

Open Business Model and Open Innovation: Bibliographic Analysis

Martin MATEJÍČEK * and Petra MAREŠOVÁ

University of Hradec Králové, Hradec Králové, Czech Republic; martin.matejcek@uhk.cz;
petra.maresova@uhk.cz

* Correspondence: martin.matejcek@uhk.cz

Abstract: At present, corporate governance has changed considerably. The company may have far more environmental and competitive influences of great intensity than it was in the past. In order to thrive and stabilize the competitive struggle, the company has to adapt, acquire and respond flexibly to consumers and capture the value of product and service delivery as effectively as possible. This can be achieved by a well-set business model that has to be constantly upgraded in relation to current trends, demand and other factors. The purpose of this paper is to discuss the current trend of open business models and of open innovation in relation to business models. To achieve this goal, a search using keywords in Web of Science database and a subsequent bibliometric mapping study with VOSviewer software is used. In final, the systematic review following the PRISMA guideline is included. Out of the 180 results, 28 papers were found suitable for qualitative synthesis. The results of the articles confirm the positive effect of open business models and open innovation based business models to value creation, effectivity and business performance. The growing trend of co-creation and collaboration in the field of business models is confirmed as well. Open business models and models based on open innovation are becoming more and more discussed over time. They are particularly useful in sectors characterized by high investment costs.

Keywords: business; business model; open innovation; open business model

JEL Classification: D04; O36

1. Introduction

At present, corporate governance has changed considerably. The company may have far more environmental influences of great intensity than it was in the past. To change targets in the global economy, where communication and computing technologies and open global trading regimes make the environment highly competitive, and even more so in cases of low unemployment. (Hedvičáková and Král 2018)

In order to thrive and stabilize the competitive struggle, the company has to adapt, acquire and respond flexibly to consumers and capture the value of product and service delivery as effectively as possible. This can be achieved by a well-set business model that has to be constantly upgraded in relation to current trends, demand and other factors.

According to Osterwalder (2004), the very first theoretical reference to the business model appeared in 1960 in an academic article published by an accounting journal called *Accounting Review*.

The business model describes logic and expresses how company creates value and delivers it to final customers. Emphasis is being placed on the architecture of revenue and costs associated with business. (Teece 2010)

In the literature, business models are often used to describe the creation of business values and its conversion into financial gain. (Teece 2010) According to Zott et al. (2011), business models are understood as a tool to analyze business activities, to understand external and internal activities, and as a way to control and maintain business value.

Kopp (2019) states that the business model can be understood as a plan how to get profits in a particular market. The primary part of business model is the "value proposition". This phrase identifies goods and services, that the company offers, and it also tells why these goods and services are desirable

for customers. The message could ideally be said to distinguish the product or service from competitors.

The business model for the enterprise should also include projected start-up costs, funding sources, target consumer base for commerce, marketing strategy, competition research and revenue and cost estimates.

A common mistake in creating a business model is underestimating the cost of financing a business or product. The business model can also define opportunities for partnerships with further established companies. An example would be an advertising company that could benefit from an agreement with a printing company.

Chesbrough (2003) reports a total of six functions of the business model:

- To express the value proposition (value created for users by a technology-based offer)
- To classify a market segment (clients to whom is the technology suitable and the aim for which it can be used)
- To characterize the structure of the company's value chain, that is needed to generate and deliver the value, and to select the harmonizing benefits to boost the company's standpoint in the chain
- To define the income generation processes for the company, and predict the price structure and target margins of generating the offering, given the value proposal and value chain organization chosen
- To represent the rank of the company within the value group coupling customers and providers, including recognition of possible complementary competitors and companies
- To define the reasonable strategy by which the revolutionizing company will multiply and hold advantage over others

However, the topic of this work is not only focused on business models in a general context, but above all on open business models and on linking business models with open innovation. Weiblen (2013) defines an open business model as follows: „*an open business model describes the design or architecture of the value creation and value capturing of a focal firm, in which collaborative relationships with the ecosystem are central to explaining the overall logic*“. Weiblen (2013) also defines the differences and relationships between open innovation, business models and open business models. Open innovations represent targeted openness in the area of research and development activities of the company. Business models describe the continuous creation and capture of company values in an independent way of openness. OBMs are then a subclass of business models where collaboration in creating and capturing value is crucial.

