamic capability” approach and in the highlighting of the firms’

absorptive capacity related to learning and innovation), in the Porterian “competitive advantages” theory, and, later on, in the open innovation models, the original roots of the 1990s discovery of the innovative firms’ strategies are found. Barney (1991), Teece (2007), Chesbrough (2006), Porter (1980), Wernerfelt (1984), Cohen and Levinthal (1990), and Penrose (1959) are the cardinal points of the literature that develops the heuristic logic that connects the BM concept with value creation. Moreover, following the seminal works of March, Nelson, Winter, Christensen, Kogut, and Tushman on the foundation of dynamic capabilities, we also find the enterprise-level analysis conducted to determine the distinct skills, routines, and reconfiguring capacities that firms deploy, replicate, and imitate. This cluster is anchored on a line of research that results in being more evolutionary than that subjectively described by other cited papers presented in the BM literature (such as Chesbrough and Rosenbloom’s (2002) study that links the origin of the BM concept to the structural analysis of Chandler (1962)).

Co-citation Cluster 2: BM Methodological Approaches

Cluster 2 allows us to appreciate the role played by the use of empirical research strategies and methodologies based on “theory building from case studies”, multiple case studies, and conceptual cases. This cluster refers to qualitative methodological approaches used to create theoretical constructs, propositions, and theory validation. Grounded theory is applied as a tool for theorization and new explorations. The main authors included in this cluster are Glaser and Strauss (1967), Eisenhardt (1989), Eisenhardt and Graebner (2007), Yin (1994), Miles et al. (1994), Siggelkow (2002), Strauss and Corbin (1997). This literature relates mainly to the early 2000s.

Co-citation Cluster 3: BM Theoretical Founders

Cluster 3 collects works that refer to the same period of Cluster 2 but represent the initial development of a more specific BM literature. The leitmotif of the papers in this cluster is the value creation through e-business, open technological platforms, the Internet, and electronic markets (Timmers, 1998; Afuah and Tucci, 2000; Amit and Zott, 2001; Magretta, 2002; Afuah, 2004; Morris et al., 2005). ICT pushed the creation of new virtual organizational models or BMs with specific structures, content, and governance. The fragmentation of the global value chain is the key point. Some new firms only deal with the activity

of e-distribution, while others have to completely re-organize their traditional business and their supply value chain, integrating only specific production phases with new offerings based on different pricing strategies, such as the new emerging BM of low-cost air carriers. In this initial development of the literature, the focus relies on the application of new ICTs and new technologies. As demonstrated by Chesbrough and Rosenbloom (2002), ICT companies, escaping the paradigm of closed innovation, have been able to create and capture value from spin-off firms or from using innovations produced by others (e.g., Xerox PARC). In particular, in this context, Chesbrough and Rosenbloom (2002) looked at the BM as a way to capture value from the early stages of new technology introduction. E-business enables new ways of conducting transactions, leading to the creation of new ways of value appropriation (i.e., the new Xerox printers could be rented, not just purchased). During 1990s, new models or typologies of BMs started to be described in detail. Timmers (1998) addresses the topic of the BM by providing a general framework for the classification of Internet e-commerce BMs.

In BM studies, four “value configurations” were introduced: the value chain, the platform technology related to e-commerce, the value network, and servitization (Afuah and Tucci, 2000). Offshoring practices and new logistics methods were good examples of new opportunities connected to the reformulation of the firms’ value chains. The widespread use of the World Wide Web has allowed a strategic de-verticalization of the firms’ activities and disintermediation, such as that provided by the site Amazon.com created in 1995. Specifically, as a retailer company, Amazon could bypass both wholesalers and distributors, buying directly from the publishers and obtaining an enormous competitive advantage over traditional bookshops. Examples of value network businesses (Timmers, 1998) were created in many sectors, such as in the tourism industry, where online travel agents, connecting clients, airlines companies, and hotels in a single platform, emerged with a disruptive impact (not to mention Uber, Airbnb, etc.). The concepts of connectivity, scalability, linkages, and evolutionary dynamics are developed in a vast majority of empirical cases considered by the literature. They are mainly exploratory (finding structures) rather than confirmatory (hypotheses testing).

Co-citation Cluster 5: The influence on the marketing literature

BM studies have deeply influenced the marketing literature, pushing towards a deep rethinking of the entire marketing function. The creation of value starting from customer needs has become the focal point of all the firms' actions.

Cluster 5 highlights this analytical path with the important works of Oliva and Kallenberg (2003), Vargo and Lusch (2004, 2008), Nenonen and Storbacka (2010) and Mason and Spring (2011), showing the high impact of the concept of BM on marketing studies.

The locus of value creation is no longer perceived as remaining within the firms' boundaries but is co-created among various actors within the firms' networks and consumers. Value is fully realized only when a good or service is consumed. Thus, marketing science must shift from proposing standardized and uniform strategies to advocating interactive one-to-one practices and servitization (Vandermerwe and Rada, 1988; Kindström, 2010). The important contribution of the BM literature is that companies must develop their ability to build novel relationships with customers, within a value constellation, where the intangibles and services play a fundamental role. Moreover, all manufacturing firms must offer a dynamic "service portfolio" that is adaptive to changing customer needs, moving from the supply of a pure manufacturing product to a "product cum service" that can encompass maintenance, control servicing, monitoring, and consulting (Normann and Ramirez, 1993).

Co-citation Cluster 4: The full development of BM literature

Cluster 5 is organized around the most recent co-cited articles. The authors grouped in Cluster 5 can be considered the most important contributors to the BM's contemporary analysis, which explicitly links BM design, strategy, and innovation. They represent a nascent knowledge community because they are not only widely cited individually but also often "co-cited" in the same articles, revealing the kernel of an alive influential community, which interacts and exchanges ideas (Markides and Charitou, 2004; Baden-Fuller and Morgan, 2010; Casadesus-Masanell and Ricart, 2010; Chesbrough, 2006; Teece, 2010; Zott and Amit, 2010; Zott et al., 2011; McGrath and Gourlay, 2013).

First, the most important lesson that we may extract from their writings is that the BM can be described through the design of the activities organized by the focal firm, that is, looking at the whole architectural design, value creation, and delivery and capture mechanisms employed. Companies use the

BM explicitly or implicitly as a tool to understand the “deep truths” through which the enterprise delivers value to their customers, entices customers to pay for value, and converts those payments into profit.

Second, following Casadesus-Masanell and Ricart (2010), and Chesbrough (2010), we acknowledge that globalization, deregulation, and technological change are profoundly changing the competitive game and stimulating the emergence of new BMs in this new competitive arena. The fastest growing firms are those that have innovated their BMs to be able to compete “differently”. The challenge is to take advantage of the “permanent disequilibrium” through experimenting, changing, refining, and re-inventing the BM (Demil and Lecocq, 2010).

Third, the BM becomes the locus for managerial experiments to modify traditional models or to completely innovate new businesses (Baden-Fuller and Morgan, 2010). The innovation in the BM does not always give the expected positive result. Through the example of the Naturhouse case study, Sosna et al. (2010) show how the “best” BM is the result of a trial and error learning process that takes place at all levels—individual, group, and organizational—and that through both exploitation and exploration processes, modifies and adapts the original BM to a better fit.

Fourth, Zott and Amit (2007), Zott et al. (2011), and Johnson et al. (2008) have highlighted the impact of organizational innovation on the design of new BMs (for instance, new services that are added to existing technology, such as the iTunes stores for the iPod), shifting the focus from the product to the customers’ needs.

Fifth, thanks to continuous innovation, multiple BM and new strategies can be pursued together and simultaneously. In the past, firms were controlling their value chains; today, these value chains are located in multiple revenue streams. By applying the BM concept, a company can pursue more than just two different BMs and strategies—low cost or differentiation (Markides and Charitou, 2004).