The purpose of this paper is to discuss the current trend of open business models and of open innovation in relation to business models. To achieve this goal, a search using keywords in a specialized database and a subsequent bibliometric mapping study will be used. In final, the systematic review following the PRISMA guideline is included.

The paper is structured as follows. Section 2 defines the selection of the information mapping and information resources. The next section gives reports and discussion of the results in some fields, knowledge area, keywords, and authors. Finally, Section 4 provides conclusions and main research findings.

2. Methodology

To achieve the objective of the work we searched in a scientific database with the help of certain keywords. Specifically, the Web of Science database was chosen. The search was performed on 22. 12. 2019 with the following parameters:

- TOPIC: "business model" AND ("open business model" OR "open innovation")
- Timespan: 2010-2019 (22. 12. 2019)
- Indexes: SCI-EXPANDED, SSCI, A&HCI, CPCI-S, CPCI-SSH, BKCI-S, BKCI-SSH, ESCI, CCR-EXPANDED, IC

The search resulted in a total of 180 papers from the Web of Science Core Collection. The number of publications for each year is shown in Figure 1. The topic was the most published in 2017 (28 publications), and the least in 2011 (10 publications) and 2012 (10 publications).

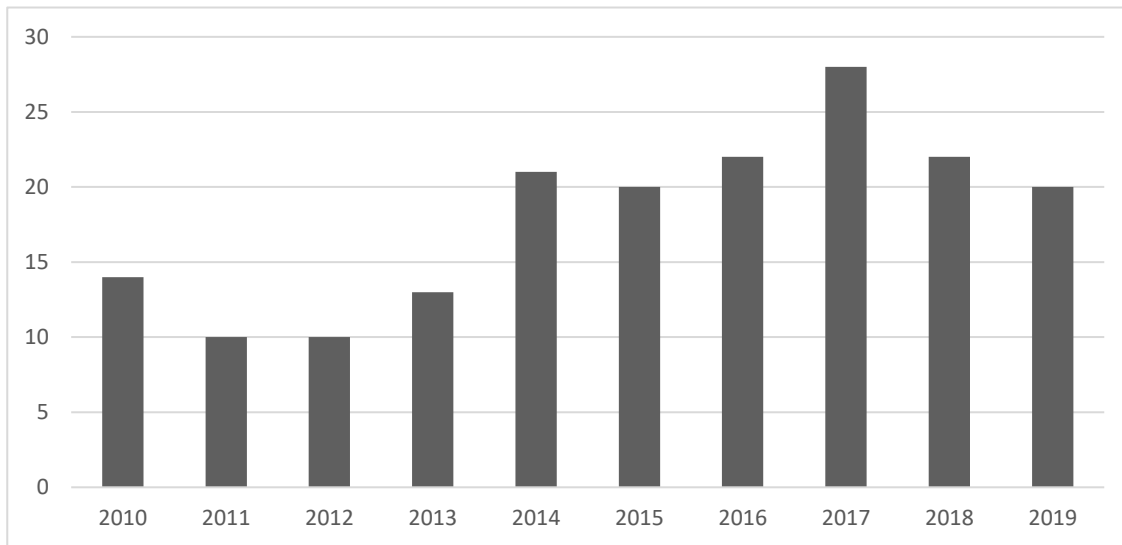


Figure 1. Numbers of papers in WOS (Web of Science) database based on the query "business model" AND ("open business model" OR "open innovation").

In case of sorting papers by publication types, the largest part consists of articles (104), then proceedings papers (65), book chapters (6), reviews (6), editorial materials (4) and books (3).

All the records based on the keywords "business model" AND ("open business model" OR "open innovation") in Web of Science (180) were added to marked list and then exported to Tab-delimited (Win, UTF-8) file format. This data file was afterwards imported to VOSviewer software, which is "a software tool for constructing and visualizing bibliometric networks. These networks may for instance include journals, researchers, or individual publications, and they can be constructed based on citation, bibliographic coupling, co-citation, or co-authorship relations". (Leiden University 2019) The results of co-occurrence analysis are in the next chapter.