Sixth, the works of Chesbrough and Rosenbloom (2002), Mansfield and Fourie, (2004), Seddon et al. (2004), Comes and Berniker (2008) and Baden-Fuller and Haefliger (2013), help us to arrive at a final conceptualization of the main elements of a BM by considering (a) customer identification, (b) customer engagement, (c) network linkages, (d) organizational design, and (e) costs and monetization. Taken together, all these elements encompass the classical strategy illustrated by Porter (1980) of being focused within the same “value chain” alternatively on costs or on product differentiation. The new lesson learned

is that, instead, firms must create new “product architectures” involving local and external suppliers, distributors, institutions, and customers.

-----insert Table 3: Overview of co-citation clusters -----

Bibliographic Coupling Network Analysis

Unlike the co-citation analysis, bibliographic coupling adopts a forward-looking perspective, as it looks at recent and emergent trends in the literature (new research areas) and topics selected by authors who share the same bibliography. In bibliographic coupling, documents become linked because they cite the same publications. In coupling, we do not look at the papers cited but explore the emerging sub-fields of the literature. To analyse the key publications and the bundling of articles into distinguished clusters, this study uses a document bibliographic analysis of 3,604 documents that have been cited by the BM publications included in this sample.

Due to the high number of documents related to the BM concept, in order to improve the interpretability of the network and to focus on key publications, we set thresholds to include only papers with at least 20 citations, finally obtaining a sample of 368 valid publications. As in the case of co-citation analysis, 20 citations represent the right balance between the information reduction due to a too high threshold and a rapid decrease in the modularity index for thresholds lower than 20.

Table 4 shows the documents in each cluster along with their coupling association strength, their label and the clusters’ description including their size and the documents’ average year. The network has a density of 0.23, which indicates that the network is relatively dense. Determined through the use of an algorithm for community detection, the modularity index measures how well the network can be clustered into groups (Waltman and van Eck, 2013). Within the network, the analysis identified 15 clusters: the modularity value is relatively low at 0.23, which reflects, as also found in the co-citation analysis, a strong linkage among all the documents in the network, confirming once again the existence of a certain degree of overlapping.

We found 15 clusters from the bibliographic coupling analysis, but we consider only seven of them because the remaining eight were very small and peripheral. The topics of the seven clusters are as

follows: BM and digitalization; BM in high-tech environments; BMI and BM evolution; BMs and social innovation; BM and open innovation; BM, new firms start-ups, and entrepreneurship; and BM in services.

The clusters are presented in chronological order based on the average publication year of the documents and refer to the cluster members (see Table 4).

Coupling Cluster 1: The BM in the era of digitalization

Cluster 1 is the oldest cluster that our analysis has highlighted and contains 66 articles. Cluster 1 identifies research publications dealing with the development of BMs in the digital era. The use of ICT is perceived as the fundamental key to create new BMs or to innovate them. In this context, BMs use new technologies to create new devices or services, addressing new consumers' needs. Papers sharing a similar bibliography (with the highest coupling association strength) are those papers written by the founders of the literature and associated with numerous new articles written by "followers". In the first positions, we find Amit and Zott (2001) and Teece (2010) together with the new entry of Hulland et al. (2007), and Fichman et al. (2014). The latter two are a reflection on early investments in online channels and on digital innovations in firms. They are more accurate and less abstract, representing a kind of "operationalization" of the first founder's contribution. These articles are the most theoretical that have been inserted in the cluster (how to create a profitable value proposition, how to invest in capabilities, how to develop new digital innovations in products and processes, and how to adopt ICT tools and networking). The remaining contributions deal with a very wide research field that, in turn, can be segmented into eight main areas: digital innovation (10 articles), e-commerce (9 articles), b2b (6 articles), supply chain organization (5 articles), new digitalization of music (5 articles), open source (3 articles), collective biddings (3 articles), and pricing (3 articles). Various approaches are used, derived from operational science, management of information systems, and business. Two subgroups deserve a special focus.

Digital innovation

Among this subgroup, we would like to mention the important paper of Gruber and Henkel (2006). It studies a case of open source software (Linux), where traditional forms of intellectual property rights are not applied: new start-ups benefit from access to an open community. Active participation in this open

innovation process gives firms visibility towards potential customers and builds a technical reputation. The profit model is based on the activity of private consultancy for which new starts-up are paid.

E-commerce

The e-commerce modality is the most influential radical breakthrough innovation introduced in the distribution sector during the 1990s. Bremser and Chung (2005) present a very original discussion, building a general framework for the analysis of the performance of e-business activities. Their highly cited paper has been published in the *Journal of Electronic Commerce Research and Applications* but has also reached a vast audience in management studies. E-business commerce can be identified by two categories, namely, partial and pure e-business. Their article shows that there is a visible trend of traditional businesses to “migrate” to partial e-business, where both online and offline retailing modalities are present. When describing the BM, metrics for 11 key implementation issues were identified: the sources of value creation; time lapse; the type of discrete and continuous measures; sensor technologies; adaptive control models for feedback from customers and suppliers; the use of strategic indicators for evaluating the relevance of the BM; integration of indicators for accurate predictions; the selection of the most reliable measures; risk control measures; privacy; and legal issues.

Coupling Cluster 2: BM in high-tech environments including new firms and spin-offs

New ventures and spin-offs considered through the lens of a BM perspective comprise the main topic discussed in Cluster 2, which contains 28 articles. New ventures and spin-offs experience great difficulty in defining a viable BM (Andries and Debackere, 2006, 2007). Studies inserted in Cluster 2 follow an evolutionary approach (Garnsey et al., 2008; Doganova and Eyquem-Renault, 2009). Considering the commercialization of technology, several different BMs are considered, which alternatively use the following: patent protection, complementary assets, tools for the reduction of commercial uncertainty, and continuous learning—Dahlander and Magnusson (2008), Pries and Guild (2011) and Landry et al. (2013)).

Coupling Cluster 3: Business Model Innovation (BMI)

Cluster 3 contains 41 articles concerning experiments to modify the firms' strategies. The review articles are among the most cited (Priem et al., 2013). As depicted in the articles in this cluster, BMI requires high corporate level investments (such as the Apple investments in the iPod and iTunes or the new organization of fast design in Zara) or new firm alliances (such as in the case of Nokia and Google). BMI also requires critical "complementors" (the "super-jumbo" Airbus A380 needed a new airport infrastructure).

Specific modalities are underlined: a pay-as-you-use modality (Desyllas and Sako, 2013); latecomer firms focusing on low pricing (Wu and Zuo, 2010); the evolving firms' capabilities (Baden-Fuller and Morgan, 2010); trial-and-error learning (Sosna et al., 2010; Aspara et al., 2013); products' re-engineering (Björkdahl, 2009); and e-commerce bookselling (Raff, 2000). Interestingly, the potential of BMI to push both de-verticalization and re-verticalization is discussed (Christensen et al., 2002; Obloj et al., 2010; Bock et al., 2012; Sabatier et al., 2012).

In BMI, firms can develop more than just one BM (Markides, 2013), as demonstrated by the creation of Go by British Airways, imitating the success of Ryanair. Incumbents can be capable of integrating novel and old knowledge into BMI (Bergek et al., 2013; Jacobides et al., 2012).

Coupling Cluster 4: BMs and Eco-social innovation

Cluster 4 pertains to an "eco-social innovation" research area that includes quite recent articles with an average publication year of 2008. Cluster 4 contains 66 articles and two main paths.

Ecological BMs

Ecological new BMs highlight two aspects: the "reduction of harm done"—with the changing of product portfolios and processes in order to tackle waste management, eco-efficiency, energy saving, reducing emissions, recycling, and eco design—and the application of a radical novelty (Sanchez and Ricart, 2010). In the latter case, innovations tend to be radical and systemic. Firms investigate the entire life cycles of products, their origins, their use of sustainable raw materials, their consumption, and the end of their useful life. Firms are also integrating corporate social responsibility (CSR) into their annual reports (Adams et al., 2016; Adner, 2012).

This literature presents benchmarked examples (Nike, which has created its “Considered Apparel Index” to score the environmental attributes of its products (Adams et al., 2012, 2016), has also entered into a strategic partnership with NASA, USAID, and the US State Department to promote changing solutions in the use of water, energy, and healthier materials). In 2010, Puma the German sportswear company, upgraded its web interface to enable designers and suppliers to evaluate carbon emissions, freshwater usage, and pollution and waste.

Social innovation-driven BMs

Many articles in Cluster 4 discuss the importance of including in innovation four billion potential consumers located in poor areas of the world: the “base of the pyramid”. Multinational enterprises (MNEs) are asked to make changes in their international strategy (Halme et al., 2012). Ricart et al. (2004), Sanchez and Ricart (2010), Yunus et al. (2010) and Hall and Wagner (2012), lead this research path, representing the reference authors of a vast emergent literature. Among the articles with the highest coupling association strength is the work of Muhammad Yunus, (the founder of the Grameen Bank in Bangladesh), who launched microcredit for poor women, established a successful bank, and developed a new yogurt (in an alliance with Danone), rich in proteins and vitamins (Yunus et al., 2010; Prahalad, 2012). Another key idea in this cluster is the concept of frugal innovations (Chesbrough et al., 2006a and b; Rivera-Santos and Rufin, 2010; Yunus et al., 2010; Prahalad, 2012; Santos, 2012; Wu and Pagell, 2011) and Zeschky et al., 2011) that meet the needs of revenue-constrained consumers in urban or rural locations (Rivera-Santos et al., 2012; Kolk et al., 2014; Phillips et al., 2015).

Coupling Cluster 5: BMs and open innovation

In Cluster 5, there are a total of 38 articles for which the average publication year is 2009 and in which the “open innovation” concept is explored (Saebi and Foss, 2015; Chesbrough, 2006; Chesbrough, 2010); Grönlund et al., 2010; Djelassi and Decoopman, 2013).

By analysing the case study of Procter and Gamble, Grönlund et al. (2010) show how the company used new ideas derived from a large number of external inventors, increasing R&D productivity and simultaneously benefited from the use of innovations created outside the company. BMI can also stem from crowdsourcing operations (Djelassi and Decoopman, 2013), from active users (Hienerth et al.,

2011), and from the involvement of competitors (Bengtsson and Kock, 2014; Ritala et al., 2014) and business partners (Basole, 2009; Kodama, 2007; 2009; Valkokari et al., 2012). In the field of high tech, collaboration and coordination often lead to technological innovation, in which there is a high level of technological uncertainty (Basole, 2009).

Coupling Cluster 6: BM and Entrepreneurship

The 47 documents grouped in Cluster 6 represent the fusion of the existing BM literature with the topic of entrepreneurship. As argued by Demil et al. (2015), the BM explains the logic of the firm, the way it operates, and how it creates and captures value for its stakeholders. These authors reconnect strategy with entrepreneurship, suggesting a more central place for the entrepreneurial decisions (Zott et al., 2011). Bucherer et al. (2012) and Carayannis et al. (2015) focus on new types of BMs in which design and sustainability are dominant. In the context of the technology-based firm, Trimi and Berbegal-Mirabent (2012) and Da Silva and Trkman (2014) illustrate the emergence of new BMs focused on lean organizations. Cavalcante et al. (2011), George and Bock (2011) and Brettel et al. (2012) deepen the BMI aspects, examining efficiency vs. novelty and creation vs. revision.

Coupling Cluster 7: BM in services

In this cluster, there are 28 articles that focus on services. Containing novel articles, this group highlights the last emerging trend in BM research: the creation of BMs in services. This shows the shift of interest in the literature from manufacturing to services and the transition from selling products to selling solutions (Mason and Spring, 2011).

According to Storbacka and Nenonen (2011), the literature discusses different types of BM reconfigurations: “partnering” (Anderson and Narus, 1991), “from selling products to selling solutions” (Davies et al., 2007), “moving downstream in the value chain” (Wise and Baumgartner, 1999), and “transitioning from products to services” (Oliva and Kallenberg, 2003). All these changes require firms to be engaged in processes where they “negotiate” resources and capability in their relationship with customers to create an appropriate configurational fit. These configurations are perpetually dynamic, as new actors enter the context. Known as ‘servitization’, a term coined by Vandermerwe and Rada (1988),

this trend delineates the tendency of manufacturing firms to offer bundles of different combinations of goods and services (Kindström, 2010; Kastalli and Van Looy, 2013). In this context, project-based organizations have experimented with interesting new, viable BMs (Kujala et al., 2010, 2011; Wikström et al., 2010; Ferreira et al., 2013; Storbacka et al., 2013).

-----insert Table 4 here-----

4. DISCUSSION

The originality of our article is related to the methodology utilized—scientometrics. By investigating 3,604 articles extracted by automatic searching for keywords in the title, keywords, and abstract, we have been able to represent the entire field of research through looking at the following: 1) the most cited articles, 2) whole references (approximately 88,000 entries), as indicated by the 3,604 scrutinized authors' papers, that enabled us, through use of the tool considering co-cited papers, to indicate the clustered articles' centrality, and to group the BM literature, and 3) the various sub-themes that were indicated by the analysis of the most recent areas of research (based on the common literature indicated by authors grouped within the similarity of their references in the most significant clusters). In contrast to the backward methodology used in the process of individuating the BM historical “founders”, a forward methodology was used in the analysis and identification of contemporary/future areas of research. Both methodologies are widely used in bibliometric analyses (Jarneving, 2005, 2007a, b; Sandström, 2009; Boyack and Klavans, 2010).

Our approach was interdisciplinary and quantitative, while other authors such as Zott et al.'s (2011)¹ adopted a qualitative perspective and concentrated their attention more on managerial and

¹ This work is based on a comprehensive reading of the academic literature, consisting of about 1,177 papers published since 1995 in peer reviewed academic journals and selected in a search by using the keyword BM. To conduct their study, the authors followed a multi-step process. They searched for articles published in leading academic and practitioner-oriented management journals during the period January 1975 to December 2009. The initial list of academic journals included the following: the *Academy of Management Journal* (AMJ), the *Academy of Management Review* (AMR), the *Administrative Science Quarterly* (ASQ), the *Journal of Management* (JOM), the *Journal of Management Studies* (JMS), *Management Science* (MS), the *MIS Quarterly*, *Organization Science* (OS), and the *Strategic Management Journal* (SMJ). Three leading practitioner-oriented journals were added, namely, the *California Management Review* (CMR), the *Harvard Business Review* (HBR), and the *MIT Sloan Management Review* (MSM). By searching with the term “business model” in the title or in keywords, they eliminated 1,120

strategic publications. Additionally, many others recent literature reviews on the BM theme adopted a qualitative prospective without specifying the criteria used in selecting the core articles. They often ignored or partially ignored the BM “founders” and the most cited articles, limiting their analysis to 100-200 articles (Shafer et al., 2005; George & Bock, 2011; Schneider & Spieth, 2013; Spieth et al., 2014; Wirtz et al., 2016b; Wirtz and Daiser, 2016; Foss and Saebi, 2017; and Wirtz & Daiser, 2018).

In our research, several top journals emerged as ones central to the development of the BM research field, including not only the typical management and business journals (such as the *Harvard Business Review*, *the Journal of Business Research*, and *the California Management Review*) but also others that are more specialized in the analysis of technology and innovation, such as *Technological Forecasting and Social Change*, *Industrial Marketing Management*, *Long Range Planning*, *the Journal of Business Research*, and *R&D Management*, among others. This is clearly not surprising because the development of the BM literature lies mainly around three fundamental axes: innovation/technology, strategy, and organizational design (Zott et al., 2011; Wirtz et al., 2016a; Wirtz et al., 2016b; Foss and Saebi, 2017).