In final, the systematic review following the PRISMA guideline is included. Keywords and abstract of publications were screened to reject papers that do not fulfill our inclusion criteria. Full-text papers were included in case they satisfied following requirements:

- Written in English
- Business model-related theme focused on openness of business models
- OR
- Open innovation-related theme focused on business models

3. Results

Figure 2 displays the co-occurrence analysis in VOSviewer software using data from Web of Science keyword search related to "business model" AND ("open business model" OR "open innovation"). "Co-occurrence" is the term which is used to represent proximity of the keywords in the title, abstract, or keyword list in paper. It is also used to find relations so that the research topic can be established. (Van Eck and Waltman 2014; Wang et al. 2018) The minimum number of keyword occurrence was set to 6. Out of the 810 keywords, 37 met the threshold and all of them were selected for the analysis.

Table 1. Most common co-occurring keywords of "business model" AND ("open business model" OR "open innovation") in Web of Science.

Cluster	Keyword	Occurrences	Links	Total Link Strength
1	open innovation	110	36	339
1	business model innovation	25	32	80
1	absorptive-capacity	20	35	102
1	networks	15	28	76
1	research-and-development	14	25	68
1	open business model	13	21	41
1	industry	12	23	46
1	future	9	23	45
1	intellectual property	8	15	26
1	strategies	8	17	25
1	companies	7	18	26
1	dynamics	6	20	36
1	open source software	6	12	15
2	business model	56	36	210
2	performance	31	34	162
2	firms	19	30	101
2	knowledge	19	30	88
2	strategy	17	30	99
2	collaboration	16	30	82
2	technology	15	27	80
2	entrepreneurship	14	27	68
2	value creation	14	28	77
2	competitive advantage	9	25	51
2	capabilities	8	24	47
2	ecosystem	6	20	33
3	innovation	30	32	88
3	business models	13	26	59
3	management	13	30	65
3	creation	10	27	52
3	crowdsourcing	9	17	27
3	product development	9	18	45
3	co-creation	7	19	33
3	framework	7	20	32
3	dynamic capabilities	6	23	34
3	impact	6	16	30
3	innovation management	6	23	34

The quantity of citations of publications related to "business model" AND ("open business model" OR "open innovation") has been increasing linearly throughout the reporting period, suggesting an increase in interest and value of this research topic, see Figure 3.

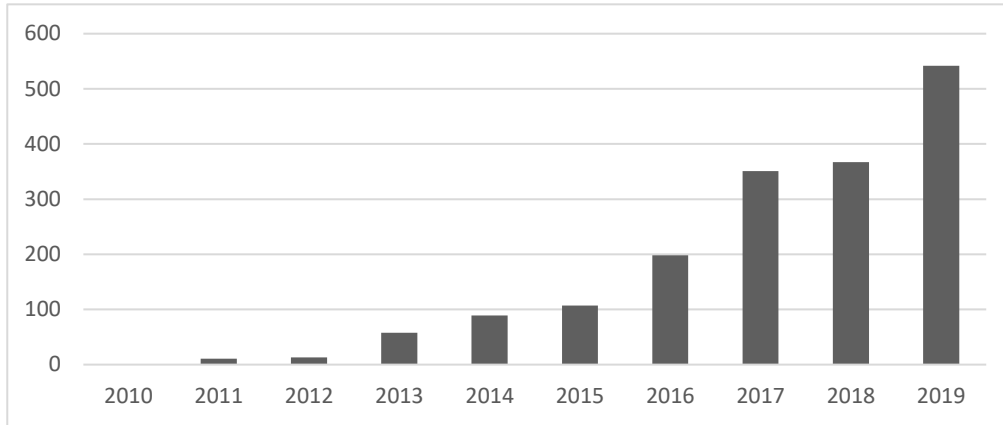


Figure 3. Sum of times cited per year of "business model" AND ("open business model" OR "open innovation") keyword from 2010 to 2019 in Web of Science.

Total sum of citations from 2010 to 2019 is 1,730 and 1,670 without self-citations. An average of 9.61 citations per publication. The topic has h-index 23.

For the final systematic review, the PRISMA guideline was followed, see Figure 4.