Among the top list of the most cited articles, we find the works of Teece, Zott, Amit, Chesbrough, Rosenbloom, Casadesus-Masanell, Ricart, Morris, and Magretta. This result was confirmed by also looking at the co-citation analysis and particularly at, as individuated in clusters 3 and 4, co-authors with a high index of centrality, which stimulated us to add others important contributors: Magretta, Timmers, Osterwalder and Pigneurs, Hamel, Afuah, and Baden-Fuller and Morgan.

Despite a wide scepticism revealed in some parts of the literature (Ghaziani and Ventresca, 2005), we have demonstrated that the concept of BM is more than an elusive idea that has just emerged with the development of ICT. Indeed, it is a workable approach that helps enterprises to specify their model of business, to interact with their clients, to design their architecture of activities and to define the most appropriate value chain. Our view is clearly supported also, among many others, by most of the “founders” of this literature, such as Chesbrough and Rosenbloom (2002), Teece (2010), Baden-Fuller and Morgan (2010), and Zott et al. (2011).

works, resulting in a sample of 133 articles. With the addition of some working papers and book chapters, they increased the final sample, reaching a total of 236 contributions.

The literature on BM has developed along two important phases.

In the first period, 1985-2005, the authors focused their analysis mainly on the value-chain configuration as a new model of generating revenues for customers by using ICT (Timmers, 1998; Afuah and Tucci, 2000; Rappa, 2001; Afuah, 2004; Osterwalder et al., 2005), while in the second period, 2006-2017 (with the exception of Amit and Zott, who published their article earlier, in 2001), the attention shifted to a more holistic view and to the development of an appropriate theoretical conceptualization with the aim of investigating the multi-facet nature of the BM (Chesbrough and Rosenbloom, 2002; Markides and Charitou, 2004; Zott and Amit, 2007, 2008; 2010; Baden-Fuller and Morgan, 2010; Casadesus-Masanell and Ricart, 2010; Teece, 2010; Zott et al., 2011; Baden-Fuller and Haefliger, 2013; Baden-Fuller and Mangematin, 2013).

Emerging from the results of our cluster analysis (co-citations and coupling) and from the appreciative reading of the most important articles, two important research issues still need to be explored.

First, a fundamental point that distinguishes the BM definition is the level of abstraction adopted in the BM conceptualization. This factor moderates issues due to the existence of so many definitions, which, in fact, filtering from the level of analysis chosen (from macro to micro analyses), can be logically explained.

Second, a fruitful terrain of exploration can be the tentative unification of the variegated BM classifications, including the unification of the ample case histories within a detailed framework of different typologies and taxonomies.

Levels of BM abstraction

Our cluster analysis (co-citation and coupling) has still not answered a fundamental issue. What actually is a BM? Surprisingly, the business model is often studied without an explicit definition of the concept. However, in the literature, following Zott et al. (2011, p. 1022), it has been described as a statement (Stewart & Zhao, 2000), a description (Applegate, 2001), a representation (Morris et al., 2005; Shafer, Smith, & Linder, 2005), an architecture (Timmers, 1998), a conceptual tool or model (George & Bock, 2011; Osterwalder, 2004; Osterwalder et al., 2005), a structural template (Amit & Zott, 2001), a method (Afuah & Tucci, 2000), a framework (Afuah, 2004), a pattern (Brousseau & Penard, 2006), and a

set (Seelos & Mair, 2007). In our view, all these definitions are converging towards a common understanding, and they are all theoretically legitimate; however, this does not allow us to proceed into a better framing of the problem of BM definition. In fact, the BM is a systemic and conceptually rich construct, involving multiple components, several actors (boundary spanning) and complex interdependencies and dynamics. In our view, the most important key question is the determination of analysis level at which the BM should be analysed.

To clarify our approach, we indicate here four possible levels of abstraction into which we can group the various streams of the literature.

The first offers a simplified representation of the BM. In this perspective, the BM can be understood as a *model* (Baden-Fuller & Morgan, 2010), i.e., a short representation of a reality that exists at the level of the firm and that has its own specific strategy, network of partners, and customer interactions. Osterwalder et al. (2005) described this as a “real world” BM, referring to specific firms that are presented as the quintessence of a specific architecture, for instance, eBay, Amazon, or Dell. Consistent with this approach, Magretta (2002) has argued that creating a novel BM is similar to writing a new story with a verbal description of how an enterprise works. An archetype can be understood as an ideal example of a BM type, such as the Gillette razor blade, which rests on the strategy of ‘selling cheap razors to push customers to buy its rather expensive blades’ (Zott & Amit, 2010, p. 218) or YouTube, where the core logic lies in delivering a basic version of the product for free and charging for a premium version. The narrative approach, using models, archetypes, and metaphors (Perkmann and Spicer, 2010), has the strength of simplicity, making a parsimonious use of important details. It is particularly effective in supporting the building of a collective sense-making and legitimacy around the BM discourse, favouring the communication of the main ideas hidden behind a specific BM. In the end, from an original BM, we can create BM variations, duplications, and the renewal of all BMs.

While narratives and archetypes may serve several important purposes, they tend to be difficult to manipulate (How can the consequences of changes in one part of the BM on the entire system be evaluated? Which impact will provoke the change of offerings? How can the evolution of the needs of the customers be followed?). A more rigorous approach to appreciate the structure of a BM is offered by graphical frameworks that conceptualize the BM by enumerating and describing its essential components.

As discussed by Massa and Tucci (2014), specific *graphical frameworks (or ontologies)* have responded appropriately to the need to express those essential components. We encounter here a second abstraction. A large body of literature has developed clear cut frames that are very useful to operationalize in detail the different BM components, among which the most well-known is that one proposed in Osterwalder's (2004) popular canvas model. Analogous graphical frameworks have been proposed by the following: Johnson et al.'s (2008) framework that was articulated in four boxes, namely, customer value proposition, the profit formula, key resources and key processes; Lindgardt et al.'s (2009) structural analysis based on the value proposition, operating model, and the business system architecture; Spielth et al. (2014), who focused on explaining, running and developing the BM; Wirtz et al. (2016b), who articulated their analysis on design and process, drivers and barriers, frameworks, implementation and operation, performances & controlling; Foss and Saebi (2017, p. 206), who highlight the process of building a BM, where BM is a contemporary a) a process, b) an outcome, and c) a way for satisfactory performances; and by Johnson (2010), where new structures in between technological opportunities and customer needs are articulated in approximately 20 different modalities.

The third abstraction or perspective on the BM has been developed around what Massa and Tucci (2014) called *meta-models*. They borrowed the term from the literature on engineering, where modelling regards a predefined class of problems that are solved through specific frames, rules, constraints, and theories. The reference is the article of Casadesus-Mansanel and Ricart (2010), where BM is conceptualized on choices and consequences, causal loops, and a deep understanding of how the architecture of choices drives the overall BM. A similar system-approach can be found in Gordijn and Akkerman (2001), who match the rigorous approach of IT systems analysis with an economic value perspective, stemming from business sciences.

In a more granular perspective, we find a fourth BM abstraction derived from the analysis of the "activity system" and built around a specific focal firm design (Amit and Zott 2001; Zott and Amit, 2010). Here, the focus is on the system of interdependent activities and on micro individual processes rather than on choices and consequences; thus, the focus is on design elements (i.e., content, structure, and governance) and themes (efficiency, novelty, complementarities, and lock-ins). Managers can structure the activity system around different themes, such as 'efficiency-centred', 'novelty', 'lock-ins' (keeping

third parties attracted at the focal firm) or ‘complementarities’ (bundling activities reaching scale and scope economies).