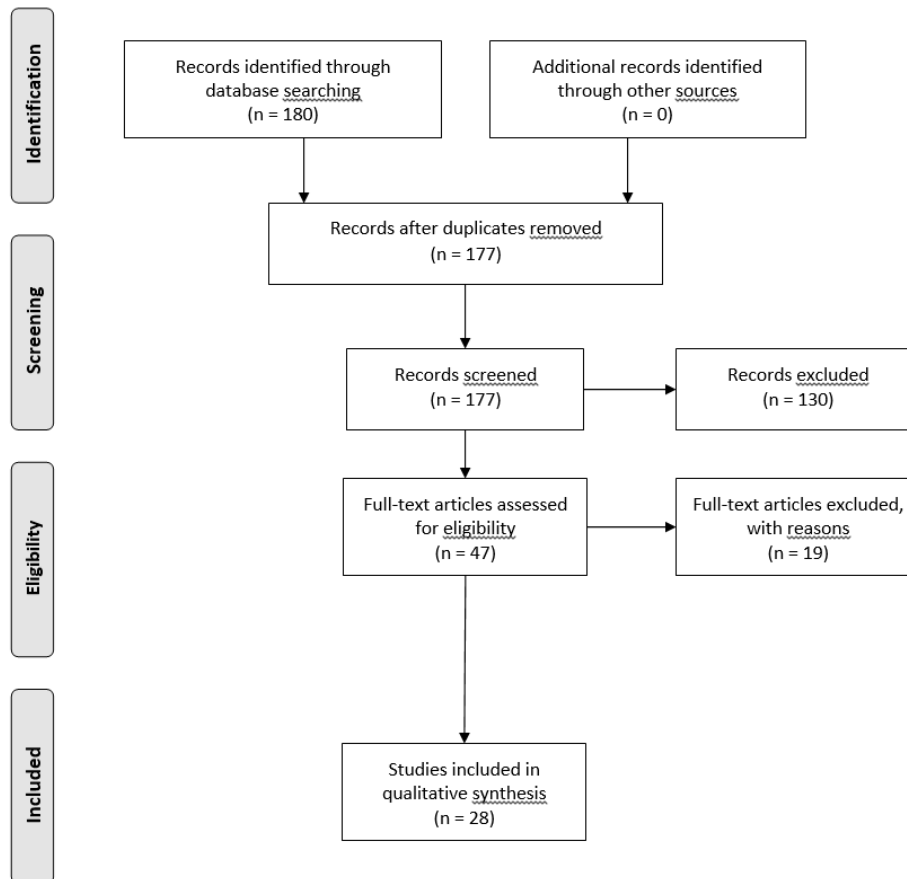


Figure 4. PRISMA flow diagram.

Out of the 180 results we removed 3 duplicates. Then 47 papers were passed to the step of full text assessment for eligibility (19 of them were rejected). Finally, 28 papers were found suitable for qualitative synthesis.

Selected studies are shown in Table 2 in descending order by the date of publication. 61 % of studies were published within the last five years (2015 - 2019), while 39 % were published in the range of 2010 – 2014.

Table 2. Studies selected.

Author	Paper Title	Field	Environment	Main Finding / Value Added
(Zhu et al. 2019)	The Fit between Firms' Open Innovation and Business Model for New Product Development Speed: A Contingent Perspective	BM, OI	265 Chinese firms from different sectors	Companies should adapt their BMs to different OI strategies to boost the innovation asdvantages
(Visnjic et al. 2018)	The Path to Outcome Delivery: Interplay of Service Market Strategy and Open Business Models	OBM	12 firms from 6 sectors	Paper shows how changes in the business strategy and the core changes in the BM jointly create value
(Pokojski 2018)	IN SEARCHING FOR BUSINESS MODEL OPEN FOR INNOVATIONS ON AGRICULTURAL MARKET – CONCEPTUAL APPROACH	BM, OI	Chemical companies, agricultural market	Paper analyses the possibility of creating an organizational and structure opened to innovation on agricultural market
(Harun and Zainol 2018)	Exploring Open Innovation as a Business Model for Enhancing Asean Economy	OIBM	Intellectual property laws in Malaysia	OIBM provides more effective and comprehensive business flow for ASEAN countries which contributes to enhancing of economic development
(Spieth and Meissner 2017)	Business Model Innovation Alliances: How to Open Business Models for Cooperation	BM, BMI, BMIA	General concept based on literature research	Authors developed framework which enables companies to open up their BM for exploiting the full potential of BMIA for BMI
(Khumalo and van der Lingen 2017)	The Open Business Model in a Dynamic Business Environment: A Literature Review	BM, OBM, OI, OIBM	Literature review	Article says that OBM is the integration of OI with a BM
(Vils et al. 2017)	Business Model Innovation: A Bibliometric Review	BM, BMI, OI	Literature review	there are many more innovation cases for Innovation in BMs than researchers capable of attending businesses demands
(Brasseur et al. 2017)	Open business model innovation: Literature review and agenda for future research	BMI, OBMI	Literature review	Study confirms growing trend of co-creation and collaboration in BMI supported by physical or digital tools, and reveals that OI has positive effect on BMI success
(Mosleh and Dehghan 2017)	Design a Model to Explain the Impact of the Open Business Model On Competitive Advantage in Knowledge-Based Companies of Bushehr Province	OBM	49 companies of Bushehr Province	Model design to explain the impact of the OBM on competitive advantage in knowledge-based companies
(Yun et al. 2016)	Open Innovation to Business Model: New Perspective to Connect between Technology and Market	BM, OI, OIBM	General concept based on literature research	Authors developed 4 types of BM toolkits, that can be used by individual firms on their present positions

(Kortmann and Piller 2016)	Open Business Models and Closed-Loop Value Chains: REDEFINING THE FIRM-CONSUMER RELATIONSHIP	BM, OBM	In general	Structure of OBM archetypes in the closed-loop value chain was developed
(Cesaroni et al. 2016)	Future Internet: Cloud-Based Open Business Models	BM, OBM	EU cloud platform	Paper discusses which BMs can be assumed by another participants involved in the usage and development of cloud-based platforms
(Ivascu et al. 2016)	Business Model for the University-Industry Collaboration in Open Innovation	BM, OI	Universities and industrial partners	Developed BM suggests a general framework for the creation of effective cooperation between universities and companies
(Asswad et al. 2016)	Overcoming the Barriers of Sustainable Business Model Innovations by Integrating Open Innovation	BM, BMI, OI	General concept based on literature research	This paper takes the novel balance of forces into account by showing the problems of a sustainable BMI and explaining how to get over them by using the toolset of an OI approach
(Ku 2015)	Recent Trends in Specialty Pharma Business Model	BM, OI	Pharmaceutical companies	OI provides opportunities for small pharma firms to gain the upper hand provided in case that specialty medicinal products or the technology platforms is what the big pharma wants
(Saebi and Foss 2015)	Business Models for Open Innovation: Matching Heterogeneous Open Innovation Strategies with Business Model Dimensions	BM, OI	General concept based on literature research	Paper contributes to the OI literature by specifying the conditions under which BMs are conducive to the success of OI strategies
(Davis et al. 2015)	Open Innovation at NASA A New Business Model for Advancing Human Health and Performance Innovations	BM, BMI, OI	NASA	Paper describes a new BM for advancing NASA human performance and health innovations and determines how OI solution sourcing services, formed its development
(Rojas and Azevedo 2014)	Pillars and Elements to Develop an Open Business Model for Innovation Networks	OBM, OI	In general	Article suggests key pillars and elements required to support the establishing of OBM for innovation networks
(Frankenberger et al. 2013)	Network Configuration, Customer Centricity, and Performance of Open Business Models: A Solution Provider Perspective	BM, OBM	3M Services, SAP, Geberit	Paper describes 3 ideal configurations of networks for OBM: the controlled, the supported, and the joint model
(Huan and Wen-song 2013)	Research on Coupling Intellectual Property and Open Business Model	BM, OBM	Intellectual property field, UTEK company	Paper explains the natures and necessities of BM and OBM in the field of intellectual property