Concluding, trying to answer the research question regarding what a BM is, we have presented here a potential integrated multi-level analysis of the BM that combines four different levels of abstraction, helping the reader to better conceptualize and classify this ample field of literature.

Typologies and taxonomies

A perhaps still unexplored area of analysis lies around the classification of the variety of BM typologies and taxonomies that we can encounter in the literature. One deals with a pragmatic topic that is related to firms and industries and to the way in which disruptive innovations have changed the dynamics of competition and the industrial structure, provoking the crisis of old incumbents and the entry of new organizations. BMs are at the same time the origin of the creation of new markets (electronic markets, market places and auctions, platforms, portals, e-knowledge communities, open source communities, and e-commerce) and the basis of the modification of the way in which existing products/services were commercialized. Emerging from the reading of the extant literature, the issue of an organized BM classification is still an unresolved research question. While some authors have focused on individual business model archetypes, others have provided a lists or typologies or taxonomies. Following Lambert (2015), the typologies are conceptually derived, consider few characteristics, are related to deduction, and provide a basis for only limited generalization, while the taxonomies are empirically derived, providing reasoning by inference; they consider numerous variables and provide a basis for wider generalization. This distinction is not clear in the literature because the criteria used to define the various types are not explicit, and often they are described in the form of a narrative discourse. Theoretical typologies use market related criteria, customers profile, and configuration, transaction, product, and strategic factors, without creating a clear classification scheme. In this literature, the distinction between typologies and taxonomies is still blurred. Moreover, there is also a lack of empirical testing of BM frameworks. The research works are mainly explorative and not confirmative.

A selective overview of BM typologies has been presented by Timmers (1998), Rappa (2000), Weil and Vitale (2001), Afuah and Tucci (2000), Pateli and Giaglis (2004), Johnson (2010), Osterwalder and Pigneur (2010), Gassman et al. (2014), and Taran et al. (2016).

There are numerous typologies that are mainly related to the Internet, ICT adoption, and web BMs, but they also refer to new revenue models (such as the pay-as-you-use modality), new strategies (shifting products to the luxury segment), new foci on firm positioning (moving upstream in the value chain, for example, becoming the principal subcontractor of large high-tech firms; see the foxconn example), new organizational models (such as the value chain integrator or the use of franchising modalities) and to a novel reconceptualization of the product-service category, including BM reconfigurations through “partnering”, “from selling products to selling solutions”, and from “transitioning from products to services” (Vandermerwe and Rada, 1988; Oliva and Kallenberg, 2003; Vargo and Lusch, 2004; 2008; Kindström, 2010; Nenonen and Storbacka, 2010; Mason and Spring, 2011).

The following overview allows us to see how fragmented the classifications that have been adopted are: Timmers classifies by e-shop, e-procurement, e-auction, e-mall, virtual communities, value chain integrators, collaborative platforms, and information brokers; Rappa classifies by brokerage, advertising, infomediary, merchant, manufacturer, affiliate, community, subscription, and utility models; Weil and Vitale use content provider, direct to the customer, full-service provider, intermediary, shared infrastructure, value net integrator, virtual community, and the whole of the enterprise/government classifications; Afuah and Tucci classify by commission, advertising, make-up, production, referral, subscription, and fee-for-service; Johnson uses affinity club, brokerage, bundling, cell phone, crowdsourcing, disintermediation, fractionalization, freemium, leasing, low touch, negative operating cycle, pay as-you-go, razors-and-blades, reverse auction, reverse razors-and-blades, product-to-service, standardization, subscription club, user community classifications; Osterwalder and Pigneur classify by unbundling, long tail, multisided platforms, free, open; Gassmann et al., (55 typologies); and Taran et al. (71 typologies), with 23 linked to value proposition, 8 linked to value segment, 14 linked to value configuration, and 10 linked to value network and 16 linked to value capture.

In conclusion, it can be said that the overproduction of typologies and taxonomies pinpoints the need for a better future simplification of criteria and constitutive elements (Shafer, 2005). In addition, the

way of measuring BM performance, scalability (Lund and Nielsen, 2018), or the validation of models seems to be still at the inception.

5. CONCLUSIONS

The main goal of this article was, by using a scientometrics approach, to understand the structure of the BM literature, its current state of the art, and its future direction. We considered 3,604 papers in the fields of business and management that were published between 1985 and 2015.

Despite several other recent published literature reviews of the BM literature, such as Mahadevan (2000), Magretta (2002), Al-Debei and Avison (2010), Zott et al. (2011), and Markides (2015), Taran et al. 2016, this particular approach, as far as we know, has not been used before.

The main results of this research are the following. We used the co-citation analysis, which has allowed us to build an analytical framework that goes beyond the various subjective studies and to identify the founders of the new discipline. Combining the references contained in the selected articles and the year of the articles' publication, we identified five clusters.

The first is linked with the BM theoretical antecedents. Here, we find the roots of the BM theorization—Barney (1991), Teece et al. (1997), Chesbrough et al. (2003), Eisenhardt and Martin, (2000), Porter (1980); March (1991); Wernerfelt, (1984), Penrose (1959), Teece (2007), Cohen and Levinthal (1990), and Nelson and Winter (1982). The second cluster refers to the importance of the empirical methodological approaches based on “theory building from cases” and the multiple cases’ analysis. The third cluster assembles the BM theoretical founders, of which we must mention Amit and Zott (2001), Chesbrough and Rosenbloom (2002), Magretta (2002), Morris et al. (2005), Timmers, (1998) and Afuah (2004). The authors that have subsequently further developed this literature (inserted in Cluster five) are as follows: Zott et al. (2011); Zott (2010); Teece (2010); and Chesbrough (2010). Finally, Cluster four reflects the transmigration of the BM analysis into marketing studies, an important development that has not yet been acknowledged in the previous surveys. In this cluster, the most associated articles are those of Vargo and Lusch (2004), Mason and Spring (2011), Nenonen and Storbacka (2010), and Siggelkow (2002).

The analysis based on coupling has highlighted several major areas of research: a) the evolution of new BMs in high-tech sectors, b) the evolution of the BM, involving important changes that produce BMI, c) new eco-social BMs, d) new BMs derived from the application of strategies of “open innovation”, e) BMs linked to new firms and new models of entrepreneurial strategies, and, finally, f) the tertiary economy, where shifting from products to products cum services, new models were developed (as discussed by Kindström, 2010).

Is the BM concept a new heuristic useful for practitioners or a new unit of analysis?

An analysis of the majority of articles reveals that the BM has both a conceptual and an empirical validity. It is placed in between an analysis of the firms’ strategy, innovation management, and value chain creation and operationalization. The topics included in the clusters show a movement from a general interest based on the analysis of innovation and digitalization to some wider themes: ecological and social perspectives. In our discussion, we have mentioned some future directions that deserve to be deepened: the introduction of a clearer level of abstraction and a reduction of the variety of typologies/taxonomies presented.

Some limitations and future directions also have to be discussed. First, bibliometric analysis is sensitive to the different types of archives used. By using Scopus or GS instead of WoS, scholars could realize slightly different results. However, bibliometric analyses are useful tools when used in combination with traditional literature reviews. In addition, our work considered the most recent articles published and we accessed a journal, namely, the *Journal of Business Models*, which is not yet included in the WoS. Second, today, the issues of environmental innovation and sustainable development are more important than in the past. Several authors advocate a transition to more sustainable systems focusing on the circular economy, where waste and pollution is minimized (Bocken et al., 2016; Geissdoerfer et al., 2018). Third, in the future, to understand the customers’ needs and market segmentation, BMs will benefit from having access to Big Data, and the possibility of one-to-one marketing will be realized. Research will also benefit from more quantitative analyses on the constitutive BM elements (Schroeder, 2016).

While this study is mainly positioned in the tradition of scientometrics, offering an updated description of the most recent research fields, it also provides practical implications, guiding managers and practitioners. Given the lack of clarity about the definition of BM in the literature, we provide

research and managers with guidance based on an ample survey of the literature on BM typologies/taxonomies, levels of abstraction, constitutive elements, and future areas of research.

Author Contributions:

Introduction, Methodology and Results - Descriptive analysis of the sample must be attributed to L. Orsi; Discussion, Results - The Co-Citation Network Analysis and - Bibliographic Coupling must be attributed to F. Belussi except for Bibliographic Coupling clusters 5, 6 and 7 that have been written by M.F. Savarese; the Conclusions are a joint effort written by the authors of the article: F. Belussi, L. Orsi and M.F. Savarese.

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Table 3: List of the top-10 Journals by number of articles published about the BM concept (1985-2015)

Journals	Articles	Fields
Harvard Business Review	92	General management journal
Technological Forecasting and Social Change	50	Technological forecasting as planning tools as they interrelate social, environmental and technological factors
Industrial Marketing Management	49	Industrial and business-to-business markets
Long Range Planning	49	Strategic management
Research Technology Management	46	Innovation management
Journal of Business Research	39	General management journal
R&D Management	37	R&D and innovation management
MIT Sloan Management Review	36	General management journal
California Management Review	35	General management journal
Technovation	34	Innovation management

Table 4: List of the top-10 articles by number of citations

Authors	Source title	Year	Total citations	Average per year
Teece, D. J.	Long Range Planning	2010	982	109.11
Zott, C.; Amit, R.; Massa, L.	Journal of Management	2011	595	74.38
Amit, R; Zott, C.	Strategic Management Journal	2001	1176	65.33
Chesbrough, H.	Long Range Planning	2010	529	58.78
Chesbrough, H; Rosenbloom, R.S.	Industrial and Corporate Change	2002	900	52.94
Zott, C.; Amit, R.	Long Range Planning	2010	419	46.56
Casadesus-Masanell, R.; Ricart J.E.	Long Range Planning	2010	319	35.44
Morris, M.; Schindehutte, M.; Allen, J.	Journal of Business Research	2005	491	35.07
Zott, C.; Amit, R.	Strategic Management Journal	2008	351	31.91
Magretta, J.	Harvard Business Review	2002	507	29.82

Table 3: Overview of co-citation clusters.

Documents in cluster and association strength (in parentheses)	Label	Description	Cluster number	Size	Year
barney j, 1991, (263); teece dj, 1997, (259); chesbrough h., 2003, (248); eisenhardt km, 2000, (246); porter m, 1980, (243); march jg, 1991, (242); wernerfelt b, 1984, (240); penrose e. t., 1959, (236); teece dj, 2007, (233); cohen wm, 1990, (223); nelson r. r., 1982, (216); henderson rm, 1990, (216); christensen cm, 1997, (214); chesbrough h., 2006, (212); dyer jh, 1998, (211); teece dj, 1986, (206); peteraf ma, 1993, (201); amit r, 1993, (199); chesbrough hw, 2007, (197); pfeffer j., 1978, (196); leonard barton d, 1992, (195); porter me, 1996, (194); williamson o.e, 1975, (184); tushman ml, 1986, (182); schumpeter j, 1934, (182); cyert r, 1963, (179); laursen k, 2006, (177); levinthal da, 1993, (175); prahalad ck, 1986, (175); dierickx i, 1989, (174); tripsas m, 2000, (170); christensen c.m, 2003, (169); fornell c, 1981, (168); chandler a. d., 1962, (166); podsakoff pm, 2003, (163); prahalad ck, 1990, (163); adner r, 2010, (163); grant rm, 1996, (161); christensen cm, 1996, (160); adner r, 2006, (159); gulati r, 2000, (158); chesbrough h, 2007, (157); garcia r, 2002, (157); brandenburger am, 1996, (156); utterback j., 1994, (156); powell ww, 1996, (155); lieberman mb, 1988, (155); winter sg, 2003, (155); kogut b, 1992, (154); vonhippel e, 1986, (154); coase rh, 1937, (153); dimaggio pj, 1983, (153); schumpeter j. a., 1942, (153); zahra sa, 2002, (153); anderson p, 1990, (153); hannan mt, 1984, (153); christensen cm, 2006, (152); armstrong js, 1977, (150); christensen cm, 1995, (149); grant rm, 1991, (148); granovetter m, 1985, (148); sirmon dg, 2007, (148); nunnally j. c., 1978, (147); o'reilly ca, 2004, (147); katz ml, 1985, (146); kim w. chan, 2005, (143); christensen c. m., 1997, (141); moore jf, 1993, (136); granovetter ms, 1973, (134); barney j. b., 1986, (131); chesbrough h, 2006, (128); bower jl, 1995, (127); bonaccorsi a, 2006, (127); williamson o. e., 1985, (126); chesbrough hw, 2003, (125); nonaka i, 1994, (124); hamel g., 1994, (124); chesbrough h., 2006, (123); shapiro c, 1999, (122); nonaka i., 1995, (121); von hippel e., 1988, (119); drucker p., 1985, (118); rochet jc, 2003, (116); weick k. e., 1995, (116); pisano gp, 2006, (114); von hippel e., 2005, (113); dosi g, 1982, (113); chesbrough hw, 2007, (110); jensen mc, 1976, (109); dahlander l, 2010, (108); uzzi b, 1997, (106); lumpkin gt, 1996, (106); eisenmann t, 2006, (102); rogers e. m., 1995, (101); williamson o. e., 1985, (95); rogers em, 2003, (83); porter m. e., 1990, (76); davis fd, 1989, (25)	BM Antecedent Theoretical Roots	Cluster 1 does not represent the intellectual “founding fathers” of the discipline in particular, but the common intellectual background that was applied by the first authors interested in developing the BM approach. We find here the original ruts of the 1990s discovery of the innovative firms strategies, ingrained in the “resources based view” and in the “dynamic capabilities”	1	98	1992
eisenhardt km, 1989, (268); eisenhardt km, 2007, (256); miles m. b., 1994, (242); yin r. k., 1994, (219); yin r. k., 2003, (218); glaser b. g., 1967, (214); yin r. k., 2009, (208); yunus m, 2010, (187); gibbert m, 2008, (183); siggelkow n, 2007, (182); seelos c, 2007, (181); strauss a, 1990, (176); schumpeter j. a., 1934, (175); shane s, 2000, (171); pettigrew am, 1990, (168); langley a, 1999, (164); dahan nm, 2010, (163); sarasvathy sd, 2001, (160); bowman c, 2000, (154); patton mq, 2002, (151); alvarez sa, 2007, (144); mintzberg h, 1985, (142); hart sl, 2002, (139); baker t, 2005, (138); sarasvathy s. d., 2008, (130); stubbs w, 2008, (130); ries eric, 2011, (128); mair j, 2006, (127); boons f, 2013, (123); bocken nmp, 2014, (121); london t, 2004, (121); freeman r. e., 1984, (118); porter me, 2011, (116); austin j, 2006, (115); prahalad ck, 2002, (110); clarkson mbe, 1995, (108); anderson j, 2007, (104); shane s, 2000, (104); prahalad c. k., 2004, (102); yin r.k., 1984, (102); mitchell rk, 1997, (96); zahra sa, 2009, (94); battilana j, 2010, (82); porter me, 2006, (81); elkington j, 1997, (64)	BM Methodological Approaches	Cluster 2 allows us to appreciate the novel role played by the use of new research strategy and methodologies, based on theory building from cases, particularly multiple cases.	2	45	2000