(Berre et al. 2013)	Open Business Model, Process and Service Innovation with VDML and ServiceML	BMI, OI	In general, networked enterprises	Authors developed platform that provides a foundation for cloud-based OBMI, service innovation and process innovation for networked enterprises
(Holm et al. 2013)	Openness in Innovation and Business Models: Lessons from the Newspaper Industry	BM, OBM, OI	Newspaper industry	Paper examines the effect of opening BMs in the newspaper industry
(Huang et al. 2013)	Overcoming Organizational Inertia to Strengthen Business Model Innovation An Open Innovation Perspective	BMI, OI	141 small enterprises in Taiwan	OI has a major mediating effect on the relationship between organizational inertia and BMI, and the relationship between organizational inertia and company performance
(Rajala et al. 2012)	Strategic Flexibility in Open Innovation - Designing Business Models for Open Source Software	BM, OI	Open source software	A business model that embodies open innovation raises dilemmas between open and closed innovation paradigms
(Chu and Chen 2011)	Open Business Models: A Case Study of System-on-a-Chip (SoC) Design Foundry in the Integrated Circuit (IC) Industry	BM, OBM, OI	Integrated circuit industry	Paper analyzes a new OBM, called design foundry, in the integrated circuit industry
(Davey et al. 2011)	Innovation in the Medical Device Sector: An Open Business Model Approach for High-Tech Small Firms	BM, OI	Medical device sector	This paper using qualitative approach investigates the implicit and explicit BMs within HTSFs in the health care sector and provides a practical contribution to understand the tasks and identify solutions
(Gronlund et al. 2010)	Open Innovation and the Stage-Gate Process: A REVISED MODEL FOR NEW PRODUCT DEVELOPMENT	BM, OI	Oil and gas industry	The application of stage-gate model can assist companies in capturing value from both external and internal technology exploitation in increasingly OI processes
(Perr et al. 2010)	Open for Business: Emerging Business Models in Open Source Software	BM, OI	Open source software	Paper considers the dynamics of value creation fueling the production of OSS and examines the BM factors which enable capturing value

BM = Business Model, BMI = Business Model Innovation, BMIA = Business Model Innovation Alliances, OBM = Open Business Model, OBMI = Open Business Model Innovation, OI = Open Innovation, OIBM = Open Innovation based Business Model.

4. Discussion and Conclusion

A total of 28 publications were briefly described in the table 2. It was found that the areas of the problem described could be divided into a total of seven groups, most of which do not focus only on one specific group, but there are interdependence groups (business model, business model innovation, open business model, open business model of innovation, open innovation, open business model innovation, and one paper also describes the so-called business model innovation alliances).

Some articles are a literature review (3), some create a general concept based on a literature research (4), some create general concepts using research in collaboration with real companies (7) and

the rest of papers (14) were focused on applying specific models for specific companies or fields of business, for example: chemical companies, agricultural market, intellectual property laws, EU cloud platform, universities and industrial partnership, pharmaceutical companies, NASA, 3M Services, SAP, Geberit, newspaper industry, open source software, integrated circuit industry, medical device sector and oil and gas industry.

The aim of chosen publications is usually either to determine the impact of open business model, open innovation, etc. on the company's results, or to create specific models for a specific area of application.

The results of the articles confirm the positive effect of open business models and open innovation based business models to value creation, effectivity and business performance. For example the study of Holm et al. (2013) confirms that the open business model is a useful analytical and conceptual device which can be used for studying the interrelations between business model adjustment and technological discontinuities. Zhu et al. (2019) say that companies should adapt their business model to different open innovation strategies to boost the benefits from innovation. According to Harun and Zainol (2018) open innovation based business models provide more effective and comprehensive business flow, which contributes to enhancing of economic development. Huang et al. (2013) in their study found out that business model innovation has positive effect on firm performance. It is necessary to add that high performance of the company in the period of prosperity is absolutely necessary - in all probability, this performance indicates the state that the company is stable and will achieve positive results even in the period of economic recession. On the other hand, the good performance of a company only in a certain area may mean great problems for the whole company in the future. (Hedvičáková and Král 2019)

We can confirm the growing trend of co-creation and collaboration in the field of business models. Open business models and models based on open innovation are becoming more and more discussed over time. They are particularly useful in sectors characterized by high investment costs. The purpose of this paper was fulfilled with the help of keyword search in Web of Science, bibliographic mapping, PRISMA guideline and literature review.

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