<p>amit r, 2001, (269); chesbrough h, 2002, (269); magretta j, 2002, (265); morris m, 2005, (264); porter m.e., 1985, (244); shafer s. m., 2005, (242); timmers p, 1998, (236); osterwalder a, 2005, (220); mahadevan b, 2000, (216); hedman j, 2003, (215); afuah a., 2001, (213); tikkanen h., 2005, (212); hamel g., 2000, (201); weill p., 2001, (193); linder j., 2000, (177); stewart dw, 2000, (174); afuah a., 2004, (172); yip g., 2004, (160); ghaziani a, 2005, (152); porter me, 2001, (149); tapscott d., 2000, (139); pateli ag, 2004, (138); stabell cb, 1998, (138); porter m. e., 2001, (137); venkatraman n, 1998, (135); gordijn j, 2001, (133); schweizer l., 2005, (133); alt r, 2001, (131); dubosson-torbay m., 2002, (126); afuah a., 2003, (124); osterwalder a, 2009, (117); osterwalder a., 2004, (113); porter me, 1985, (105); rayport jf, 1995, (76)</p>	<p>BM Theoretical Founders</p>	<p>Cluster 3 collects works that represent the initial development of a very specific BM literature. The leitmotiv of the papers inserted in this cluster is the value creation through e-business, open technological platforms, internet and electronic markets</p>	<p>3</p>	<p>34</p>	<p>2001</p>
<p>vargo sl, 2004, (207); mason k, 2011, (201); nenonen suvi, 2010, (187); siggelkow n, 2002, (171); oliva r, 2003, (169); day gs, 1994, (166); jick td, 1979, (166); vargo sl, 2008, (163); vandermerwe s., 1988, (158); kindstrom d, 2010, (157); baines ts, 2009, (151); wise r, 1999, (150); prahalad ck, 2000, (147); storbacka k, 2011, (146); dubois a, 2002, (144); fang e, 2008, (143); tuli kr, 2007, (140); normann r, 1993, (139); davies a, 2004, (136); windahl c, 2006, (132); prahalad ck, 2004, (128); gebauer h., 2005, (127); davies a, 2006, (125); mathieu v, 2001, (125); neely a., 2008, (125); davies a, 2007, (122); matthyssens p, 2008, (122); galbraith jr, 2002, (120); normann r., 2001, (118); ostrom al, 2010, (116); ulaga w, 2011, (113); payne af, 2008, (111); mathieu v, 2001, (102); vargo stephen l, 2008, (95); tukker a., 2004, (92)</p>	<p>BM influence in the marketing literature</p>	<p>Cluster 4 shows that BM literature has provoked an important change in management and business studies highlighting that the consumer become the focal point of every firm actions.</p>	<p>5</p>	<p>35</p>	<p>2004</p>
<p>zott c, 2011, (269); teece dj, 2010, (267); zott c, 2010, (265); chesbrough h, 2010, (263); osterwalder a., 2010, (263); johnson mw, 2008, (262); demil b, 2010, (261); zott c, 2007, (260); zott c, 2008, (260); casadesus-masanell r, 2010, (253); baden-fuller c, 2010, (251); chesbrough h., 2007, (241); mcgrath rg, 2010, (237); amit r, 2012, (231); sosna m, 2010, (230); george g, 2011, (228); osterwalder a., 2005, (226); gambardella a, 2010, (221); markides c, 2004, (218); doz yl, 2010, (214); baden-fuller c, 2013, (210); markides c, 2006, (206); casadesus-masanell r, 2013, (195); doganova l, 2009, (195); baden-fuller c, 2013, (192); winter sg, 2001, (192); wirtz bw, 2010, (188); cavalcante s, 2011, (186); bock aj, 2012, (181); spieth p, 2014, (180); johnson mark w., 2010, (179); mitchell d., 2003, (179); wirtz bw, 2016, (176); voelpel s. c., 2004, (175); calia rc, 2007, (174); sabatier v, 2010, (171); smith wk, 2010, (171); casadesus-masanell r, 2011, (168); al-debei mm, 2010, (165); osterwalder a., 2004, (165); achtenhagen l, 2013, (164); pohle g., 2006, (164); zott c, 2013, (164); giesen e., 2007, (161); desyllas p, 2013, (159); bjorkdahl j, 2009, (157); schneider s, 2013, (157); lambert sc, 2013, (155); svejenova s, 2010, (155); markides cc, 2013, (154); teece dj, 2010, (154); richardson j, 2008, (153); sanchez p, 2010, (152); bucherer e, 2012, (149); dasilva cm, 2014, (148); thompson jd, 2010, (142); demil b, 2015, (134); dubosson-torbay m, 2002, (131); willemstein l, 2007, (122)</p>	<p>The core BM literature</p>	<p>Cluster 5 includes the most important contributors to the contemporary analysis of BMs, which explicitly links BM, strategy, and innovation.</p>	<p>4</p>	<p>59</p>	<p>2010</p>

Notes: We reported only the first author's name and the year of documents due to spatial constraints. For the same reasons these authors have been not included in the references.

Table 4: Overview of bibliographic coupling clusters.

Documents in cluster and association strength (in parentheses)	Label	Description	Cluster number	Size	Year
amit, 2001, (203); hulland, 2007, (165); fichman, 2014, (164); merali, 2012, (158); teece, 2010, (144); gruber, 2006, (140); mcivor, 2004, (138); patari, 2010, (133); currie, 2004, (130); bremser, 2005, (112); kauffman, 2001, (112); standing, 2006, (102); oestreicher-singer, 2013, (90); bockstedt, 2006, (87); steinfeld, 2002, (82); bond, 2003, (75); francis, 2005, (65); carbonara, 2005, (65); venkatraman, 2000, (65); trkman, 2007, (62); gallagher, 2001, (62); garengo, 2007, (61); loebbecke, 2015, (58); wirtz, 2003, (55); lumpkin, 2004, (54); lee, 2001, (54); zwass, 2010, (50); juttner, 2007, (46); hayes, 2005, (46); aage, 2008, (44); dai, 2002, (41); rossetti, 2008, (39); susarla, 2009, (36); hinz, 2008, (35); olbrich, 2011, (33); hennig-thurau, 2010, (32); swatman, 2006, (28); mahadevan, 2000, (26); bhargava, 2004, (22); parker, 2005, (19); weill, 2002, (18); bonaccorsi, 2006, (15); casadesus-masanell, 2006, (14); huang, 2005, (14); hu, 2004, (13); barabba, 2002, (13); pauwels, 2008, (12); berger, 2006, (11); peffers, 2005, (11); buyukozkan, 2004, (10); clemons, 2009, (9); demirkan, 2010, (7); kannan, 2009, (7); xirogiannis, 2004, (7); bernstein, 2008, (6); fay, 2004, (6); jackson, 2003, (6); zeng, 2003, (5); stewart, 2000, (5); liang, 2011, (4); fay, 2009, (4); lehdonvirta, 2009, (4); ding, 2005, (4); marquez, 2004, (4); suh, 2003, (2); sashi, 2002, (2)	BM & Digitalization	Cluster 1 presents digitization as the fundamental key to innovate the BM. In this context, BMs mobilize technology to create new devices or services, addressing new consumers' needs.	1	66	2006
doganova, 2009, (193); andries, 2006, (193); patzelt, 2008, (167); dahlander, 2008, (165); andries, 2007, (141); mustar, 2006, (134); garnsey, 2008, (128); munari, 2011, (125); hitt, 2001, (123); landry, 2013, (118); pries, 2011, (95); bathelt, 2010, (91); suarez, 2013, (86); chesbrough, 2007, (51); chung, 2008, (45); casper, 2000, (42); carpenter, 2003, (41); chesbrough, 2007, (34); sanders, 2004, (34); colli, 2013, (18); lazonic, 2010, (18); folkman, 2007, (16); fischer, 2012, (14); lazonic, 2011, (14); hsu, 2005, (13); coriat, 2002, (8); bower, 2003, (7); pindado, 2012, (5)	BM in high-tech environments	Cluster 2 explores a particular aspect of the BM. The authors grouped in this cluster try to identify and clarify different aspects of new ventures and spin off through the lens of a BM perspective.	2	28	2007
desyllas, 2013, (207); wu, 2010, (203); priem, 2013, (199); huygens, 2001, (188); markides, 2013, (173); aspara, 2013, (171); sosna, 2010, (170); bjorkdahl, 2009, (162); aspara, 2011, (161); bock, 2012, (160); christensen, 2002, (157); obloj, 2010, (152); jacobides, 2012, (151); sabatier, 2012, (148); chesbrough, 2002, (137); sainio, 2007, (135); winter, 2001, (135); gebauer, 2012, (134); lucas, 2009, (119); dewald, 2010, (114); phaal, 2011, (109); markides, 2010, (101); bergek, 2013, (94); paramanathan, 2004, (92); tierney, 2013, (91); gambardella, 2010, (85); markides, 2004, (82); raff, 2000, (79); smith, 2010, (78); fenwick, 2009, (72); koen, 2011, (70); brown, 2002, (55); hayton, 2006, (53); kavassalis, 2003, (49); gregoire, 2012, (48); halbesleben, 2003, (38); christensen, 2000, (26); gittell, 2006, (13); beckman, 2007, (11); garfield, 2001, (4); magretta, 2002, (1)	BMI and evolution	Cluster 3 points out how technological changes are profoundly transforming the competitive game, and, in this new competitive arena, the fastest growing firms are those that have taken advantage of these structural changes to innovate their BMs.	3	41	2008

<p>sanchez, 2010, (197); hall, 2012, (172); yunus, 2010, (165); ricart, 2004, (157); halme, 2012, (144); george, 2012, (142); dunford, 2010, (127); adams, 2016, (126); wu, 2011, (126); santos, 2012, (121); schaltegger, 2016, (120); mangematin, 2003, (111); rivera-santos, 2010, (108); zesckhy, 2011, (103); escobar, 2011, (101); halme, 2014, (99); perry, 2013, (91); mcgee, 1998, (89); chesbrough, 2006, (84); seebode, 2012, (83); stubbs, 2008, (83); hart, 2003, (81); hart, 2004, (80); tallman, 2002, (80); cohen, 2007, (79); wells, 2005, (79); kshetri, 2007, (76); zollo, 2013, (74); rugman, 1998, (74); wilson, 2013, (73); athreye, 2005, (72); datta, 2012, (70); seelos, 2007, (66); dixon, 2007, (66); dahan, 2010, (64); majocchi, 2003, (64); gifford, 2010, (63); hennart, 2014, (59); jenkins, 2009, (55); srai, 2008, (55); lenway, 1994, (53); ray, 2010, (52); williamson, 2010, (51); bryson, 2009, (50); hogevoid, 2012, (49); kistruck, 2013, (38); wright, 2012, (36); linton, 2007, (36); witkamp, 2011, (35); breznitz, 2007, (32); kolk, 2014, (29); christensen, 2010, (28); phillips, 2015, (27); okereke, 2010, (23); heracleous, 2004, (19); clemons, 2007, (12); prahalad, 2012, (11); birkin, 2009, (11); jones, 2014, (8); vogel, 2005, (7); breznitz, 2005, (7); birkin, 2009, (4); hurt, 2005, (4); guide, 2003, (2); roberts, 1996, (2); gattorna, 2009, (1)</p>	<p>BMs & Eco-Social Innovation</p>	<p>Cluster 4 shows that BMs are the locus for managerial experiments to modify strategies, traditional models, or to innovate the business completely. There is a theoretical shift from capturing “rents from resources” to a demand-side perspective focused on consumer facing firm strategies that create value for end-users, and the building of external ecosystems.</p>	<p>4</p>	<p>66</p>	<p>2008</p>
<p>saebi, 2015, (187); gronlund, 2010, (184); hienerth, 2011, (179); van der borgh, 2012, (175); west, 2014, (172); djelassi, 2013, (160); ritala, 2014, (159); chesbrough, 2007, (156); chesbrough, 2010, (152); kodama, 2009, (146); valkokari, 2012, (145); basole, 2009, (134); herzog, 2010, (129); loch, 2008, (111); kodama, 2007, (111); lichtenthaler, 2011, (110); abe, 2009, (110); bengtsson, 2014, (106); kodama, 2005, (106); mcgrath, 2010, (97); gassmann, 2010, (94); hung, 2010, (78); andersson, 2008, (70); marjanovic, 2012, (63); enkel, 2009, (63); chesbrough, 2012, (61); campbell, 2003, (52); andersson, 2009, (50); chesbrough, 2007, (48); itami, 2010, (47); dougherty, 2011, (45); martinez-torres, 2010, (38); venkatraman, 1998, (37); chesbrough, 2004, (35); toral, 2009, (31); garrigos-simon, 2012, (25); lechner, 2002, (21); casadesus-masanell, 2007, (10)</p>	<p>BM & Open Innovation</p>	<p>Cluster 5 looks at the BM as the result of an open innovation strategy implemented by the companies.</p>	<p>5</p>	<p>38</p>	<p>2009</p>
<p>demil, 2015, (211); carayannis, 2015, (205); zott, 2011, (200); bucherer, 2012, (183); dasilva, 2014, (181); trimi, 2012, (179); demil, 2010, (179); brettel, 2012, (178); cavalcante, 2011, (177); george, 2011, (177); zott, 2008, (173); wirtz, 2016, (172); benson-rea, 2013, (172); zott, 2007, (172); arend, 2013, (171); hacklin, 2012, (167); zott, 2010, (165); achtenhagen, 2013, (162); moller, 2008, (162); baden-fuller, 2013, (161); lambert, 2013, (161); svejenova, 2010, (158); spieth, 2014, (157); mason, 2008, (156); coombes, 2013, (149); martins, 2015, (146); bohnsack, 2014, (146); morris, 2005, (146); baden-fuller, 2013, (143); battistella, 2012, (143); ng, 2013, (142); wirtz, 2010, (140); baden-fuller, 2010, (133); amit, 2012, (128); sorescu, 2011, (127); sabatier, 2010, (118); palo, 2011, (106); calia, 2007, (99); rayna, 2016, (86); sainio, 2012, (84); willemstein, 2007, (79); chatterjee, 2013, (77); andersson, 2009, (77); thompson, 2010, (68); kiron, 2013, (53); jarratt, 2010, (27); gloor, 2007, (12)</p>	<p>BM and entrepreneurship</p>	<p>Cluster 6 represents the fusion of the existing BM literature with the topic of entrepreneurship. Business model explains the logic of the firm, the way it operates, and how it creates and captures value for its stakeholders.</p>	<p>6</p>	<p>47</p>	<p>2011</p>
<p>kindstrom, 2014, (207); wikstrom, 2010, (192); eloranta, 2015, (190); storbacka, 2009, (190); storbacka, 2012, (186); storbacka, 2011, (172); mason, 2011, (170); spring, 2009, (166); visnjic, 2013, (159); visnjic, 2013, (156); storbacka, 2013, (152); kujala, 2010, (147); kindstrom, 2010, (138); finne, 2013, (134); storbacka, 2011, (128); ferreira, 2013, (127); kujala, 2011, (126); storbacka, 2011, (115); barquet, 2013, (113); wynstra, 2015, (110); ng, 2012, (100); terho, 2012, (100); maglio, 2013, (88); davies, 2007, (80); biggemann, 2013, (58); wikstrom, 2009, (37); parida, 2014, (24); lau, 2007, (1)</p>	<p>BM in services</p>	<p>Cluster 7 discusses different types of business model reconfigurations: “partnering”, “from selling products to selling solutions”, “moving downstream in the value chain” and “transitioning from products to services”</p>	<p>7</p>	<p>28</p>	<p>2012</p>

Notes: We reported only the first author’s name and the year of documents due to spatial constraints. For the same reasons these authors have been not included in the references.